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Contributors

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London School of Hygiene and Tropical Medicine

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VACCINATION COMMISSION.

FIRST REPORT

OF THE

ROYAL COMMISSION

APPOINTED TO INQUIRE INTO THE SUBJECT OF

VACCINATION;

WITH

MINUTES OF EVIDENCE AND APPENDICES.

Presented to both Houses of Parliament by Command of Her Majesty.
1889.



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1889.

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ROYAL COMMISSION.

VICTORIA R.

Victoria, by the Grace of God of the United Kingdom of Great Britain and Ireland Queen, Defender of the Faith,

To Our right trusty and well-beloved Councillor, Farrer, Baron Herschell, Our trusty and well-beloved: Sir James Paget, Baronet, Fellow of the Royal College of Surgeons, Sir Charles Dalrymple, Baronet, Sir William Guyer Hunter, Knight Commander of Our Most Distinguished Order of Saint Michael and Saint George, Fellow of the Royal College of Physicians, Sir Edwin Henry Galsworthy, Knight, William Scovell Savory, Esquire, President of the Royal College of Surgeons, Charles Bradlaugh, Esquire, John Syer Bristowe, Esquire, Fellow of the Royal College of Physicians, William Job Collins, Esquire, Fellow of the Royal College of Surgeons, John Stratford Dugdale, Esquire, one of Our Counsel learned in the Law, Michael Foster, Esquire, Master of Arts, Professor of Physiology in Our University of Cambridge, Jonathan Hutchinson, Esquire, Fellow of the Royal College of Surgeons, James Allanson Picton, Esquire, Samuel Whitbread, Esquire, and Frederick Meadows White, Esquire, one of Our Counsel learned in the Law, greeting!

Whereas We have deemed it expedient that a Commission should forthwith issue to inquire and report as to—

(1.) The effect of vaccination in reducing the prevalence of, and mortality from, small-pox.

(2.) What means, other than vaccination, can be used for diminishing the prevalence of small-pox; and how far such means could be relied on in place of vaccination.

(3.) The objections made to vaccination on the ground of injurious effects alleged to result therefrom; and the nature and extent of any injurious effects which do, in fact, so result.

(4.) Whether any, and, if so, what means should be adopted for preventing or lessening the ill effects, if any, resulting from vaccination; and whether, and, if so, by what means, vaccination with animal vaccine should be further facilitated as a part of public vaccination.

(5.) Whether any alterations should be made in the arrangements and proceedings for securing the performance of vaccination, and, in particular, in the provisions of the Vaccination Acts with respect to prosecutions for non-compliance with the Law.

Now know ye, that We, reposing great trust and confidence in your knowledge and ability, have authorised and appointed, and do by these presents authorise and appoint, you, the said Farrer, Baron Herschell; Sir James Paget; Sir Charles Dalrymple; Sir William Guyer Hunter; Sir Edwin Henry Galsworthy; William Scovell Savory; Charles Bradlaugh; John Syer Bristowe; William Job Collins; John Stratford Dugdale; Michael Foster; Jonathan Hutchinson; James Allanson Picton; Samuel Whitbread; and Frederick Meadows White; to be Our Commissioners for the purposes of the said inquiry.

o 59226. Wt. 4426.

And for the better effecting the purposes of this Our Commission We do by these presents give and grant unto you, or any five or more of you, full power to call before you such persons as you shall judge likely to afford you any information upon the subject of this Our Commission; and also to call for, have access to, and examine all such books, documents, registers, and records as may afford you the fullest information on the subject; and to inquire of and concerning the premises by all other lawful ways and means whatsoever.

And We do further by these presents authorise and empower you, or any five or more of you, to visit and personally inspect such places as you may deem expedient for the more effectual carrying out of the purposes aforesaid.

And We do by these presents will and ordain that this Our Commission shall continue in full force and virtue; and that you, Our said Commissioners, or any five or more of you, may, from time to time, proceed in the execution thereof, and of every matter and thing therein contained, although the same be not continued from time to time by adjournment.

And We do further ordain that you, or any five or more of you, have liberty to report your proceedings under this Our Commission from time to time, if you shall judge it expedient so to do.

And Our further Will and Pleasure is that you do with as little delay as possible report to Us, under your hands and seals, or under the hands and seals of any five or more of you, your opinion upon the several matters herein submitted for your consideration.

Given at Our Court at St. James's the Twenty-ninth day of May one thousand eight hundred and eighty-nine; in the Fifty-second year of Our Reign.

By Her Majesty's Command.

HENRY MATTHEWS.

FIRST REPORT.

TO THE QUEEN'S MOST EXCELLENT MAJESTY.

MAY IT PLEASE YOUR MAJESTY,

WE, the undersigned Commissioners appointed to inquire into the subject of vaccination, desire humbly to submit to Your Majesty the following Report of the steps which have been taken up to the present date to prosecute the inquiry entrusted to us.

The Commission at their first meeting, considering that it would contribute to clearness if the evidence on the several points submitted to them were kept distinct, decided to take evidence upon those questions as far as practicable in the following order :—

1. The historical and statistical case in favour of vaccination.
2. The arrangements made for vaccination under the existing law, and the mode in which the law is administered.
3. The case against vaccination, and especially against its continuing to be made compulsory.
4. The reply to these objections.
5. Any substitutes that can be suggested in place of vaccination for the purpose of preventing the spread of small-pox.
6. Any improvements that can be suggested in the present law or its administration for the purpose of removing objections to vaccination or making it more effective.

Six meetings have been held, and four witnesses have been examined, notes of whose evidence, with other information relating thereto, are appended; but the evidence coming within the first of the above heads is not yet exhausted.

We propose, therefore, when we resume our meetings to take further evidence upon that head; but we think it well, availing ourselves of Your Majesty's gracious permission to report our proceedings from time to time, to submit at once the evidence already taken.

All which we humbly submit for Your Majesty's gracious consideration.

(Signed) HERSCHELL.
JAMES PAGET.
CHARLES DALRYMPLE.
W. GUYER HUNTER.
EDWIN H. GALSWORTHY.
WM. S. SAVORY.
CH. BRADLAUGH.
J. S. BRISTOWE.
W. J. COLLINS.
JOHN S. DUGDALE.
M. FOSTER.
JONATHAN HUTCHINSON.
J. ALLANSON PICTON.
SAM. WHITBREAD.
FREDERICK MEADOWS WHITE.

12th August 1889.

BRET INCE,
Secretary.

Sir John Simon, K.C.B.

26 June 1889.

17. The practice had prevailed in the East from before that date?—It had prevailed from time immemorial.

18. And inoculation was considerably prevalent amongst the wealthier classes of society during the latter half of the last century, was it not?—It was.

19. The introduction of vaccination dates practically from the commencement of the present century, does it not?—Yes; Jenner's first publication was in 1798.

20. Vaccination was practised, I believe, to some extent before there was any legislation on the subject?—Yes, for some years there was no legislation, but the Treasury made a yearly grant in assistance of vaccination.

21. Can you tell us when that grant commenced?—The information will be found in a chapter which is not before you,—the 5th chapter of my Report of 1857. There was an annual grant to the National Vaccine Establishment,—at first, I think, of something like 6,000*l*., but eventually of 2,000*l*., chiefly for the maintenance of the supply of lymph. Vaccination under that grant was practised only or almost only in London, but the lymph supply was for the whole country.

22. Can you tell the Commission the date when that commenced?—From early in the century, and it continued down to the year 1840. It was a period of what may be called "charity vaccination;" there were plenty of charitable vaccinations in London and throughout the country, and, as in aid of them, there was the parliamentary grant.

23. Can you tell us whether at that time the practice of vaccination generally prevailed amongst those who were not in need of charitable assistance?—It is impossible for me to speak accurately of the quantity; but no doubt the practice was spreading very considerably among the educated classes in England.

24. And in addition to that, vaccination was assisted in the case of the poorer classes by charity?—Yes, but not yet by rates. On the contrary, it had been legally held that an overseer was not bound to take measures to procure the children of his parish to be vaccinated during the prevalence of small-pox. Then in 1840, with amendment in 1841, came the law which instituted public vaccination, vaccination out of the rates; the amendment in 1841 being, that vaccination should not be counted as parochial relief in the disqualifying sense.

25. But although at that time the rates provided means of vaccination, there was no obligation on anyone to avail himself of it?—None.

26. Can you tell me whether the opportunity of vaccination was largely taken advantage of?—I have not at hand the means of quoting figures, but it was certainly largely taken advantage of.

27. But I suppose there would be still a certain number of people who would not have their children vaccinated?—Quite so.

28. What was the next step?—The next step was that in 1853 an Act was passed making vaccination compulsory; promoted by Lord Lyttelton, in the House of Lords, at the instigation of the Epidemiological Society.

29. That remained the law until the year 1867, did it not?—It did.

30. What, putting it shortly, was the change made in 1867?—There were amendments of detail; there was no change of principle.

31. There was no really important change?—No really important change. A really important change was made in the year 1871.

32. What was the change then made?—An arrangement was made by which it became almost inevitable that defaulters under the law should be followed up closely and be caught.

33. So that it was designed at all events to secure a much more complete system of vaccination?—Yes, by compulsory means.

34. And have you reason to believe that it accomplished that object?—I think there is no doubt that it generally accomplished that object.

35. That remains the law at the present time?—Yes.

36. So that for statistical purposes, one may look at the periods prior to 1840; then from 1840 to 1853; then from 1853 to 1871; and then from 1871 to the present time?—Yes; those would be periods of very different characters.

37. There is considerable difficulty, is there not, in the comparison of statistics with regard to this country, owing to there being, prior to a comparatively recent period, no proper statistics of death?—Quite so.

38. As regards London there were the bills of mortality, which purported to record all the burials in the Church of England burial grounds, I believe?—Yes.

39. Were there no similar statistics in the provinces?—There were the parish clerks' registers, of a very imperfect description, I believe.

40. Those would be only in each parish; there was no general record kept?—No general record.

41. So that the only general record of the death-rate from diseases that we had prior to the time of the general registration of deaths were the bills of mortality for London?—Yes.

42. These bills of mortality would, however, err, would they not, on the side of showing fewer deaths than the number that really took place?—That is believed to have been the case.

43. It almost must have been the case, must it not, because of course they would not record more people as buried than were buried; and, on the other hand, if only burials in Church of England burial places were recorded, there must have been some burials not recorded; and therefore the number recorded must have been less than the number of deaths?—Yes.

44. At all events, it could not err in the opposite direction?—No.

45. There is another question with regard to the comparison of statistics that I want to put to you. Has the classification of the causes of death differed from time to time?—Enormously; so much so that one might as well try to talk modern zoology in the language of Aristotle as to talk about modern facts of disease in the language of the years of the bills of mortality. It is a different language altogether.

46. Even in recent years the classifications have not always been precisely the same, have they?—There have been slight differences even in comparatively late years; one sees new names growing up in pathology, just as one would see the same sort of thing in botany or chemistry. The old multitudes of unnamed deaths get specific names.

47. That is to say, what was under some more general heading is distributed under more specific headings?—Some more general heading, and also occasionally special former headings, such as we are not able at present accurately to translate. For instance, in the bills of mortality, one sees such causes of death as "chrisomes," "mold-shot head," "liver-grown," and other names that it is now very difficult to interpret. Then one sees grown up now "Addison's disease," "Bright's disease," "Hodgkin's disease," and so forth; diseases bearing the names of the pathologists who first succeeded in identifying them.

48. I think I observed in the statement which you have handed in, that a very large number of the deaths in the bills of mortality were classed as deaths from old age?—Yes.

49. And, comparing it with more recent statements, there would seem to be fewer deaths from old age now than there were then?—The diseases would now be called by their particular names.

50. You have formed an opinion, have you not, with reference to the effect of vaccination in preventing the prevalence of small-pox to the extent to which it formerly prevailed?—I have formed a very decided opinion upon that subject; but I am bound to say that it is an opinion that goes on correcting itself in detail from day to day. The best bit of evidence which I have seen since my attention was first directed to the subject, is one which will, no doubt, be before the Commission—the evidence as to the Sheffield epidemic of a year or two ago, evidence from the Medical Department of the Local Government Board. When I compiled my blue book of 32 years ago, we were only two-thirds of the distance from the discovery of vaccination that we are at the present time. I used what material there was then, but the material has largely increased.

51. Then had you formed the opinion that vaccination had largely diminished the prevalence of small-pox?—There could be no doubt of that; that was evident. No one capable of argument, I think, looking at the matter impartially, could have doubted that at the time.

52. At the time when you made the report, in the year 1857, compulsory vaccination had only just come into operation?—It had begun four years previously.

53. It had begun too recently to enable you to form any conclusion as to its effect?—Quite so; but now there is evidence on that branch of the subject.

54. But, prior to the introduction of compulsory vaccination at all—when there was only what I may call State-assisted vaccination—do you think that still there was a large reduction in the disease beyond what would have taken place if there had been no vaccination?—I think that is certain. I was able, in the year 1857, to quote the experience of other countries as well as that of England.

55. I believe some other countries are better supplied with statistics than we are, their statistics having been properly kept at an earlier date?—That is so.

56. I think, also, in some of the foreign armies there had been a very complete system of vaccination on a large scale, the results of which had been carefully collected?—Yes.

57. Is there any specific illustration drawn from foreign countries to which you would like specially to direct the attention of the Commissioners?—In the chapter about "small-pox since the use of vaccination" I referred to the case of Sweden; comparing with the 28 years before vaccination 40 years soon afterwards; and I referred to some other foreign experiences. A passage, in which some such references were made, is this: "During the earlier period there used to die of small-"pox, out of each million of the Swedish population, "2,050 victims annually; during the latter period, out "of each million of population, the small-pox deaths "have annually averaged 158; or compare two periods "in Westphalia, during the years 1776–80," (I may observe that, now, I should consider that too short a period for comparison) "the small-pox death rate was "2,643; during the 35 years, 1816–50, it was only 114, "Or taking together [from this table] the three lines "which belong to Bohemia, Moravia, and Austrian "Silesia, you find that where formerly (1777–1806), "there died 4,000 a year, there now die 200. Or "taking two metropolitan cities; you find that in "Copenhagen, for the half century, 1751–1800." (here we get a good term of years) "the small-pox death rate "was 3,128, but for the next half century only 286; and "still better in Berlin, where for 24 years preceding "the general use of vaccination, the small-pox death "rate had been 3,422, for 40 years subsequently it has "been only 176. In other words, the fatality of small-"pox in Copenhagen is but an eleventh of what it was; "in Sweden little over a thirteenth; in Berlin, and in "large parts of Austria, but a twentieth; in West-"phalia, but a twenty-fifth In the last named "instance, there now die of small-pox but four "persons where formerly there died a hundred."

58. Have you any reason to suppose that statistics bringing the matter down to a later date, would show any substantially different result?—I have no reason to suppose so. In one case there, a very short period was quoted, which as at present advised, I certainly should not quote, viz., a period of five years. Of course if a severe epidemic of small-pox fell in the time, it would make a disproportionate difference.

59. In most of the instances, I see that the term of years ranges from 20 years to 50 years?—Yes, that generally would be quite enough for comparison.

60. In this country what comparison are you able to make?—A very imperfect one; but I say there: "From "such information as exists, it seems probable that the "small-pox death-rate of London within the Bills of "Mortality during the eighteenth century ranged from "3,000 to 5,000. During the ten years 1846–55 it was "under 340."

61. That was the latest ten years that you could take for your own report of 1857?—Yes, it was the latest I could get. But these masses of statistics are best understood, I think, when they are seen together with comparatively small statistics. There were a good many smaller quantities of statistics that I quoted that are very valuable. Early in the century (1819) there was a little bit of evidence from Norwich which no doubt carried a great deal of conviction to people's minds. A very well-known and distinguished surgeon of that place observed minutely 112 infected families during an epidemic of small-pox, and published the results, which were these: The houses had 603 inmates; there were 202 cases of small-pox, with 46 deaths. The 603 inmates consisted of three groups of persons: first, persons protected by previous small-pox were 297 (that was at the beginning of the century, and they had no new small-pox among them, and no deaths; secondly, persons protected by vaccination were 91, and among them two caught small-pox, and none died; 215 persons, that is to say, more than one-third of the population, were unprotected, and of those 215, 200 caught small-pox, and 46 died. There were abundant cases of that sort put before the public at that time on good testimony. Then, further, in those early days of vaccination, or in still earlier days, in the early Jennerian days, it was a matter of frequent occurrence to test the result of a man's vaccination by inoculating him with small-pox afterwards, and there were plenty of cases of that sort in evidence that the man who had been vaccinated and was then tested with small-pox inoculation proved insusceptible of it. That was the kind of evidence that there was then.

62. And that would be a severer test than merely coming in contact with persons having small-pox?—Considerably more so.

63. I observe in the statistics that you have just given us that nearly half the inhabitants of the infected houses appeared already to have had small-pox?—Yes; that was in 1819.

64. The disease at that time, if that is at all to be taken as a sample, must have been enormously prevalent?—Everybody expected small-pox in the last century, sooner or later. People would go on to a very advanced age in some cases without having it, as they now go on sometimes without getting measles or whooping cough; but it was a common current contagion in the country, and sooner or later, I do not say everybody without exception, but nearly all people got it. For people who boasted "I have not had small-pox," there was the phrase current—*nemo ante obitum beatus*,—"wait a bit." Louis XV. died of a second attack of small-pox when he was an old man.

65. In the early days of vaccination, in the early part of the present century, the effects were, I understand, carefully watched?—Very carefully.

66. There was at the time scepticism to be overcome?—There were several sorts of scepticism. There was apprehension that the vaccinated might have horns grow on them, but that did not fulfil itself. There were doubts as to the reality of the protection, and the doubts as to the reality of the protection were very severely tested; but on that point I have a qualification, and a very important qualification, to put in. In those early days there was a weak point which they could not know, and which, later in the century, began to show itself. They had assumed too easily, that the protection given would be a life long protection; and as the century went on they found that it was not life-long in an absolute sense; that, while it was a great advantage to have been vaccinated in infancy in the sense of escaping attack, and while it was a still greater advantage in the sense of escaping death, yet it was not in either sense an absolute life-long protection. It became evident that in process of time the protection weakened itself; and then came into vogue, first in Germany, first of all, I think, in the Wurtemburg Army, the practice of re-vaccination.

67. (*Sir Edwin Galsworthy.*) About what date was that?—Frequent impermanence in the protectiveness of early vaccination had begun to be generally recognised in the twenties; and in 1829, systematic re-vaccination was begun in the Wurtemburg military service. At the same time with the growth of knowledge as to the value of re-vaccination, there was advancing a new series of extremely important observations as to the different degrees of protection that are given by different degrees of vaccination. These really were two new discoveries in the matter of vaccination; and in estimating vaccination at the present day, one must have great regard to these two points. They were not, in the year 1857, as clear as they are now. My official successors know much more about them now than I knew in the year 1857.

68. (*Chairman.*) Do I correctly understand that the effect of what was ascertained was that vaccination in childhood did not always secure immunity, or that it never secured immunity, and always wore off?—It wore off in what, at that time, was an uncertain proportion of cases. In regard of what was then supposed to be a small minority of cases, there was hope that the proportion of failure represented only the proportion of bad vaccination; and that bad vaccination had a great influence in it I have no doubt; but as time has gone

Sir John Simon, K.C.B.

26 June 1889.

on we have learnt, as of unquestionable experience, that, even after vaccination absolutely good, there will generally be after a certain time a certain re-acquirement of susceptibility for small-pox.

69. Do you mean that there is a certain re-acquirement of it in every case, or that in the whole number of cases there is some re-acquirement of it?—In a large proportion of cases there is re-acquirement of susceptibility; we have not the exact measure yet. It practically would be impossible to make statistics for the purpose that should distinguish between the better and the worse vaccination; but taking the vaccinated in lump, I should say, as certainly applicable to the majority of them, that they have some degree of re-susceptibility; and I believe that the degree in which they have it depends, probably, in part, on personal conditions, but in greater degree on the quality of the original vaccination. Even where there has been good vaccination there undoubtedly is in general a need for re-vaccination at or before the age of puberty.

70. Is it your view that persons who had been originally vaccinated (taking, of course, not an individual case but the average) would be in a better position as regards smallpox than persons who had not been vaccinated at all?—I regard the statistical evidence as overwhelming on that point

71. Notwithstanding the fact that it is not absolutely permanent?—There is not a doubt that even with that drawback a man who has been vaccinated is in a much better position than if he had not been vaccinated. The Commission will find very good evidence on that point, as well as on many others in the admirable report on the Sheffield epidemic.

72. With regard to vaccination being a better protection if it is more complete, which you referred to as also being a comparatively modern discovery, what were you then referring to?—There is a famous tabulation, by the late Mr. Marson, of deaths in the Small-pox Hospital. So far as he had got his results in the fifties, they were published in my report of 1857; but he afterwards considerably extended them, and they were always to the same general effect, which was this,—that the death-rate of those small-pox patients who were having small-pox after vaccination went in proportion to the insufficiency of the original vaccination.

73. How was that determined?—Mr. Marson's experience as resident medical officer of the Small-pox Hospital extended I believe to 40 years, and, for more than thirty years, he took exact notes of all the vaccination-marks he could discover in the thousands of small-pox cases which came under his care in the hospital.

74. It might be convenient if you were to give us the results?—I observe that I say to the Committee of 1871—"Mr. Marson having personally laid before the "Committee his complete experience down to the "present time, I think it unnecessary to subjoin his "particulars." Therefore, I may best refer to his "evidence in the 1871 Blue Book.

75. Mr. Marson is dead now?—Mr. Marson is dead, unfortunately. I refer to his earlier experience at page xxviii of my 1857 Report, and Mr. Marson put his completed before the Committee of 1871. It is in their report at page 236.

76. How is the successful vaccination ascertained; is it by the number of marks left on the arm?—Vaccination produces a characteristic vesicle, running a characteristic course.

77. But what trace does it leave behind it so that at a later date it can be ascertained whether there has been successful vaccination or not?—It leaves a very definite scar—a peculiar scar.

78. And does the classification of the completeness of vaccination depend upon the number of those scars or upon their character?—It depends upon number of scars, or on size of scarred surface, only so far as the scars are characteristic; that is to say, scars not characteristic on the arm might mean any accident, any burn or any cut with a knife.

79. I do not mean that, but does a scar that undoubtedly arises from vaccination show a different characteristic if the vaccination has been more successful or less successful. I want to know what is the test which enabled Mr. Marson or anyone else to classify the vaccinated cases into more successful or less successful?—If the local result of vaccination has been regular for its three weeks duration, at the end of that time there remains a particular sort of scar. If there has not been a regular course the scar will not present the normal characteristics; it will present the kind of scar that any chance ulceration might have made. Then, where there are say five marks (that is the number they prefer to have) of a particular sort, the observer infers that at those five spots vaccination has run its course normally. He would class that case as a case of successful vaccination, and that case he would offer to be tested by small-pox.

80. That is to say, that a competent person examining the arm afterwards would be able to judge from the character of the marks there whether the vaccination had effected its purpose more or less completely?—Whether it had run its normal course; on which then his inference would be "and will therefore protect "against small-pox."

81. And I understand you to say, that the result of Mr. Marson's investigations was that the more clear the indication of successful vaccination the smaller the number of cases in which the persons were attacked by small-pox?—His observations related only to the relative severity of attacks, not to the relative frequency. The latter he had no means of judging; but as to relative severity, the degrees were inverse to the vaccination-marks, and the differences were very great.

82. You have not continued your statistics beyond the year 1857?—No. In 1875 I put before the Local Government Board a report which Dr. Seaton had prepared, on the statistics of the great small-pox epidemic of 1870-3 in relation to vaccination and the vaccination laws, and I then submitted some general observations on our measures for prevention of small-pox; but since 1857 I have not reported statistically on the same scale as then with regard to small-pox and vaccination.

83. In what year was the great small pox epidemic?—From 1870 to 1873; it was an epidemic all over Europe, perhaps partly in connexion with the German war when a great diffusion of small-pox by French troops took place.

84. It was not confined to this country?—Oh no, it was all over Europe.

85. But England suffered as well?—England suffered very largely indeed.

86. You have not prepared any statistics yourself comparing the later periods when vaccination had been more completely enforced with the earlier periods when it was only voluntary?—I have not prepared any myself, but any that I could prepare would be of no value as compared with those which the Registrar-General has at command; and the best answer I could give on the subject would be to quote a table, which I have in my hand, founded upon his material. It makes comparison of three periods differentiated by differences of law as to compulsion: *i.e.*, first, the period of optional vaccination, secondly, the period of obligatory but not strictly enforced vaccination, and thirdly, the stricter period; in other words, the three periods 1847-53, 1854-71, and 1872-80. That table shows for the three periods succesive declines of the small-pox death-rate for all ages. The rates for the three periods respectively are: 305, 223, and 156.

87. Did the period of 1872-80 include the period of the small-pox epidemic?—The epidemic lasted for about 2½ years. About half of it as to time, and about six-elevenths of it as to deaths, belonged to the period 1854-71: and the remainder belonged to the period 1872-80.

88. I thought you gave 1872 as the date of the great epidemic?—The tail of it was still existing in the spring of 1873; it began in 1870. But the more important column in the table is that which shows what happened as to children under five years of age who of course were the class chiefly affected by the differences of compulsory law. In the first period their death-rate was 1,617, in the second period it was 817, and in the third period it was 323.

89. (*Dr. Collins.*) Is that per million living?—Per million living.

90. (*Mr. Bradlaugh.*) That is taken from Table L, on page xxii of the 43rd Annual Report of the Registrar-General, is it not?—I think it is, but the paper from which I am reading is a paper of Dr. Buchanan's.

91. (*Chairman.*) I will not trouble you further with those statistics, because we shall get them from the Registrar-General. Is there any other fact that you would wish to bring before the Commission with refe-

rence to the question upon which I am examining you, namely, the history of the introduction of vaccination and its effect in securing immunity from small-pox?—I think I have answered the main questions that arise, but my eye falls here upon an important quotation that I would give from Dr. Buchanan. He compares the deaths of children under five years of age in the six years before the compulsory law with six late years, namely, the years 1847-52 with the years 1876-81, six years in each case. The mortality of the children in the earlier period was 227 per million living, and for the later period 21 per million—less than one-tenth.

92. That is in the case of children under five years of age?—Yes.

93. Is there any reason to suppose that even under the existing law (I am excluding particular parts of the country where there has been a special opposition to vaccination) there are in some parts of the country a large number of people who are unvaccinated?—The reports of the Medical Officer of the Local Government Board give annually an account of the state of each district as to the fulfilment of the law, and the numbers remaining unvaccinated are in general very small; in far the larger part of the districts they are relatively quite insignificant.

94. Would there probably be even amongst those who are so vaccinated a certain proportion of cases in which the work had not been efficiently and carefully performed?—I am afraid one must admit that there would be a proportion, but we have no means of knowing what proportion.

95. And where, though they were returned as vaccinated, you could not be certain that there had been successful vaccination?—Quite so. The improvement in the quality of vaccination in the last 30 years has been immensely great. When I became responsible for looking after the matter I was shocked, utterly shocked, at the existence of a compulsory law with absence of precaution for the quality of vaccination; and I may say that it was my first work under the Privy Council to try and get that amended. I took the greatest pains with it, and the improvement since then in the quality of vaccination has been enormous.

96. (*Sir James Paget.*) Is there not some increase in the proportion of deaths of adults during that period and a great diminution in the deaths of children?—Yes, representing the respective liabilities to post-vaccinal small-pox, probably.

97. (*Sir Guyer Hunter.*) Speaking of better and worse vaccination, do you place any value upon the number of typical cicatrices upon a child's arm as the test of the success or non-success of that vaccination?—Yes.

98. What number would you lay down?—So far as I have been able to judge I think, five is a very good number. I do not think you need go beyond five. I think you would get with five cicatrices, probably, all the security that could be expected.

99. And that, in your opinion, would be a fair protection up to adult life?—Up to approaching puberty.

100. Then do you consider that re-vaccination ought to be had recourse to for the further protection of the individual from the effects of small-pox?—I think it is very desirable.

101. Do you think it essential?—In Germany it is made almost compulsory. They have given a great deal of attention to the subject of re-vaccination. Our best early knowledge on the subject was derived from German sources, and I place a great deal of confidence in the conclusions that the Germans have come to.

102. The statistics tend to show that this compulsory re-vaccination has had a good effect in diminishing the number of deaths after attacks from small-pox?—General compulsory vaccination has only been in force for, I think, the last dozen years, so that I would not speak of its results; but the results that Germany had obtained by re-vaccination in its army were splendid, and led, no doubt, to the enactment of the general law.

103. (*Sir James Paget.*) That was specially shown in the Siege of Paris, was it not?—Yes.

104. (*Mr. Savory.*) Although re-vaccination be desirable, I take it that you are clear that the influence of a single vaccination in infancy, as a rule, does not wholly die out?—One cannot say that it never entirely dies out, but as a rule, certainly not.

105. As a rule it lasts more or less the whole life?—It lasts in some degree. If it has been once well done in early life there generally are remains of it to the end. That was Mr. Marson's experience.

106. You attach importance to the number of the scars; do you attach importance to the size and depth of the scar, assuming it to be a genuine scar?—Assuming it to be genuine, I think it ought also to be of a certain size. You want a certain quantity in addition to the quality of local effect. The quantity may be in one, so to speak, halfpenny large scar, or in five three-penny-bit scars. But they ought not to be too small. Some vaccinators have preferred endeavouring to get one very large scar, but in attempting that they sometimes got an inconveniently concentrated irritation; and it was found, I thought, when I was collecting evidence on the matter, distinctly better to divide the quantity between four or five vesicles.

107. So that, practically, it might be said that the efficacy of the vaccination is in proportion to the number and size of the scars?—Yes.

108. (*Professor Michael Foster.*) But I suppose that you pay attention to the quality of the scar as well?—Yes; that was stated in the question, "assuming a "typical scar."

109. I suppose you use the term "up to puberty" as a convenient term for describing a certain period of time; you do not suppose that in the physiological changes of puberty there is any special action wiping out, so to speak, the protection of vaccination?—I did not mean to attach importance to the changes of puberty, but (approximately) to the age alone.

110. You mean a certain number of years?—When I was in office I thought that 15 years of age or, if in the presence of small-pox, 12 years of age was a very reasonable time to fix; but I believe that at the present time Dr. Buchanan, instead of my 12 years would prefer to say 10 years; and if that were his opinion I should be sure that it was right.

111. Are the criteria by which the late Mr. Marson looking to the marks, judged of the efficiency of the past vaccination, accepted by vaccinators generally, or is there difference of opinion?—I will not say that there is no difference of opinion, because so few people can have been actual observers of the matter on a large scale. Mr. Marson's opportunities were colossal, and very few can have had such opportunities; but others who have had large opportunities have, I believe, made similar observations. Similar observations have, I believe, been made in the Small-pox Hospitals under the Metropolitan Asylums Board.

112. There is a general consensus of opinion as to certain characters of the marks indicating successful or unsuccessful vaccination?—Yes.

113. In the statements that you made as to the difference of nomenclature of diseases in past times, you said that the differences were very great; I suppose you would not go so far as to say that these old Bills of Mortality are useless for drawing conclusions, but simply that they have to be treated with care and within certain limits?—Yes, with discrimination.

114. (*Mr. Meadows White.*) Did Dr. Buchanan succeed you?—Not immediately; there was an interval of three years during which the office was held by Dr. Seaton.

115. Dr. Buchanan has had the same opportunities as you have had of collecting statistics and information?—Quite.

116. And he would be able to carry on your evidence up to the present time?—Quite so.

117. I understand that in handing in the paper which you have prepared and which was put in in the inquiry in 1871, you adhere to that entirely now, and do not see any reason to modify it?—There are plenty of passages which I could modify. I hope that I have learnt a little in the last 32 years. The general knowledge of the subject has greatly extended itself. There are points that I would correct, but to the general tendency of the report I entirely adhere.

118. Would any modification that you now think necessary be merely as to matters of detail, not affecting the general purport of the statement that you put in?—I think I can answer that sufficiently. On the necessity for re-vaccination I should express myself more strongly than I did in the year 1857. On the question of possible ill effects from vaccination I should speak much more precisely than I did in 1857; otherwise, nothing occurs to me at this moment in which I should wish to speak otherwise now than as I spoke in 1857.

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119. (*Mr. Meadows White.*) Would any further information which you have obtained since you put in your paper before the Committee which sat on the Act of 1867 modify the strength of your conviction as to the beneficial effect of vaccination in reducing the prevalence of, and the mortality from, small-pox?—That vaccination had a beneficial effect in reducing the prevalence of, and the mortality from, small-pox: certainly not.

120. Or in any way weaken the conclusions that you arrived at upon that point?—Certainly not, as to its greatly beneficial effect.

121. Upon that subject your conclusions are not weakened in any way?—No.

122. (*Mr. Picton.*) You stated that you could speak with more knowledge now as to any evil or injurious effects arising from vaccination; in which direction would your increased knowledge modify your former opinion, that is to say, whether you saw more or less injurious effects from it?—I should prefer not to answer that question in a word. I am quite prepared to go into the subject if his Lordship would wish to open it now, but I think I had better not answer it in a word. I could not in a word do justice to it.

123. Then I should like to ask you a question or two to fill up what I cannot but think *lacunæ* in the history of the rise and growth of vaccination as it has been put before us in the evidence. Is it not according to your knowledge that Jenner considered the element of horse-grease to be essential to true cow-pox; did he not draw a distinction between cow pox not affected by horse-grease, and cow-pox as derived from horse-grease?—I must confess, and I must ask you to forgive me when I confess, that I am really not quite up in that bit of history as to his opinions. I have not for a long while read minutely anything as to them. There was a great deal of speculation in his mind as well as a great deal of actual observation, and I have never attached much importance to the speculative part of it.

124. You are aware that he did treat certain cases of cow-pox as spurious, and that he drew a distinction between genuine and spurious?—Yes, no doubt.

125. But you are not able to tell us what he considered to be genuine cow-pox?—He had a very strong notion, I believe, of genuine cow-pox in its results; but I cannot speak with confidence as to his opinions as to origin, or whether he would have applied the test of origin to the question of whether it was true or spurious.

126. You think he judged it entirely by its results?—I do not wish to say that which appears to be contradicting the view I gather you to be holding; but I do not recollect whether, in measuring his expectations of success, he would have attached importance to the point whether his cow-pox had come originally from the horse or not.

127. You are able to tell the Commission, probably, how long Jenner expected the protection to last in the case of any individual?—I think that originally he expected it to last for a lifetime.

128. He expressed himself with confidence as to that, did he not?—I think he did.

129. Did he modify that opinion in the course of his experiments?—In his lifetime, certainly.

130. As to the reception of vaccination by the public generally, was there much opposition offered to it?—Yes, there was much opposition.

131. Not so very much, perhaps, there was no public agitation against it?—No.

132. Was not it felt to be considerable advantage to get rid of the practice of inoculation; at that time was not it coming to be felt that inoculation was a serious danger?—Yes.

133. And the claim made on behalf of vaccination was that it gave equal immunity from the regular disease of small-pox, but without the danger of spreading infection?—Yes.

134. I think you told the Commission that from your study of the subject you thought you could conclude that almost everyone had small-pox in the last century?—Yes, sooner or later.

135. Could you tell us what is the general estimate (of course, I know you cannot give it exactly) of the proportion of deaths to cases of small-pox in the last century; out of so many seizures with the disease, what proportion would die?—The estimates are very different; no doubt the mortality differed in different epidemics. I do not think that any answer to that question could be given which is worth much. I know that 30 years ago I quoted figures which were to be found in the books upon the subject, but I should not now attach importance to them.

136. Could you tell the Commission the lowest estimate that has been formed of the proportion of deaths to cases? Should I be right in saying that 18 per cent. is the lowest estimate that has been formed?—I will see if I have any note upon the subject. I find on referring to my report of 1857, an estimate or computation that a sixth part would have died, as a moderate computation; that is to say, for every five persons who had passed through the small-pox, one had died. That is the estimate that I give in 1857.

137. Then if everyone had small-pox it would follow that one-sixth of the population was continually carried off by small-pox?—It would be so.

138. If you add to that the mortality from other diseases, a very much larger proportion of the population would have died than is now the case?—I think I said, or meant to say, that no one could count himself safe. No doubt some did pass through life without small-pox; but it was so general that no one counted himself safe; everyone was liable to it, although some probably did escape.

139. You would draw that distinction between those days and the present; at present you think everybody may consider himself safe who has been vaccinated?—Relatively safe; if you say vaccinated and re-vaccinated, I should say yes.

140. I understand you to say, with regard to re-vaccination, that in your view the best established opinion is that re-vaccination is necessary at or about the time of puberty?—Yes.

141. But you quoted the opinion of Dr. Buchanan, that the re-vaccination should take place about the age of 10 years?—If in the presence of small-pox.

142. But not otherwise?—Not necessarily as early as that. I quoted as the advice I used to give when in office: "re-vaccination at 15 years of age, or if in the "neighbourhood of small-pox, at 12 years of age"; that is to say, I reckoned that even in the presence of small-pox they would be safe up to 12 years of age. But here comes the later correction: Dr. Buchanan would rather say 10 years.

143. (*Chairman.*) Do you mean that you would substitute 10 years for your 12 years?—Yes, on Dr. Buchanan's authority, I would substitute 10 years for my 12 years.

144. (*Mr. Picton.*) Would the constitutional changes which take place at puberty affect vaccination which had been administered at 10 years of age?—I am not aware that they would do so.

145. Supposing a child vaccinated at 10 years of age, then to pass through the constitutional change, should it be re-vaccinated again after that?—I do not know whether you may have noticed the question that Professor Foster asked as to the constitutional changes.

146. I did; and it is on account of that that I am asking the question?—I had no intention of connecting it with the constitutional change at puberty; but I took that as representing the completion of a certain number of years of life. I did not mean to connect it with the puberty processes.

147. But I understood Professor Michael Foster to ask you whether you thought that the constitutional changes taking place at puberty, as it were wiped out the effect of vaccination?—Not at all; not the puberty changes in themselves.

148. Then if vaccination is administered, say, about the age of 12, do you think it will last the whole of the life after that?—Hitherto we have not experience upon a large scale to answer that exact question, because re-vaccinations have generally been performed rather later, say at about 15, 16, or 17 years of age; but the protection of those re-vaccinated has lasted for life.

149. Is it not the custom of medical men to recommend a third or fourth vaccination in cases of epidemics?—I will not say that there are no medical men who would make that recommendation, but I should not say that it is general; I am sure it is not the advice of the best authorities.

150. But I understand you to say that there is no clear and confident opinion that a second vaccination at the age of 12 or 14 would last the whole of the life?—There is a very clear opinion that re-vaccination (without distinction as to the precise date at which it is done) gives protection for the remainder of the life.

151. Without any repetition?—Yes, speaking of re-vaccination as it has been customarily practised, without reference to shades of earlier or later. That there is any difference of stability between re-vaccination done at 12 and re-vaccination done at 15 is not established in any way, as far as I know.

152. Then would you advocate compulsory re-vaccination?—That is another matter.

153. But is it not necessary to complete the benefit of infant vaccination? I understand you to tell the Commission that the virtue of vaccination expires, or probably expires, in the majority of cases at about the age of 12 to 15.

(*Chairman.*) I think the witness said that there would be some benefit still remaining.

(*Mr. Picton.*) You stated that in the majority of cases there was a relapse into a state of susceptibility to the disease?—Yes.

154. Then to that extent the virtue of infant vaccination is lost?—To that extent; it being always understood, please, that I did not mean a relapse *in toto*, but a partial relapse into susceptibility.

155. To that extent, of course, the virtue of early vaccination is gone?—To that extent.

156. All that I ask you then, is, would it not be necessary, in order to restore complete insusceptibility on the part of the population, to enforce vaccination at the age of 13 or 15; would not that be a necessary consequence?—Perhaps in the present state of the argument, I had better answer that upon an assumption. Assuming that the State intends to compel complete insusceptibility, that would certainly be necessary.

157. You told the Commission, I think, that the differences in the quality of vaccination are enormous—I think you used that term?—Yes.

158. Does not that expose the poor who are vaccinated in considerable numbers at public stations, to much risk?—I am happy to say not now, but if I were asked whether it did so 40 years ago, I should say yes.

159. Does the quality of vaccination depend only upon the nature of the lymph, or does it depend also upon the character of the subject to whom it is administered; would the same lymph, I mean, produce a different quality of vaccination in two different children?—In two healthy children, using the word "healthy" in its popular sense, or if you like, even in its stricter medical sense,—in two healthy children the effects would be, with the rarest possible exceptions, the same,—I cannot say that they would be absolutely the same. There may be in individuals latent peculiarities of constitution which may make very exceptional differences; but, broadly speaking, in healthy subjects the effects would be the same.

160. Then it is necessary in re-vaccination to ascertain carefully that the children are equally healthy? Can you tell us, from your experience, about what number may be vaccinated in the course of an hour at any public station in a populous district?—No, I cannot.

161. Would there be as many as two dozen vaccinated in the course of an hour?—Perhaps there might be. I will not deny it.

162. You would not think it was anything out of the way if that occurred?—I have not observed the rate of vaccination, so that it would be merely a speculative answer.

163. But it requires some little time to make an examination of a child to see that it is properly healthy, does it not?—Yes, but those accustomed to examinations do them expeditiously.

164. I think it requires that the child should be entirely undressed, does it not, to be sure that there is no such disease as would make the vaccination dangerous?—"Entirely undressed." I am not prepared to say; but that the vaccinator should take a good survey of a considerable proportion of the child's skin, and look particularly at certain parts of it, I think is essential.

165. I read, for instance, that Jenner especially warned vaccinators against *herpes*; can the presence of that be observed, or can the absence of it be assured without a very thorough examination of the whole of the child?—The complaint against which vaccinators are more particularly cautioned as to the health of a child in its own interests is *eczema* not *herpes*. For eczema the vaccinator in search of it looks directly at certain parts of the body.

166. And you do not think it necessary that the child should be thoroughly examined in a nude condition?—In entire nudity, I think not.

167. (*Dr. Collins.*) You have been asked as to Jenner's views, would you kindly give us your own views as to the nature of vaccination?—I myself, as far as my study of the subject goes, believe that Jenner was right in the name he gave to the disease, when he called it *Variolæ Vaccinæ*. As far as my knowledge goes, I believe it is really small pox grafted upon the cow.

168. Has any experience of recent years occurred to demonstrate that?—Yes, in my opinion, there has. I, in that matter attach very great importance to Mr. Ceely's observations. I am aware that, in contradiction to them, a great deal of curious experimental evidence has been adduced from Lyons; and I have noticed also with great astonishment and curiosity the results of some experiments which were made for the Local Government Board by Dr. Klein. I of course have seen that there is difficulty in the subject. Those who remember Mr. Ceely, will know what an exceedingly careful and painstaking man he was—a genuine naturalist and looker for truth, and will not readily believe him to have been wrong in his account of what had been passing under his eyes; but undoubtedly there were apparent discrepancies to be reconciled; and something effectual towards that reconciliation seems to me to have been done by Dr. Voigt, chief public vaccinator of Hamburg. I refer to a series of papers published by him in 1882 and 1883 in the *Deutsche Vierteljakrschrift für die öffentliche Gesundheitspflege* on the subject of small-pox and vaccination: papers founded on large experience and study in the general subject, and giving special examination to this controversial question. With reference to the controversy, he had conducted a novel series of experiments, and eventually his result is the same as Ceely's. For a time he was just as completely baffled as Chauveau and Klein had been; but at length he found an exceptional case, and from that exceptional case he was able to carry on ordinary vaccination, first of all, through a series of calves, and then into human subjects. In the last paper of the series he gives the result of an extensive use of this lymph in the public vaccinations of Hamburg. I do not pretend to explain it; but as you ask me for my opinion, *quantum valeat*, I say that I think Jenner's interpretation of the case was right.

169. The experiments of Dr. Klein were purely negative in their results?—Yes.

170. He failed in numerous instances to produce any results on the cows by inoculation with small-pox?—Yes.

171. Could you tell the Commission of any result of Chauveau's inquiries?—Yes, he produced small-pox.

172. Did he produce it in a human being?—Yes, no doubt he gave him small-pox.

173. May I take it that your impression of the nature of vaccination is that it is the small-pox of the cow?—Yes, quite so.

174. I see that in your paper of 1857 you make this remark: "On the conclusion of this artificial disorder, "neither renewed vaccination, nor inoculation with "small-pox, nor the closest contact and cohabitation "with small-pox patients will occasion him to betray "any remnant of susceptibility to infection." Do you adhere to that?—As far as I understand the point, I adhere to the principle of the statement, but should not now express myself in such unqualified terms as to a possible "remnant of susceptibility." Your quotation, I observe, is from my report of 1857. If I were now writing the passage, I should probably not go farther than to express my belief that the person might without fear expose himself to any risk of infection.

175. Do I understand that a person who has once had the cow-pox shows no susceptibility to renewed vaccination?—My meaning was only as to the immediate time. I have no fresh knowledge what immediate re-vaccination would do, nor as to immediate inoculation with small-pox.

176. May I take it, having regard to that report, that you adhere to that?—Yes, with the qualification I have stated, I think I may say I adhere to it.

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177. Then I understand that a person once vaccinated is practically in the position of a person who has had the small-pox?—I believe so.

178. Is it or is it not a fact that the majority of re-vaccinations are successful?—I was not there speaking of an immunity extending through life. I discuss that later on in the paper. I was speaking of the particular moment when the "artificial disorder" was concluded.

179. Can you tell the Commission how soon after the primary vaccination it is possible to re-vaccinate successfully?—I do not know.

180. Is it or is it not a fact that the majority of re-vaccinations are successful in the case of recruits entering the army, for instance?—I believe it is.

181. Something like 90 per cent. of the cases, I think, are successful?—Yes, I assume so.

182. If that be so, can you regard a second vaccination as standing in the same relation to the primary vaccination as an attack of small-pox would do to a primary attack of small-pox?—These are subtle physiological questions to which there are statistical answers, but I have not the statistics fresh in my mind, and I would rather not answer them speculatively.

183. Do I understand you regard vaccination as equivalent to an attack of small-pox as regards subsequent susceptibility?—I think I should venture in that context to say, "analogous" rather than "equivalent."

184. But I think you said on an earlier page of this 1857 paper that a person once vaccinated is protected from small-pox, because he has in fact had it?—It is quite true that 32 years ago that was my language.

185. Is that one of the points which you desire to modify now?—It was figurative language.

186. Not pathologically precise?—It was not meant to be pathologically precise. What the person had had was not *literally* small-pox, but (if the explanation I have given be right) was *modified* small-pox, *vaccino*-small-pox, *variolæ vaccinæ*. In 32 years one learns to express oneself more precisely in pathology.

187. Mr. Picton asked you with regard to the views which Jenner entertained as to cow-pox, and I will ask you whether or no this is a correct passage from his inquiry. He is speaking of horse grease. He says: "It is an inflammation and swelling in the heel, from "which issues a limpid fluid possessing properties of a "very peculiar kind, which seems capable of generating "disease in the human body, after it has undergone the "modification I shall presently speak of, which bears "so strong a resemblance to the small-pox that I think it "highly probable it may be the source of that disease"; is that correct?—If you read it as his I take it as his. I have no reason to suppose it otherwise than correct.

188. Do you suppose it to be pathologically correct?—That is another point.

189. Apparently Jenner held that horse grease was both the source of cow-pox and of small-pox?—That it was itself equine small-pox, and was the source, or one of the sources of cow-pox. I suppose we may take it for granted that the horse was capable of a good many maladies about its heels. Jenner took a pretty long while, and also his successors have been giving a great deal of time to the discrimination of the disease in cows; and probably in horses the subject was not less difficult.

190. You speak of "discrimination" of the disease in cows. Do I understand that there are a variety of eruptions of the teats of cows?—Undoubtedly.

191. How is it possible to distinguish that which will give true pox from that which will not?—How is it possible to distinguish any two diseases? How is it possible to distinguish epilepsy from measles? They have different signs.

192. Could you tell us the signs?—An expert can. I do not profess to be an expert in the diseases of the cow, but if you would care to follow this point more minutely, there are observers at the present time who can give the distinctions to you, I believe, very exactly.

193. Is it not a fact that lymph has been derived from various original sources at different times for the purpose of vaccination?—There is room for misunderstanding in your question.

194. Is it not a fact that lymph has been obtained by inoculating a cow with small-pox for the purposes of vaccination?—Yes.

195. Is it not a fact that lymph has been used from the cow-pox derived from horse grease inoculated upon a cow; was not that Jenner's source?—Within my experience, lymph has not been derived from the horse.

196. Have you any reason to doubt that observation of Jenner's?—I know that he believed the grease of horses to be of the same contagium with cow-pox, and that to some extent in part of his career he inoculated with human lymph which had descended from equine infection; but I have never attached any particular importance to that portion of his practice, and I have not much recollection of particulars relating to it.

197. I thought that you commended his work as a masterpiece of medical induction. I take it that you are familiar with its chief points?—I am not now familiar with the details of his cases. I have not looked at his book for many years.

198. Is it not a fact that lymph has been drawn from so-called spontaneous cow-pox?—Yes.

199. And you have had several instances of such?—I have had knowledge of several instances.

200. At any rate, there are three sources from which lymph has been derived at various times?—And there have been derivations of lymph from variolated cows.

201. I mentioned that in the first instance. Are these all precisely the same disease?—They are believed to be. I do not wish to include the horse's heel, because although I have not the least doubt that the horse's heel has had cow-pox, I do not know the effect of inoculations from the horse sufficiently to speak of them; but I have not the least doubt that cow-pox has been in the horse's heel occasionally; and assuming the case to have been correctly diagnosed, I can quite conceive that this would give as good vaccination as any other lymph.

202. Are you aware that Jenner considered so-called spontaneous cow-pox to be spurious and worthless as a protection?—He probably had not exhausted the subject of the eruption on the teats of cows. Quite lately, in a controversy which has arisen about cows and scarlet fever, it has been made quite evident that cows are subject to very various eruptions upon their udders. I am not at all prepared to say that Jenner had exhausted that subject. I think it very probable that he had not. But when I look at the question of vaccination, I look at it independently of the question of origins; that is to say, remote origins. I look at current vaccination, such vaccination as you will find at any well-conducted vaccination station in England.

203. I believe a calf lymph establishment has been opened by the Government, has it not, in recent years?—There is a calf lymph establishment.

204. Can you tell me the origin of that lymph?—I cannot; that has been since my time.

205. Now, to go back to the question of small-pox in the centuries preceding vaccination. I believe Sydenham was the first to discriminate between small-pox and measles, was he not?—I am not quite prepared to say that.

206. Was small-pox discriminated definitely from measles before the time of Sydenham?—In English literature, I believe not; but the London Bills of Mortality reach back to 1629, and the earliest of them (when Sydenham was barely five years old) name small-pox and measles as different diseases.

207. Can you tell the Commission anything of the mortality from small-pox in the 17th Century?—I give some statistics of it as far as they could be got from the bills of mortality; and it is as well to note here that the Bills of Mortality, very deceptive for some purposes, are not so deceptive when they positively name small-pox—the disease was tolerably definite. In the statistics which I quote at page lv. of my report of 1857, I find that small-pox in the years 1629 to 1635 gave 189 deaths per 100,000, and in 1660 to 1679 gave 417 per 100,000.

208. Per 100,000 deaths, is that?—No, per 100,000 of estimated living population.

209. The first period would be before the time of Sydenham, I apprehend?—Yes.

210. How does that compare with the mortality from small-pox in the 18th Century?—There was a tremendous small-pox mortality in two periods which I have here—in the period from 1728 to 1757 it was 426; from 1771 to 1780, which was the middle of the inoculation

period, it was 502. Then in the first decennium of this century it was 204, in the period from 1831 to 1835 it was 83, and in the period 1840-54 it was 40.

211. Do you consider that inoculation was in any way responsible for the heavy mortality at the end of the 18th Century? —Undoubtedly.

212. Did vaccination to a large extent replace inoculation?—Yes, certainly.

213. Was Dr. Farr an authority upon statistical questions in this country?—A very high authority upon statistics.

214. Would you agree with this quotation from Dr. Farr, "Small-pox attained its maximum after inoculation was introduced; this disease began to grow "less fatal before vaccination was discovered, indicating, together with the diminution in fever, a "general improvement in health then taking place"? —I should not agree with the whole of that. I am not aware of any material to justify the opinion that small-pox was growing less fatal before vaccination was discovered.

215. Is it or is it not a fact that the mortality from fevers declined in nearly the same ratio as that from small-pox?—In London, both diseases did largely decline at the same time, but I am not aware of this having been so elsewhere; and I have no reason to believe that in London the decline of one had anything to do with the decline of the other. In the period 1660-79 when the small-pox mortality was very high in the Bills of Mortality, when it was 417 per 100,000, the general death-rate was 8 per cent.—it was 8,000 per 100,000, and the fevers were of enormous amount, the plague being among them: it was a great plague period.

216. The impression is not correct that fever declined in the early part of the 19th Century much in the same ratio as small-pox?—I have not statistics before me which will enable me to speak of particular years, but it is a fact that in London fever did begin to decline from the beginning of the century, as did also small-pox: I however do not see the least reason to believe that there was any connexion between the two declines.

217. Small-pox is a zymotic disease, is it not?—Yes.

218. Are zymotic diseases in any way influenced by sanitary conditions?—Syphilis is also a zymotic disease, but I am not aware that the existence of syphilis is in any way governed by sanitary conditions.

219. Are there not certain conditions connected with syphilis which would make the analogy rather a dangerous one?—Yes; but I am not aware that the circumstances which govern the spread of fever govern the spread of small-pox. I have no experience to that effect.

220. You would put the whole decline of small-pox down to the introduction of vaccination?—Yes, taking it for granted, when you ask me that question, that you are not referring to very minute differences.

221. Speaking broadly?—Speaking broadly, I look to it entirely as a matter of vaccination.

222. Can you give the Commission any figures with regard to the number of patients who are admitted to small-pox hospitals who are vaccinated?—I cannot.

223. Is it, or is it not a fact that mild small-pox is as infectious as the most severe?—In a sense, yes; whether in all senses I am not prepared to say. I suppose that a person with a very intense small-pox, say, confluent small-pox, gives off from his body a great deal more contagion than a person who has a mild attack; but that a dose of contagion from the person with the mild disease gives the disease as truly as a dose of contagion from the confluent case, I admit.

224. With regard to Mr. Marson's evidence in connexion with the number of vaccination cicatrices, I observe at page 237 of the Blue Book, at Question 4122, where he is speaking of those having four or more vaccination cicatrices, he says that "Of those having "four or more vaccine cicatrices there were 2,459. "Of those 1,263 had good cicatrices. The mortality "was 11, and out of those 11 there were 10 having "superadded disease." Do I understand that he deducts the 10 from the 11 in calculating the mortality? —Yes.

225. That would considerably diminish the mortality among those who had good cicatrices?—Yes, or perhaps in other cases among those who had bad cicatrices.

226. You were speaking in answer to Sir Guyer Hunter with regard to the evidence derived from the Franco-German war as to the efficiency of vaccination—I did not quite gather what that was—you made an allusion to it, but you did not amplify the answer?—I think I referred to the German evidence of the advantages of re-vaccination; I believe there was a great deal of small-pox in the French army, and that the Germans had large proportions of it among their French prisoners.

227. Could you give the Commission any figures with regard to that?—No, I could not.

228. Or in the German army?—I could not.

229. All the German army was re-vaccinated at that time, I believe?—Yes.

230. Were there any deaths from small-pox of re-vaccinated German soldiers?—There were very few.

231. If the numbers are given, as I believe they are, as 263, you would not doubt them. I presume they were all re-vaccinated?—I am incompetent to speak upon many of these statistical points, because I have not the facts before me; but I take it for granted that the Commission will have before it a compilation of facts, and good conclusive statistical evidence upon points of that kind duly authenticated.

232. Can you give the Commission any statistics as to the influence of a small-pox epidemic upon the general mortality?—I am not aware that it exerts any.

233. It does not increase the general mortality? Do you know whether the total death-rate of the population is increased by a small-pox epidemic?—I presume that it is increased by the number of small-pox deaths.

234. Is that so?—I presume so. Of course a man who dies of small-pox cannot be run over or die of a chronic disease; he is dealt with in one way and cannot be dealt with in another. Except in that sense, and supposing the other conditions equal, I am not aware that there will be anything but the addition of so many small-pox deaths.

Adjourned till Wednesday next at 1 o'clock.

Second Day.

Wednesday, 3rd July 1889.

PRESENT:

THE RIGHT HON. THE LORD HERSCHELL IN THE CHAIR.

Sir JAMES PAGET, Bart.
Sir W. GUYER HUNTER, K.C.M.G., M.P.
Sir EDWIN HENRY GALSWORTHY.
Mr. WILLIAM SCOVELL SAVORY.
Mr. CHARLES BRADLAUGH, M.P.
Dr. JOHN SYER BRISTOWE.
Dr. WILLIAM JOB COLLINS.

Professor MICHAEL FOSTER.
Mr. JONATHAN HUTCHINSON.
Mr. J. ALLANSON PICTON, M.P.
Mr. SAMUEL WHITBREAD, M.P.
Mr. F. MEADOWS WHITE, Q.C.
Mr. BRET INCE, *Secretary*.

Sir John Simon, K.C.B.

3 July 1889.

Sir JOHN SIMON, K.C.B., F.R.S., &c., &c., further examined.

235. (*Dr. Collins.*) At the last sitting of the Commission you told us, while paying a high compliment to Dr. Farr as a statistical authority, that you were not aware of any material justifying his conclusion that at the end of the last century, and the beginning of the present century, the mortality from fever had declined in nearly the same ratio as the mortality from small-pox?—I am afraid I must say (as more important people say in the House of Commons) that one would like to have notice of this question, and of questions of this character, for the purpose of looking up the records. I cannot answer the question extemporaneously. I should be very happy, if I were desired to do so, to look up the matter for the Commission, but questions of this sort involve reference.

236. Might I ask your attention to the table in your paper which appears at page 379 in the Blue Book for 1871; that is, I believe, taken from Dr. Farr?—You are quite right. The table relates exclusively to London. (*See Appendix I., page* 88.)

237. Might I ask your attention to the mortality there given from fever in the third, fourth, fifth, and sixth columns. I would ask you whether there is not material there to justify the conclusion of Dr. Farr?—I observe a note of interrogation in several of the columns.

238. I think that is not so in the line relating to fever. Would not the figures there given justify the conclusion that fevers had declined in those periods, nearly in the same ratio as small-pox?—I see in the years beginning the century, a large reduction of fevers undoubtedly. In the period before that I cannot say that I do.

239. The plague was included in previous periods, I see. May I take it that there is material there to justify the conclusion which Dr. Farr has drawn?—I would rather not draw a conclusion from two columns of a table, and I would rather not draw a conclusion from London exclusively; but I quite notice the difference to which you refer.

240. But you have referred to this table, I think, to show the decline of small-pox?—I hope I have not referred to any column of it exclusively; I have referred to the whole table with reference to the decline of small-pox.

241. With regard to the Act of 1867, you mentioned in your examination in chief by the chairman, in answer to questions 29, 30, and 31, that the changes in the law which were effected in the year 1867, I think, were merely matters of detail?—I said that there was no change of principle.

242. Would you wish to amplify that answer at all?—If you think that there is something that I have overlooked, if you will mention it, I will tell you directly.

243. I was going to ask you whether it was a fact that cumulative penalties existed before the year 1867?—I had not that in view; I was thinking of the more general aspect of the question. You must not of course take me to be speaking as an expert on a question of law, but I have no doubt that the Act of 1867, made it easier to press for cumulative penalties. I would not say off-hand (nor would my opinion be worth having, at any rate, because I am not an expert in law) whether cumulative penalties were in the theory of the old law. They may or may not have been; I do not pretend to be a judge of that. That cumulative penalties became more easily recoverable under the Act of 1867 I have no doubt; but that is not a change of principle.

244. You would not consider that the Act of 1867 originated a new era as regards compulsory vaccination?—Not, except in detail. When the Legislature said, "We command vaccination," the principle covered the Act of 1867. The Legislature that commands, means its commands to be obeyed.

245. I have before me the 12th Report of the Medical Officer of the Privy Council, including your report for the Medical Department, and I find that on page 50 you say: "In 1867 these defects" (speaking of some defects previously enumerated) "were removed by the new "Vaccination Act of that year; and from 1867 there "consequently date further very considerable measures "of improvement." That you would perfectly agree with?—That related entirely to points of detail. I think you will observe, that in that passage I am speaking with reference to the improvement of local systems, with reference to our inspections of public vaccination and to our improvements of method, not with reference to the principle of compulsion.

246. I see that upon page 52 of this Report you also say: "In 1867, the new Vaccination Act began, in this "as in all other respects, an era of greatly accelerated "progress"?—But here I am speaking entirely of improvements that we in the office were able to make in the quality of public vaccination, not as to questions of enforcement of the law.

247. All I want to know is whether you consider that from 1867 there dated a distinct improvement as regards the general vaccination of the country?—Yes, distinctly.

248. If that were the case, would it not be fairer, in drawing conclusions as to the diminution of small-pox effected by more general vaccination, to commence a new era in the year 1867?—If the Commission were sitting in the year 1989, I should say, yes, certainly, you ought to date a period from then. But the period 1868–71 would be too short for reasonable statistics.

249. But I see that in the tables which you have given us, you date your last period of small-pox mortality from 1871 up to the present time?—I quoted what material I had, but not speaking of a short period as if it were a long period in any matter of statistics.

250. But the point that I wish to understand is this: In answer to Question 86 of last Wednesday's evidence you have given us three periods of small-pox mortality of this century?—Those are the Registrar-General's figures.

251. They are the periods 1847–53, 1854–71, and 1872–80?—Yes.

252. Would it not have been well, in order to ascertain how far alterations in the law had effected more general vaccination and reduction of small-pox, to have commenced a new period in 1867?—I cannot say that I think it important one way or the other. The statistics are those of the Statistical Department of the Registrar-General, who, I suppose, is as nearly indifferent to the result of his figures as a man can be; for of course a statistician ought to be perfectly indifferent to what comes out at the bottom of his columns. For a reason best known to himself (but I think I remember that

he does give a reason) he takes this division, and, as I think, it brings out the truth.

253. It would have made a considerable difference in the figures, would it not, if the last period had dated from 1867 instead of from 1872, because the latter period would then include the big epidemic of 1871? May I ask whether you have before you the explanation which the Registrar-General gives of his classification?—I cannot give it, but I know that Dr Ogle is here, and he will account, I am sure, for the division that is adopted.

254. You told us last Wednesday that, so far as you are aware, when small-pox prevailed epidemically, it increased the general death-rate, broadly speaking, by the number of small-pox deaths?—I of course meant that, as subject to the condition of "*cæteris paribus*." *Cæteris paribus*, the small-pox would increase the death-rate by the number of those whom it killed.

255. Then when a reduction of small-pox was effected by vaccination, was the general death-rate lowered by the number of small-pox deaths that were taken off, again broadly speaking?—In what period particularly?

256. In any period, or any figures that you can give us?—It is difficult to answer the question without reference to the fact that those who do not die by small-pox have eventually to die by something else. One must remember that.

257. May I put it in this way: have you had any evidence before you to show that where a large reduction of small-pox fatality has been effected by vaccination, the general death rate has not been reduced in a corresponding degree?—I cannot call to mind statistics settling this question one way or the other; but the Commission might very easily refer to the case of Sheffield, and examine there, as to the particular case, what the general mortality has been.

258. May I ask your attention to your paper of 1857, on pages 161 and 162, in which you give some figures reported by the College of Surgeons for Prague, dealing with Bohemia. There are two tables, the first from 1796 to 1802, during which period the proportion of deaths generally to the population was 1 in 32, while the deaths from small-pox were 1 in 396⅔ of the population. In the second period, subsequent to the introduction of vaccination, from 1832 to 1855, the proportion of deaths from small-pox was 1 to 14,741½ of the population, but the proportion of the total number of deaths to the total population was 1 to 32½, almost identical with the first period?—I really cannot off-hand discuss the statistics contained in those tables. I am not competent to discuss them in detail, and I am not sure that there is difficulty in the figures that you quote. Those are statistics of a long while ago and a long way off. Now we have the statistics of our own country that we can refer to, and the statistics of the present day. I submit, is it not better and more advisable to take as crucial the cases where we can verify every detail? You have, for instance, the case that I mentioned just now of the recent Sheffield epidemic. The report on it is a volume of such careful work as I have never seen exceeded. I submit that there is a case for statistical examination and cross-examination. Then again you have the Registrar-General's statistics of a broader kind, reaching down to the present day; and I venture to think that you would get more useful results out of statistics of these sorts than out of the statistics of Prague, or rather from my evidence on the statistics of Prague, which I really know but very imperfectly. I know that 32 years ago I had, from Austrian official sources, these statistics which go back to the year 1796, but I am now quite unable to give the collateral information which might help to interpret them.

259. It was simply because you referred to Bohemia in your examination-in-chief that I was led to look up these particular tables?—It is quite true that I referred to a table in which Bohemia is quoted, but always feeling strongly that the evidence that now is to guide England is the evidence of to-day, not the evidence of 30 years ago or 50 years ago.

260. Before leaving that subject, I will ask you in conclusion whether the evidence there given would not lend plausibility to the conclusion that the reduction of deaths from small pox by vaccination does not necessarily thereby lower the general death-rate?—I am not aware of any reason in the nature of things why, while vaccination is reducing small-pox, other causes should not be increasing other diseases. One must compare the whole case; one must master all the causes that are in operation before one can say yes or no; one cannot discuss it as an abstract question.

261. Would you be prepared to agree with Dr. Farr (who you admit is a high authority) in this quotation as to the causes of death in the year 1867: "It is of "course by no means proved that the general mortality "under unfavourable sanitary conditions is much "reduced by rendering the child insusceptible of one "type, while he remains susceptible to all other types "of zymotic disease"?—That is a speculative opinion that we have not material for testing. I think he very prudently and properly begins by saying, "There is no "reason why we should assume." I may agree with him that there is no reason why we should assume either one way or the other. It is very dangerous to attempt *a priori* arguments in matters of this kind. I regret to say that when I look back to things that I have written in olden times I catch myself having done it, and, therefore, you must not look upon me as presuming to censure others: I criticise myself quite equally. Thirty or forty years ago, one was much more disposed to think that one could discuss these questions *a priori*. They are questions of experiment; it is in proportion as one gets more experience that one becomes better able to speak about them.

262. In the report with which I am dealing, Dr. Farr gives ample *a posteriori* evidence; but I take it that you are not familiar with the material?—I have not the facts before me.

263. (*Mr. Bradlaugh.*) With reference to the division into periods in your answer to Question 86, I think I am right in assuming that you followed Table L. on page xxii of the Forty-third Annual Report of the Registrar-General for the division of periods. I do not know whether you are aware that on page xxi. the Registrar-General says that "The second sub-period "begins with 1854, when vaccination became obliga-"tory, but without any effectual means of enforc-"ing the obligation being instituted, and closes with "1871." If it be true that from 1867 to 1871 parents have not only been liable to repeated convictions and penalties for not allowing their children to be vaccinated, but that there was actual evidence before the Committee which reported in 1871 of the infliction in several cases of more than one fine or imprisonment with regard to the same child, would not that induce you to think that the sub-period which began with 1854 should have rather ended with 1867?—I should not see any objection to a re-arrangement of the periods.

264. I quite understand that the period has not been selected by yourself; you have simply adopted the period taken there?—Yes. In any artificial arrangement of periods that one makes, one has to face the fact that epidemics of small-pox, more or less severe, recur at uncertain intervals; and if one were to govern oneself by the small-pox epidemics (and I should see no objection to that, let me observe) one would have to reconstruct, not only one period, but the whole set of periods. One might say, "Let us take periods with a "certain quantity of small-pox epidemic in them," if one could define such periods; which would be difficult, but perhaps not impossible. If short terms of years are compared on any other principle than that, too much turns on the accident whether or not the respective terms have had equal epidemic periods in them. One avoids that difficulty in taking long periods.

265. I am afraid I did not make myself at all clear, but what I was suggesting was whether whoever prepared the Registrar-General's Report had not omitted to consider the operation of the Act of 1867 when he used the words, "without any effectual means of "enforcing the obligation being instituted"?—Quite so.

266. You would rather agree with me in that?—Quite so, to the extent in which the Act of 1867 had added to the strictness of enforcement.

267. I do not know whether you remember a letter of Mr. Gibb's to Sir Benjamin Hall, which I think you had to consider, written on the 30th of June 1855, and afterwards printed as a parliamentary paper in 1856, presenting a view, from the anti-vaccinationist position, of the history of the introduction of vaccination and its alleged effects on small-pox mortality?—I think I gave some answers on the subject of that letter before the Select Committee of 1871. I no doubt looked the matter up or refreshed my memory as I best could at the time, and, subject to correction by that answer, which is probably more correct than anything I could

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say now, I knew nothing whatever of that letter. I became medical officer of the Government in, I think, October, 1855. So that I was not in office at the time of the letter.

268. The letter was written on the 30th of June 1855, and was moved for in Parliament and printed in 1856?—When I was appointed, Sir Benjamin Hall was no longer President of the Board of Health.

269. It is only a mere matter of history, but do you sufficiently remember it to know that it presented what was claimed to be the historical state of the matter on the anti-vaccinationist side, so far as Mr. Gibb's understood it?—I do not well recall it now. If any importance attaches to it, I of course would look it up with pleasure.

270. Do you happen to remember that there was such a letter?—Yes, I remember to have heard of it afterwards.

271. As illustrating the advantages of vaccination you have referred to the practice of vaccination in different countries; but is there not now in foreign countries, and has there not been always some variety in the artificial production in human beings of the disease which you describe as small-pox grafted upon the cow?—As to the variolation of the cow, I am not aware of its being much practised in foreign countries; but I am imperfectly aware that there are differences in the lymphs used, and in the mode of storing the lymph for use. The use of the four-footed animal in vaccination in Germany is, I believe, very considerable; but to the best of my imperfect knowledge, not by variolating them from the human subject, but by carrying on in them (as is now also done in London to a considerable extent) the already modified infection: carrying on in them such an infection as you give when you vaccinate them from the human subject. I believe that to be extensively the practice in Germany and Belgium and Holland.

272. So that there are, in fact, various vaccines throughout Europe at the present moment?—I believe that the countries I have named would not quite accept that they had, in any essential sense, different vaccines. They would admit that they are carrying on the contagium with differences of method, but would not allow that the contagium is different, or that the vaccination is a different vaccination.

273. Would the same answer apply to France?—I am not aware how they are doing in Paris at present.

274. In your opinion has there been, during the past 50 years, any diminution in the protective quality of vaccine?—There is accumulating evidence of the impermanence of infantine vaccination; but whether that evidence represents in any degree an increased use of weak lymph is not quite absolutely known. It is a question which I discussed in the year 1857, according to such lights as there were, and I brought forward all the evidence that was then collected, but it was not even then conclusive. What we certainly know a great deal better than we knew in 1857, is that infantine vaccination by itself is not as protective for the whole life as Jenner hoped it would be; but whether the impermanency of that protection is increasing in the successive generations, we are not sure. There is this difficulty in the case; that in the early days, non-occurrences or non-severities of post-vaccinal small-pox were necessarily in people not very remote from their original vaccination; whereas now, a person contracting post-vaccinal small-pox may be at 80 or 90 years' distance from his first vaccination.

275. I do not know whether you saw a little pamphlet which was sent to each member of the Commission last Wednesday by Dr. William Sharp?—No.

276. If Dr. William Sharp states that "the increasing "mildness of vaccine noticed and rejoiced in by "Dr. Woodville has now reached a degree which is "seriously damaging"; should you agree in that?—No, I should not myself use those terms.

277. What degree should you think it had reached, if any?—Whether Dr. Woodville's lymph was more effective than the lymph now commonly current, in the sense that infantine vaccination with it was more protective, or more permanently protective, than our present infantine vaccination, is a question which, so far as I know, we have no sufficient means of answering; and the doctrine of a progressive weakening of lymph, in the sense (as I understand it) of the passage you have read, is not a doctrine I see reason to accept.

278. Should you agree with Dr. William Sharp that the vaccine now in ordinary use is not sufficiently reliable?—I would not use that language. That the infant vaccinated with it will require re-vaccination is certain; but when only 30 years had elapsed from Jenner's beginnings, people had already begun to see that re-vaccination was desirable, and whether it is an increasing desirability, I do not know; and in any case I should greatly doubt whether impermanence of protection on a large scale can be chiefly a question of enfeeblement of lymph.

279. Would you agree with Dr. William Sharp that the ordinary vaccine, by passing through many generations of mankind, has become diluted, and, not only diluted, but adulterated?—No. I am unaware of its being so with vaccine any more than it is so with small-pox. The contagium of small-pox has not become less effective by passing through a terrible lot of generations.

280. That you quite disagree with?—That vaccine lymph has often degenerated in slovenly hands, I know as beyond question. There is no doubt that care is requisite to keep lymph up to its standard. But whether, with good vaccination, the lymph diminishes in vigour is very doubtful. It is a question which, as I say, according to the lights of 1857, I discussed a good deal in my report of that year; but necessarily, even now, a great deal of the discussion is speculative and doubtful. I wait for larger and more exact experience in the matter.

281. I do not know whether I correctly gather that you consider that such degeneration in the quality of the vaccine, as you think, has taken place often, has been the result of improper treatment by the vaccinator?—It has often been the result of a want of sufficient selection in the arms from which to vaccinate.

282. I think you told the Commission on the last occasion that inoculation had very materially increased the mortality from small-pox in the last century?—There seems to be no doubt of that, so far as I can judge.

283. In your opinion, would the cessation of a cause which had augmented the mortality from small-pox be fairly creditable with the diminution of mortality?—With some portion of it.

284. A proportion equivalent to the augmentation caused by the inoculation?—Quite so. So that, for comparison of vaccination periods with small-pox periods, one would wish, if one could, to compare present times, not only with pre-vaccination times, but with pre-inoculation times.

285. In your evidence before the Committee of 1871, you were asked this at Question 3061 on page 176:—"But supposing that a person be successfully vaccinated as a child, and be successfully re-vaccinated at "the time of puberty, do you consider that, reasonably "speaking, that is a protection against small-pox?" And your answer was: "With an extremely small "margin (and I am not prepared to say that even as "regards that margin there may not be room for "fallacy) but subject to a very small qualification, it "seems to be an absolute protection." Do you still hold that view?—The only difference that I would make in that answer is, that instead of using any vague word, such as the word "almost," I should prefer to advance exact figures; and such exact figures as I would wish to advance, you have before you with regard to Sheffield. It is because of the exactitude that I so repeatedly refer to the Sheffield volume, which seems to me invaluable; but in substance what I said in 1871 is what I should hold at the present day.

286. I do not know whether you are acquainted with the statistics of the small-pox hospital experience of London since the Metropolitan Asylums Board was established?—I looked at it the moment it was published, though I have not looked at it since; but I think I recollect that it established a great difference in favour of the re-vaccinated.

287. I do not know whether you have had your attention drawn to the handbook of the Metropolitan Asylums Board for 1887?—I have no doubt that at the time I saw the figures, but I cannot now call them to memory.

288. I would put it to you, whether you are aware that, of some 53,000 cases of small-pox treated, some 41,061 were cases of persons who had already been vaccinated; would that induce you at all to reconsider

your answer?—I thought I was speaking of vaccination with inclusion of subsequent re-vaccination. At the present time, if I were discussing the merits of vaccination, I should keep the two things solidly together, the vaccination in infancy, and the re-vaccination some years afterwards. When I now speak of persons being satisfactorily vaccinated, as at the present period, I mean to include "and at a certain time re-vaccinated." For statistical purposes, unless a distinction were drawn, I should mean that. I should be prepared, of course, to distinguish between the two cases; it is necessary to do so; but the complete protection which vaccination is capable of giving is not given unless there be re-vaccination at or before puberty.

289. May I take it that your opinion would be, and that such experience as that of the Metropolitan Asylums Board would show that Jenner was mistaken in claiming an absolute protection from one vaccination?—Yes, that had become manifest even during Jenner's lifetime.

290. I do not know whether you have had your attention drawn to the classification which you have referred to of persons into "vaccinated," "unvaccinated," and "doubtful," or whether you have heard it suggested that many cases are included under the head of "unvaccinated" simply from insufficiency of information?—There will always be room for a certain quantity of real error in cases of this kind.

291. I do not know whether you have heard it suggested that friends of persons who have been alleged to have died unvaccinated have claimed occasionally that those persons have been wrongly classified, and that they have really been vaccinated?—I should rather suspect that, if there is misrepresentation on the part of the parents, it would tend to be the other way; that they would claim to have been vaccinated in order that they may seem to have obeyed the law, although, in fact, they have been unvaccinated. I should think that would be a more probable tendency of error; but the question is speculative.

292. As I understand it, according to your own view, vaccination ought not to be performed by the vaccinator unless the subject is in good health?—Certainly not.

293. The persons, therefore, who were unvaccinated would be presumably persons of indifferent health or of poor health?—That would presumably be so in the case of persons who were medically ordered not to be vaccinated.

294. Then I suppose in any case of epidemic, persons of poor health or indifferent health would, presumably, be more likely to swell the list of mortality than those in good health, apart from any question of vaccination?—If it were possible to make a classification of that kind, which would, no doubt, be a very proper matter for examination, what you would want would not be a vague assertion of ill-health, but evidence that vaccination had been medically postponed on account of the ill-health. If you could make a class of that kind among the unvaccinated, *i.e.*, a class of persons who had been left unvaccinated because of medically-certified ill-health, that no doubt would be an interesting class for examination: always assuming the certificates to have been given in good faith.

295. If you will pardon a very ignorant question, I think I understood you to put the cow-pox and the small-pox as variations of the same disease?—That I believe to be the case.

296. There is no limitation to the female in the human family. Does the bull ever, so far as you are aware, suffer from that pox?—I am not aware whether the bull ever does suffer from it, but perhaps there is tacitly a sort of Contagious Diseases Act in force for his advantage, so that, in practice he would not be put in the way of contagion.

297. Do you think that it is only milch cows that have the cow-pox?—I am not aware.

298. The suggestion intended by my question is this: Is the disease one which is natural or artificial?—We believe it to be artificial, and at least generally to be conveyed by the milker's hands.

299. I think I have understood you to say already that in looking at the statistics for these short periods questions of epidemics ought to be considered by any one basing conclusions upon the statistics?—Yes.

300. I will not ask you now as to the question of 1857, but I will ask you to be kind enough to look into the statistics that you have referred to of Sweden, Bohemia, Moravia, and Copenhagen, because on some other occasion I would trouble you with some questions on the statistics of each of those countries, and if you would prefer it I would forward you a note of the particular objections to the statistics?—I shall be much obliged if you will do so.

301. (*Dr. Bristowe.*) Let me recall your attention to questions 224 and 225. In question 224, Dr. Collins quotes as follows from Mr. Marson, "Of those having "four or more vaccine cicatrices there were 2,459. Of "those, 1,263 had good cicatrices. The mortality was "11, and out of those 11 there were 10 having super-"added disease;" and he then asks you, "Do I "understand that he deducts the 10 from the 11 in "calculating the mortality?" Your answer is "Yes." In the next question he asks, "That would considerably "diminish the mortality among those who had good "cicatrices?" And again your answer is "Yes." May I ask whether, when Mr. Marson deducted these 10 deaths, he did not deduct them because they were, in his opinion, due not to small-pox at all but to some superadded disease? Was it not his belief that those 10 patients did not die of small-pox?—The principle upon which he acted in all his calculations was to exclude cases in which there could be question whether the one disease or the other killed, or in which a superadded disease distinctly killed, but the crude figures, as well as the corrected figures, were put before the Committee. He gave the figures without any kind of deduction, and in his answer to Question 4122 will be found his mention of this particular group of cases.

302. May I ask further whether it would not be in relation rather to mild than to severe cases that such deductions would need to be made?—I do not see my way to answer that question one way or the other. One seems to be getting there into what is speculative, but the principle of his statistics seems to be clear enough. He gets as nearly as he can an unmixed experiment of vaccination of a certain quality in a certain number of cases.

303. At any rate you see nothing remarkable in his deducting the 10 from the 11 cases?—He deducted in each group whatever the number was of cases of superadded disease.

304. May I ask you further whether, by including these doubtful cases,—the cases, namely, where the persons presumably died of some superadded disease,—the effect of his statistics would be materially altered?—Certainly not. Here are the figures before you. You will see that there is a difference, undoubtedly, but it is not a difference which affects the main argument.

305. Can you give for comparison the results of Mr. Marson's calculations and those obtained by including the deaths which he omits?—I cannot calculate them except with a pencil.

306. Going to another point, you have been questioned with respect to spurious cow-pox, sporadic cow-pox, and ordinary cow-pox. I take it that sporadic cow-pox is simply ordinary cow-pox occurring in isolated cases?—Yes, certainly; that would be saying the same thing in other words, if it is cow-pox and is sporadic.

307. Then as to spurious cow-pox, that, I take it, is merely a name applied to diseases which have been mistaken for cow-pox but which are not cow-pox?—Yes.

308. And it has no other meaning that you know of?—I know of no other meaning.

309. So that you look upon cow-pox as being one disease?—I look upon cow-pox as one disease as definitely as I look upon small-pox as one.

310. Therefore all the cow-pox now spread throughout the country is a specific disease in exactly the same sense as small-pox is a specific disease?—Quite so.

311. Have you any further information you would wish to give with regard to the early history of small-pox in this country? Small-pox was said to be confounded with measles about the time of Sydenham, was it not?—Small-pox was confounded with measles statistically, at all events, in the earlier Swedish statistics; and there were speculative doubts in Sydenham's time, I believe, as to the deeper relations of small-pox and measles; but there was no general confusion of the two diseases. The name of small-pox existed long before Sydenham was in practice. As I had occasion, I think, to notice the other day, in referring to a table in the Blue Book of 1857, you will find small-pox in the Bills of Mortality of 1629 when Sydenham was only five

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years old. At page lv of the Blue Book of 1857 the Bills of Mortality from 1629 to 1635 give 189 deaths by small-pox in London.

312. (*Sir Edwin Galsworthy.*) In your previous evidence you spoke about re-vaccination being almost compulsory in Germany; is there any other country where compulsory re-vaccination has been in force or is in force?—I am not able to speak with certainty.

313. Are you aware of any evidence of the rates of mortality amongst re-vaccinated persons who have been specially exposed to small-pox as compared with persons similarly exposed who have not been re-vaccinated?—Yes, I am in a general sense aware of such statistics. I have repeatedly had occasion to quote Mr. Marson's experience in his small-pox hospital, according to which experience such persons never contracted the disease.

314. That is to say, such persons as nurses who are continually exposed?—Such re-vaccinated persons as were in habitual attendance on the sick never contract small-pox.

315. After re-vaccination?—After re-vaccination. I cannot quote chapter and verse, but I believe that the experience of the metropolitan hospitals is pretty nearly to that effect; and if one wants to measure the value of complete vaccination, I presume that one cannot have better tests than that. Let unvaccinated people try the experiment of nursing small-pox patients, and see how many of them escape.

316. (*Mr. Meadows White.*) Had you the administration of the Medical Department after 1871?—I remained in the Department for five years after that time, and, of course, I had such experience as there was.

317. I am only asking this question with reference to the two Acts of 1867 and 1871. The chief difference in the Act of 1871 over the Act of 1867 was that it made the appointment of vaccination officers compulsory, did it not?—Yes.

318. It having been previously to that time voluntary?—Yes.

319. That, I think, was mainly owing to the recommendations of the Committee which sat in 1867?—Of the Select Committee of 1871.

320. Did you observe in consequence of the adoption of that policy any improvement or greater vigour in the enforcement of the Acts?—Yes, there was greater vigour, I think; and an account of that will be found in one or two of my last reports.

321. Might that have been the reason for taking the period of 1871 as the initial year of these statistics rather than the date of 1867, that there was this compulsory appointment of vaccination officers for the purpose of prosecuting those who offended against the Vaccination Acts?—Quite so; there was a very distinct administrative difference after 1871. I should say a much greater administrative difference than after 1867.

322. (*Chairman.*) There seems, as far as I can see, to have been one very important change made. Under the Act of 1867 notice had to be sent by the registrar of births to the parents of the children requiring vaccination, and a certificate of successful vaccination was sent by the parent to the registrar either of the district in which the child was registered, or, if there should be no registrar at all there, then to the registrar of the district where the child was vaccinated, and that register was open to inspection and search on payment by the public and free to any vaccination officer. But the Act of 1871 provided that every registrar of births should every month transmit by post to each vaccination officer whose district was wholly or partly comprised within the district of that registrar, a return of all the births, and of all deaths of infants under 12 months in his district during the last month; so that the vaccination officer of the district, knowing where those children were who had been born in his district, was able to be on the look out to see whether they had been vaccinated or not; whereas before that he had no knowledge of any increase in the births of his district. That seems to be a very important change, and one likely to affect the extent to which the Act would be enforced?—That would be so. The difference after 1871 was very great. The parliamentary intention that vaccination should be compelled began then to be vigorously carried into effect by special officers appointed for the purpose, which made a great difference. That great administrative difference dates from 1871 and not from 1867; but, undoubtedly, there was a difference in 1867, although quite a minor difference.

323. (*Dr. Bristowe.*) I find that in a former question I quoted the word "sporadic" in error for the word "spontaneous." Is there any foundation for the belief that there is such a thing as spontaneous cow-pox?—There may be speculative ground for it; but, as to matter of fact, I have never known of spontaneous cow-pox any more than of spontaneous cat or dog.

(*Dr. Collins.*) The words I used were "so-called "spontaneous."

324. (*Mr. Picton.*) With regard to the nursing of small-pox, of course small-pox cases had to be nursed before vaccination was known. Are you able to give any figures showing that before vaccination the nurses in small-pox cases constantly caught the disease, or any figures showing the difference between the periods before and after?—There are no statistics certainly, but small-pox was running about then like measles, and people in general were apt to have it early in their lives as they now have measles. I produce evidence here as to the number of the infantile population that had it.

325. I only want to ask you this: Is it only a matter of inference that nurses took small-pox more frequently before vaccination was discovered than afterwards, or are there any figures to show that nurses in small-pox cases took the disease more frequently in old times than they do now?—I do not infer anything. If the question is of those times, then, of the adult nurses in attendance on the sick, a very large proportion would have had the disease as children. It was a disease which fell on children overwhelmingly, just as measles now falls on children overwhelmingly, and the nurses would have had that kind of protection. But what in my previous answer I said, with reference to the present immunity of the properly re-vaccinated nurses in the metropolitan hospitals, was: let your unvaccinated, if they would like to make the experiment for the public service, try how *they* would fare if they exposed themselves to the same test.

326. But the point that I wanted to have made clear is, whether there is any way of proving that nurses before the time of vaccination used to take small-pox more frequently than they do now?—No, there is no particular history of nurses before vaccination.

327. (*Chairman.*) But is there any reason to suppose that nurses possessed an immunity because they were nurses before vaccination was introduced?—No, there is no separate history of nurses in those days.

328. (*Mr. Hutchinson.*) There was a little confusion as to the term "spontaneous cow-pox." I want to ask whether you think that there are two sources, or more, of the vaccine lymph now in use, or whether it be not probable that, when vesicles occur upon the udder of the cow, they are always contracted from the hands of the dairymaid; whether in fact there is any variola different from the human variola? There might be a variola incident to the cow independently of inoculation from the human subject, might there not?—The question of the absolute origin of cow-pox, whether it was originally a horse-disease, or a cow disease, or a human disease, is necessarily involved in obscurity.

329. Dr. Collins asked you whether there were not three sources, and whether you thought it made any difference whether a child was vaccinated from the udder of the cow, or from the lymph now in use, or from a horse's heel; is it not probable that it is all one?—I believe Dr. Collins's "three sources" to be merely three different channels of conveyance for one single and same contagium.

330. Supposing the pock produced by vaccination were a good one attended by a good areola and that it left a good scar, would you think it of any importance at all to inquire where the vaccine lymph was got from?—Not the least.

331. (*Dr. Collins.*) Could you tell the Commission whether, since the Act of 1871, the percentage of successful vaccinations to births has increased as compared with the period between 1867 and 1871?—That I do not know.

332. That, I take it, would be the most practical way of ascertaining the increased stringency of the law?—One would have to compare within the practice of the same vaccinator.

333. I was speaking of all over the country. I believe the figures are given every year?—Probably, if you got a sufficient number of skilful vaccinators, you would have good material for the comparison, but you would wish to be sure that the vaccine was of the same quality throughout.

334. I believe the Local Government Board annually publish the percentage of successful vaccinations to births?—Yes.

335. But you cannot tell me whether you think it has increased since the Act of 1871?—I cannot say. May I mention that I have understood you to mean "successful" vaccinations as opposed to "unsuccessful"?

336. No, I mean successful vaccinations as compared to not being vaccinated at all?—That is to be found in the reports of the Local Government Board.

337. But you have not the figures here?—I have not the figures here at command.

The witness withdrew.

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338. (*Chairman.*) Are you the Superintendent of Statistics in the office of the Registrar-General?—Yes.

339. How long have you held that position?—Nearly ten years.

340. What data exist for comparing the small-pox mortality in unvaccinated times with that of the present day?—There are no very perfect data, because previously to this century we have no knowledge of the population, and no accurate knowledge of the number of deaths; so that it is impossible to calculate a death-rate. But you have some indications of an inferior kind, by comparing the proportion of deaths from small-pox to the deaths from all causes in previous centuries, and in the present day. We have not got the facts for England, but we have the bills of mortality for London, which tell us for two centuries past what were the number of burials from cases of small-pox, and what were the number of burials from deaths of all kinds.

341. Have you made any statement of the result of such comparisons?—I have taken as a basis for comparison, the 10 years from 1871 to 1880, which are the years which include the great outbreak in London in 1870–71, so that those years represent a time when small-pox was particularly abundant in London. Taking those 10 years, I find that, in round numbers, the small-pox deaths were 20 in 1,000, from all causes. I then go back 100 years to the corresponding decennium in the 18th century, 1771–80, and I find that the small-pox deaths were then 97 in 1,000. Then going back another 100 years, 1671–80, I find the proportion was 66 in 1,000; so that in the present century small-pox, as measured by its proportion of deaths to deaths from all causes, has been from three to five times less common than it was in those previous times; and it is plain that if the death-rate of the 18th century and the death rate of the 17th century was higher than it is now, small-pox must have been very much more prevalent, because a larger proportion of a larger number of deaths occurred from it. Of course it is only an assumption, but an almost certainly true assumption, that the death rate was higher in the 17th and 18th centuries than it is now.

342. Since 1837, that is to say, for the last 50 years and upwards, we have accurate statistics?—You have more accurate statistics since the General Register Office was instituted and a civil register begun, which was in 1837; and from that date we have the small-pox deaths and the small-pox death-rate in proportion to the population, for each year, with the exception of four years, in which there is a gap; but for those 50 years, or rather 46 years out of those 50 years, we have fairly accurate returns of the small-pox mortality.

343. What was the cause of the void of the four years?—I cannot tell you; but for four years the causes of death were not abstracted. It is a long time ago. I presume the staff was not sufficient for the purpose.

344. Were those four years consecutive years?—Yes, they were consecutive years. The missing years were 1843, 1844, 1845, and 1846. I have a table here which gives the figures in a tabular form, and also in the form of a diagram. The table gives the annual deaths from small-pox per million living in England and Wales, and the diagram gives the same in a diagrammatic form. (*The diagram and table were handed in. See Appendix II., Table A: page* 114.)

345. The table begins with 1838, when there were 1,064 deaths per million?—Yes, per million living. The table shows great fluctuations, and very irregular fluctuations.

346. In 1871 it reached nearly as high a level as in 1838; that was the year of the epidemic, when the number was 1,015 deaths per million?—It was practically the same as in 1838.

347. In 1872 there were 824 deaths to a million living. I see since that date the highest year down to 1877 has been 178?—Yes. The table deals with 46 years, and if you divide it equally into an earlier and a later period of 23 years each, you will find a very marked difference. In the first 23 years the rate was only twice under 100, whereas in the second 23 years it was 12 times under 100. In the first 23 years there were only five occasions when the rate was under 150, whilst in the second 23 years it was 19 times under 150.

348. In the last 15 years, that is, from 1872 to 1887, the rate has never been higher than 178?—That is so. I should say that the figures include chicken-pox as well as small-pox. It was necessary, in order to make the comparison fair, to include chicken-pox, to which a certain number of deaths are attributed every year. It was impossible to separate them in the earlier years, consequently they have been added in the later years, which makes the figures a little higher than those given for small-pox in the Registrar-General's Annual Reports.

349. One hundred and seventy-eight is the highest in the 15 years beginning with 1873; that is to say, after the two years of epidemic; and then if you take the 15 years before, it was in six cases out of the 15 years higher than 178?—I would, however, divide the years in a different way. Instead of dividing them into portions of 10 or 15 years, or periods simply determined by their length, I would divide them by the changes in the vaccination laws, into periods or sub-periods corresponding with the different vaccination enactments. I would divide them in that way into three sub-periods: the first from 1838 to 1853, inclusively, the period during which vaccination was purely optional; then a second sub-period, from 1854 to 1871, inclusively, in which vaccination was nominally compulsory, but when there were no effectual means of enforcing the obligation; for though there were in some cases vaccination officers, their appointment by boards of guardians was not compulsory, and these bodies neglected, very commonly, to do their duty.

350. (*Mr. Picton.*) Do you object to 1868 instead of 1871?—Yes; 1868 was the year when permission was granted to boards of guardians to appoint vaccination officers, but they did not appoint them, as I believe, except in rare cases. In 1872, the Act having been passed in 1871, it became obligatory on the part of boards of guardians to appoint vaccination officers; and consequently from that date I take the third period, of comparatively strictly enforced vaccination. Taking these three periods, purely optional vaccination, vaccination nominally compulsory, and vaccination compulsory and efficiently enforced, I find the small-pox death-rate in the first period was 408 per million, in the second period it was 223 per million, and in the third period, from 1872 to 1887, it was 114 per million, showing a marked and progressive decline, coinciding in time with the changes in the vaccination laws. The decline in the whole time has been about 72 per cent.

351. (*Chairman.*) You have given the Committee the decline in the deaths from small-pox in the later periods as compared with the first, and with each other, is there any evidence to show, beyond the fact of the decline and the alteration in the vaccination laws with the view of making vaccination more effective, that the decrease was due to vaccination and not to other causes, such as improved sanitary regulations?—I think there is such evidence. There are statistical facts which it appears to me impossible to explain on any other hypothesis than that the decline was due to vaccination. Notably this comes out, I think, if instead of taking the change in the aggregate death-rate from

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small-pox, you consider the changes in the death-rate from small-pox at successive ages of life. If it were true that the great fall of 72 per cent. in small-pox was due to improved sanitation, which doubtless has reduced mortality very considerably, we should expect, naturally, that the fall would have been shared by persons of all ages; but nothing of the kind is the case. When we take the death-rate of children up to five, from five to 15, and so on, in successive age-periods, we find that the decline in small-pox has been entirely limited to the earlier stages of life. In the first age-period, that is, in the first five years of life, the mortality has fallen 85 per cent.; among children between the ages of five and 10 it has fallen 64 per cent., and in children between the ages of 10 and 15 it has fallen 27 per cent.; whereas at every age period after that the death-rate has actually increased. From 15 to 25 the mortality rose, from 25 to 45 it rose, and from 45 and onwards it rose. That appears to me to be incompatible, whatever may be its explanation, with explanation by any cause which would be shared by all ages alike. I hand in a table which shows the death-rates at successive ages in the three sub-periods. (*See Appendix II., Table B: page* 114.)

352. There has been within that period a general fall in the death-rate, has there not?—There has been a fall in the general death-rate, but the fall in the death-rate has been about nine per cent.; it may be a little above or a little below, but in whole numbers the decline has been nine per cent.; whereas in small-pox it has been 72 per cent.; and I know of myself no reason, putting vaccination out of the question, why small-pox should be more affected by improved sanitation than other diseases. Perhaps it would be better to compare it with other zymotic diseases, as they are called, rather than with the general death-rate. If then you compare it with measles, you find the decline in measles to be nine per cent., whereas in small-pox it is 72 per cent. The only other zymotic disease for which data exist all the way back is whooping cough; that has declined rather more than one per cent. during the time that small-pox has declined 72 per cent. Still, there are some of the diseases, though I cannot follow the figures the whole way back, which must be admitted to have shown an amount of decline almost as great as that of small-pox, for instance fever. The fall in fever is not so great as that of small-pox, but it is not very far short of it. That fall is in part explicable by the fact that in former times a great deal was called fever which is not called fever now. It was the practice in the earlier days of registration to return the deaths of children, and old people, and others who died of diseases accompanied by feverish symptoms, as from fever; and that is now getting less and less the practice. Moreover, there is another thing to be borne in mind. Doubtless, the deaths from enteric fever, which form the great bulk of these cases, have been reduced by the discovery of the mode in which it is disseminated, that it is disseminated by means of excremental matter, and especially from excremental fouling of water, so that there has been here, as I believe in the case of small-pox, a special cause for the diminution, causing these deaths to fall off to a much greater extent than the general death-rate.

353. If you look at the different ages in that respect, do you find any similar comparison to that in small-pox?—Not at all. The fever fall has been, as one might have expected, at all ages; in small-pox the decline has been only under 15 years of age, whereas above that age there has been a rise in the rate. For instance, taking the last age-period, 45 years and upwards, the small-pox mortality rose from 22 to 47 per million; but under fever, for the same age-period, there was a very considerable fall. The fever mortality fell from 1388 to 323 per million amongst those who were over 45, in the same time in which the small-pox mortality rose from 22 to 47. (*See Appendix II., Table C: page* 114.)

354. (*Dr. Collins.*) Could you give the Commission the figures for typhus fever?—For typhus fever we can only go back a very short time, as far as 1869. In the first three years from that date there were very high rates, 193, 147, and 121. And then the rate fell down to practically nothing, to such small figures as 9 and 7; so that the rates can hardly be looked upon as trustworthy. Typhus may be said to be a disease which is dying out; but no very accurate statistics can be given about it, because in the earlier periods there was a great confusion between typhus and enteric fever, or, as it was commonly called, typhoid fever.

355. (*Sir Edwin Galsworthy.*) Have you the figures for scarlet fever?—We can only go back to 1859. There has been a very notable decline in scarlet fever in the last few years. The rates were lower in each of the last five years than they ever were before. I think that fall seems to be coincident with the greater recognition of the utility of isolation, and the greater use of hospitals for that purpose. In 1878, seven per cent. of the scarlet fever deaths in London occurred in public hospitals; the proportion then rose to 13, and so on gradually, until in 1887 it reached a per-centage of 37, and in 1888 of 43 per cent., and coincidently with this increased use of isolation, scarlet fever has declined very largely.

356. (*Mr. Meadows White.*) Is that distributed over all ages?—Comparatively so few persons die after childhood of scarlet fever, that the rates for adults are not worth calculating, but they can be calculated. I did look to that point, and I found that the fall was enormous, but rates calculated on such small numbers are not worth much attention.

357. (*Chairman.*) Scarlet fever, if I understand your view, is what you may call substantially an infantile complaint, whereas small-pox is no more an infantile complaint than an adult complaint?—More children, doubtless, have small-pox than adults, because the greater portion of the adults have had it already, or have been vaccinated.

358. I mean to say, that small-pox has never been regarded as a disease to which youth is specially subject apart from vaccination?—No, all ages are liable to it, and, as far as I know, all ages are liable to it equally.

359. Of scarlet fever you would not say that, I understand?—The question of the liability at different ages is rather a wide question to enter upon. I think myself that there are differences of liability to scarlet fever at different ages and that children are more liable than either infants or adults; but people at all ages are liable, and as regards measles the liability would appear to be practically equal at all ages for this reason, that some years ago—I think it was in 1846—certain islands, the Faroe Islands, which had not had measles in them for 60 years or some such period as that, suddenly had a case of measles brought into them, and the whole population, of all ages, were attacked; there was no immunity given by advanced age.

360. Have you any statistics with regard to the condition in relation to vaccination of those who have died of small-pox?—Since 1880 the small-pox deaths have been separated into deaths of those who are certified to have been vaccinated, of those who are certified to have been unvaccinated, and of those, being the larger number, of whose vaccinational antecedents no account was given. Since that date, omitting the deaths of all children under three months of age, and taking those only who had got to the age of compulsory vaccination, there have been altogether 10,578 deaths from small-pox. Of these, 2,843 were certified to have been unvaccinated, and 2,032 to have been vaccinated; while as to the remaining 5,703, there was no information. Now it is generally estimated, and I believe the estimate is not disputed, that about five per cent. of the population are unvaccinated; consequently, if vaccination has no effect in hindering small-pox, about five per cent. of the deaths from small-pox should be the deaths of unvaccinated persons, that being the proportion of such persons in the population. As a matter of fact, limiting ourselves to those of whose condition we know something, and who are certified to have been either vaccinated or unvaccinated, 58 per cent. were deaths of the unvaccinated, instead of five per cent.; that is to say, the deaths were raised from five to 58 per cent. in some way quite unintelligible, if one supposes that vaccination had not affected the matter. It must, however, be admitted that in that comparison there are 5,000 odd omitted of whose condition we know nothing. It may be said, of course, that all these deaths were of vaccinated people. Even if you admit that, you find that the deaths of the unvaccinated were 27 per cent. of the total deaths, instead of being five per cent., and that is on the extreme hypothesis that everybody of whom we know nothing as to their condition had really been vaccinated.

361. Does that include the deaths at all ages?—At all ages, except of those under three months.

362. But it includes all above three months?—Yes.

363. Have you made any similar calculation of those above three months, but below ten years, because it has

been suggested that in children above the age of 10 or 12 years the effect of vaccination would have died out, and that a person certified as vaccinated would not enjoy the same protection as complete vaccination would give?—I have no such information, I could do it below ten or below 15, but not below 12. The deaths are only taken out by certain periods, and 12 is not one of them. The figures in Table B suggest that the effect of vaccination dies out, because they show an increase of mortality from small-pox, after 15 years of age.

364. Will you give the rate to the Commission from three months up to 10 years?—I will do so by the next meeting of the Commission. (*See Appendix II., Table D: page* 114.)

365. Have you also made out a table showing the distribution as regards age of the vaccinated and unvaccinated, who die from small-pox?—Yes, I have; and omitting, as before, all children under three months, that is, under the age of compulsory vaccination, and separating the deaths into what I will call unvaccinated and vaccinated deaths, and taking the unvaccinated deaths, I find that 60 per cent. of them were under the age of 15; consequently, if all persons were unvaccinated, 60 per cent. or thereabouts of the deaths from small-pox would be of persons over three months and under 15 years of age, this being the proportion among the unvaccinated. But taking the vaccinated deaths, I find that only 13 per cent. were under 15 years of age; so that it appears to me that there must have been something or other in the introduction of this practice of vaccination which has reduced the proportion under the age of 15 from 60 to 13 per cent.; that vaccinated persons under 15 are enjoying some greater protection than vaccinated persons above 15, and that this protection is not enjoyed by those who are unvaccinated. (*The table was handed in. See Appendix II., Table E: page* 114.)

366. That would give information of the same description as the return which I asked for just now?—Yes, of the same character.

367. These figures would show that out of every 1,000 who died unvaccinated 597 were under the age of 15, and that out of every 1,000 who died vaccinated only 126 were under 15 years?—Yes; I said 60 per cent. in round numbers; it is 597 in 1,000. As regards the ages of the vaccinated and the unvaccinated respectively who die of small-pox, there is another point to which I would call attention, but which is not shown in that table, namely, the different proportion in the two cases of deaths in the first three months of life and in the next nine months among infants in the first year of life. Clearly, supposing vaccination to afford any protection, children who are over the age of compulsory vaccination are in the aggregate more protected than children who are under the age of three months, because a large proportion of them will have been vaccinated, and that difference between the two ought to increase as vaccination becomes more and more stringent. Therefore I have looked to see whether that was the case, and I find that in the years from 1852 to 1860, 63 per cent. of the infantile deaths from small-pox were of infants over three months; from 1861 to 1870 the proportion had fallen to 57 per cent.; and then, taking the period from 1881 to 1887, it had fallen still further to 50 per cent.; so that there is a progressive diminution in the proportion of infantile deaths from small-pox among those over three months of age who are getting more and more protection by the increasing stringency of vaccination. The numbers on which the calculation is based are not very large, so that I should not think the argument was of any great value; still that is how the figures came out.

368. Is there any other point arising upon the statistics to which you desire to call the attention of the Commission?—I understand that you are excluding the question as to whether other diseases have increased owing to vaccination?

369. Yes; that will be a later part of our inquiry. I understand you to say that the general death rate has decreased as well as the general small-pox rate?—The general death rate has decreased 9 per cent., while the small-pox rate has decreased 72 per cent.

370. (*Sir James Paget.*) Would there be any material difference if you were to divide the period from 1854 to 1867 and from 1868 to 1880?—I am afraid I cannot answer that off-hand. You mean instead of taking it from 1854 to 1871. I should think there would; because in 1871 there was a considerable outbreak, and that would be excluded from the earlier period.

371. That would affect the question of the influence of the alteration of the Act of 1867?—That Act was comparatively inoperative; it gave permission to boards of guardians to appoint vaccination officers, but apparently they did not comply with it in a great number of cases.

372. The great contrast did not begin till 1872?—It did not begin till the Act was passed in 1871, in consequence of the alarm created by the outbreak of disease; and this Act came into force in 1872.

373. (*Mr. Savory.*) In the present state of the law with regard to vaccination, what children are exempted?—None, I believe.

374. But supposing a child was in ill-health?—A child who is certified by a medical man to be unfit for vaccination is of course not vaccinated?

375. At that time?—Yes, at that time.

376. That does happen?—You will get that from the Local Government Board. The business at the office with which I am connected has ceased before that time; our business as regards vaccination is simply to furnish the vaccination officers with a list of all children whose births are registered; after that we have discharged our duty, and the matter falls into the hands of the Local Government Board.

377. You could not tell, in fact, whether any children escape vaccination altogether, or how many?—No, I cannot tell that except by the returns made every year by the Local Government Board, giving the number of births, the number of successful vaccinations, the [illegible] of deaths, and the number of cases which are finally unaccounted for—that have gone away and disappeared.

378. Could you give the Commission any idea of that figure?—I am afraid I could not; it differs very largely in different parts.

379. Have you any information to give the Commission upon the general practice; is a child allowed to escape vaccination upon the ground of being delicate, although without specific disease?—I am afraid that I cannot give you any sufficiently satisfactory answer to these questions, because it is outside my office, and I only know by hearsay.

380. I wish to ask you as to the distinction between typhus and typhoid: that distinction has been comparatively recently made?—Yes.

381. Before that, typhoid got included with typhus, did it not?—Yes.

382. So that the figures about typhus are not worth much?—They are not worth much, but it is generally admitted that typhus has very much declined.

383. Still, up to that time there would be that confusion between the two; probably under typhus, typhoid would be included, and probably other fevers too?—There was no attempt to separate them until the year 1869.

384. (*Professor Foster.*) You said that the death-rate in the later periods of life from small-pox had actually increased?—Yes.

385. Is the increase great; do you know about how much it is?—Taking the ages from 15 to 25, the rate increased between the first and second of my three sub-periods from 109 in a million to 163 in a million, but since then it has gone down to 122. Taking the ages from 25 to 45, the rate rose from 66 to 131; and since has fallen to 107; finally, taking the ages from 45 years upwards, the rate rose from 22 to 52; and then fell in the third of my sub-periods to 47; and you will notice that in the last period there has been a decline again.

386. It has not been a progressive increase?—No, in the third sub-period there has been a decline, owing, as I believe myself, but that is a matter of opinion, to the greater use of re-vaccination; it has only occurred in the last few years. I made out a similar table to this some eight or nine years ago, and that showed a progressive increase, but the addition of the new years to the table shows a fall at the later ages.

387. Is that shown upon your diagram; do you give a curve for that?—No.

388. Do many other diseases show a similar increase at the later ages?—There are several diseases which show an increase at the later ages, but none, that I am aware of, that show a similar decline at the earlier ages and increase at the later ages.

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389. Do any?—The mortality from cancer shows an increase at all ages; but still, as cancer is mainly a disease of adults and elderly persons, of course, the chief increase is at the later age-periods.

390. I understand that this increase in the later years has been during the period from 1837 onwards?—I am afraid that I do not understand the question.

391. The general death rate has diminished?—The general death rate has diminished.

392. The death rate in the early years from small-pox has very markedly diminished—from 1837 on to the present time, very much more than the general death rate?—Yes.

393. But the death rate in the years from 15 to 45, so far from decreasing, has actually increased:—Yes. The small-pox rate has increased between those ages.

394. But that increase has not been progressive?—It has not been progressive.

395. There was apparently a progressive increase up to a certain period; now it has changed and it has begun to decrease?—Yes.

396. Is there any other disease of which there is any record during that period which shows anything like that?—I know of none; but I have not calculated out the rates for many diseases in the same way as this; it is a very long business.

397. You have no reason to think that there is?—No.

398. For instance, cancer, which you mentioned just now, has nothing to show like that?—No, that is increasing in every age-period.

399. When you said that the estimate was that five per cent. of the population was unvaccinated, does that mean five per cent. of the population above three months, or five per cent. of the whole population?—I have taken it to mean above three months, but I am not quite certain.

400. That would not make much difference to your figures?—No.

401. Your other results were calculated upon a population above the age of three months, not upon the whole population?—Yes. In the figures which I gave as to the vaccinated and unvaccinated, all deaths under three months are excluded.

402. (*Mr. Savory.*) How do you get the five per cent.?—It is the ordinary received estimate which I borrow from the reports of the Local Government Board. I cannot tell whether it is precisely accurate; but even if the per-centage were 10 or 20, my argument would not be changed, because 58 per cent. of the small-pox deaths are of the unvaccinated; while nobody supposes that 50 per cent. of the population or even 27 per cent. are unvaccinated.

403. (*Mr. Whitbread.*) Is there any reason to suppose that any considerable number of births escape registration?—We do not know the number; doubtless some births escape registration. There is a practice in some places—in large towns—to pass off children which have been born alive, as still-born. The parents bury them without any service as still-born, and without any registration: those cases occur, and we prosecute from time to time when this offence has been committed.

404. Five per cent., which is the generally received estimate of the unvaccinated, applies only to the registered births?—No, it is five per cent. of the living population of all ages or of all ages above three months.

405. Do you suppose that there are fewer who escape registration now than there used to be—that the statistics are more accurate?—We take all the pains we can to get the births registered; it is impossible for us to know what proportion escape.

406. Have you any idea—can you form any estimate of the number?—No, we have no data upon which to form it.

407. Would no data be possible to arrive at?—I do not think there is any possibility of ascertaining how many births escape registration.

408. But surely a comparison with the deaths and with the census and with the emigration would give you some clue?—I do not see myself how it could be done. I should be glad if there were some means of forming a trustworthy estimate.

409. Do you think that the number who escape registration is large?—"Large" is an indefinite term; but the number of births that are registered every year is nearly 1,000,000, so that a small per-centage would give a large number.

410. Would you suppose that they amount to two or three per cent.?—I should not think so, but I have no means of forming an estimate.

411. (*Mr. Meadows White.*) You gave three periods, comparing the mortality in the thousand for small-pox: one of them was from 1871 to 1880, the next from 1771 to 1780, and the next from 1671 to 1680?—Yes, that was so; I gave the proportion of small-pox deaths to 1,000 deaths from all causes.

412. I observe, comparing 1771 to 1780 with 1671 to 1680, that in the first of those two periods in the order in which you gave them, it was 97 to the 1,000?—Yes.

413. From 1671 to 1680 it was 66?—Yes.

414. I presume that would be on account of an epidemic at one time?—Yes; no doubt there were then, as now, very striking fluctuations.

415. I do not know whether you have noticed the reason for that difference?—I have not.

416. There is a great difference again between 66 and 20, as it was in 1871 to 1880?—There is. But I would notice that in this calculation we are measuring small-pox by the fluctuating standard of the total deaths. A difference in this proportion of small-pox to total deaths does not necessarily imply a corresponding difference in the amount of small-pox; for if there had been a larger number of deaths from any other cause of death, that would alter the proportion.

417. Could you tell me how much of the 19 in the thousand in 1871 the epidemic is responsible for which occurred in the year 1871–72?—Nearly three-quarters of the small-pox deaths in 1871–80 occurred in the years 1871 and 1872.

418. Was that general over the country, or was it confined to the large towns?—The epidemic was pretty general all over the country; the towns, of course, suffered most; almost all the towns suffered more or less, but not all exactly in the same year. The outbreak was spread over two or three years. But more than a third of the deaths were in the year 1871.

419. Were any places specially exempt?—I cannot say.

420. You say that it was not the business of your office to investigate the relative mortality in the different places, but you could give that, of course?—I have here a table which gives the mortality in the years from 1871 to 1888 in 20 great towns.

421. You could not tell by a glance at that table whether any and which of the great towns had any special immunity from the epidemic?—I could not, but I have a table which gives you for a period of 18 years, the mean mortality from small-pox, in the Weekly Bills of Mortality, in the 20 great towns which were then recognised.

422. (*Chairman.*) Have you got the year 1888 and the deaths per million in 1888?—I could give them in a short time, but they have not been checked, although we have got them out. I struck them out from this table for that reason.

423. Could you tell the Commission what they would be approximately?—They are lower than they have ever been before.

424. (*Mr. Meadows White.*) I thought that such an inquiry might possibly lead to a reason for the immunity from small-pox in those particular cases which would be a guide for the future. I do not know that it would so turn out, but there might possibly for instance have been special means of isolation in these large towns, or some particular pains taken in the way of special precaution. I see that the figures in these towns in the four years which include the years of the epidemic go from 2·30 to 0·11?—There has been no great outbreak in the towns since that of 1871–2, so that these figures are made up, with some small exceptions, from the deaths in that epidemic. Figures for each year can be given for each of these 20 towns, but I have not got the requisite book here.

(*Chairman.*) I think that had better be done.

(*Witness.*) I understand you wish to have the annual mortality of those two years for those 20 towns.

425. The mortality of Sunderland is given as 2·30; Oldham as 0·32, and one would like to see whether that

arose from a general contrast between those towns in respect to the deaths from small-pox, or whether it resulted from the 1871 and 1872 epidemics having affected one of the towns and not the other?—I think it would be proper to include the year 1870 also, because the outbreak began in the year 1870 in some of the towns; it began earlier in some of the towns than in others.

426. (*Mr. Picton.*) It did not conclude in some of the towns till 1873. There was a large mortality in Leicester in 1873?—I will give it for each year if the Commission wish.

427. (*Chairman.*) I think it would be better to give it for each year so that we can make the comparison ourselves, because there was no epidemic which very generally affected the mortality in 1873, was there?—I will look at the returns for each year, and make a table that will cover the epidemical period of any town that was affected, giving the return for each year separately. (*See Appendix II., Table F: page* 115.)

428. (*Mr. Picton.*) I should like to ask you whether you have a return of the precise number of vaccinations in each year, and the precise number of small-pox deaths?—I can give you the number of deaths from 1838 to 1887; the number of vaccinations I cannot speak to officially.

429. Is the register of vaccinations sent up to the Registrar-General at all?—No, he has nothing to do with it; the Registrar-General is the Registrar-General of births, deaths, and marriages; he has nothing to do with vaccinations.

430. The Registrar-General supplies monthly to the vaccination authorities the number of births?—Yes, that is all he does in the matter; the local registrars send to the vaccination officer of the district the name and address of the parent of every child whose birth they register. Their business is then finished.

431. The vaccination authorities then do not return to him but to the Local Government Board the number who have been vaccinated?—Yes, quite so.

432. At any rate, I suppose you know that the proportion of vaccination in different towns varies considerably, does it not?—Yes.

433. Are you aware of the extent of vaccination in the town of Sheffield just previously to the outbreak of the epidemic there?—I am not.

434. You have read the report, I daresay?—I have seen it.

435. You have no reason to doubt the accuracy of what they state, that Sheffield was at that time a well-vaccinated town?—I know nothing about it more than I read in the report.

436. You only know that the rate of vaccination varies in different towns?—I only know that in the same way as you do; I see it in the Blue Books which are published by the Local Government Board.

437. (*Dr. Collins.*) You gave us the deaths from small-pox per 1,000 deaths from all causes in three periods, 1671–80; 1771–80; 1871–80. In the second period, 1771–80, the deaths were 97 per 1,000, 30 per 1,000 higher than in the previous century. Can you give the Commission any reason for the excessive mortality of that time?—No; I do not know that it implies excessive mortality; it may have been a diminished mortality from other diseases; that would produce the same effect as an increase of small-pox.

438. It would only show a larger proportion of persons who were buried having died of small-pox compared to the total number of persons who were buried?—That is all.

439. You would not infer from that that small-pox was excessively prevalent at that period, would you?—It does not necessarily follow. But if you admit, as I presume we all admit, that the general death-rate was higher at that period than it is now, then you have the fact that a larger proportion of that higher death-rate was due to small-pox.

440. In the absence of knowledge of the population, you would not attribute it necessarily to an increase of small-pox?—The increased proportion of small-pox deaths does not necessarily imply an increased small-pox death-rate, unless it be admitted that the death-rate from all causes had increased.

441. Then again you find, that in the earlier period of registration, the deaths from chicken-pox were included in the table?—They were included in the earlier years, and I have included them in the later years in order to make the figures throughout comparable.

442. Could you give the Commission the years in which the deaths from chicken-pox were included, and those in which they are not?—I could not say; I found the flaw in the table, and I remedied it by putting in the deaths in the later period from chicken-pox.

443. Could you tell us whether the deaths from chicken-pox have increased?—They are given every year, but they are such a small number that one has taken hardly any notice of them.

444. But could you tell us whether they have increased or not?—Not without referring to volume after volume.

445. Would you kindly give us that information at the next sitting?—Certainly.

446. (*Chairman.*) If you had omitted the figures of the deaths from chicken-pox in the later period it would have appeared to make the argument in favour of vaccination more favourable than it should have been?—Quite so, but still the inclusion or omission of chicken-pox practically amounts to nothing, the deaths from it, or rather ascribed to it, are so few; for instance, in 1887 there were 89 deaths under that heading.

447. The number you gave us was how many per million?—It would hardly be appreciable at all; in England you have 30,000,000 of population, speaking roughly, and 89 would amount to about three per million.

448. (*Dr. Collins.*) Could you give the Commission the deaths from chicken-pox in the earlier years of registration?—No; in the earliest years they were not separated from the deaths from small-pox.

449. You told us that you estimated that 95 per cent. of the population were vaccinated?—95 per cent. of the population over three months.

450. In the evidence given before the Select Committee which sat in 1871, Mr. Simon, as he was then, gave the percentage of people vaccinated as 97½; if those figures be correct it would show a lower percentage of successful vaccinations since 1871 than there were before?—My figure of five per cent. unvaccinated, I took from some of the Local Government Board reports; it was not intended to be an accurate mathematical calculation; it was a general estimate made, I do not know upon what basis.

451. But if your estimate is the correct one, and if the estimate given by Mr. Simon in 1871 was a correct one, apparently there are fewer of the population vaccinated now than there were then?—I apprehend that these figures, 95 per cent. and 97½ per cent., are practically one and the same, so far as concerns the subject in hand. If Sir John Simon said 97½ per cent. he had probably some more accurate method of making his calculation than I had.

452. Did the last Act of 1871 have any effect upon the proportion of successful vaccinations to births?—I cannot give any statistics as to that; there were, however, more stringent arrangements made for vaccination, and I do not doubt that these had an effect.

453. Why did you not give the year 1867 as dividing your periods?—Because the stringency did not increase then in any notable way; the year 1872 was the year in which the boards of guardians were forced to appoint vaccination officers; the year 1868 was the year in which they were allowed to appoint vaccination officers; but it was the compulsory appointment of vaccination officers which was the matter of importance. It was, I believe, owing to the neglect of the guardians of the permission to appoint them that the appointment was made compulsory.

Adjourned till Wednesday next at 1 o'clock.

Third Day.

Wednesday, 10th July 1889.

PRESENT:

THE RIGHT HON. THE LORD HERSCHELL IN THE CHAIR.

Sir JAMES PAGET, Bart.
Sir CHARLES DALRYMPLE, Bart., M.P.
Sir W. GUYER HUNTER, K.C.M.G., M.P.
Sir EDWIN HENRY GALSWORTHY.
Mr. WILLIAM SCOVELL SAVORY.
Mr. CHARLES BRADLAUGH, M.P.
Dr. JOHN SYER BRISTOWE.
Dr. WILLIAM JOB COLLINS.
Mr. JOHN STRATFORD DUGDALE, Q.C., M.P.
Professor MICHAEL FOSTER.
Mr. JONATHAN HUTCHINSON.
Mr. J. ALLANSON PICTON, M.P.
Mr. SAMUEL WHITBREAD, M.P.
Mr. F. MEADOWS WHITE, Q.C.

Mr. BRET INCE, *Secretary.*

Mr. William Ogle, M.D.

10 July 1889.

Mr. WILLIAM OGLE, M.D., further examined.

454. (*Chairman.*) You wish, I understand, to make some addition to your former evidence?—I should like, with your Lordship's permission, to correct, or rather to supplement an answer I made to one of the Commissioners on the last occasion. Mr. Whitbread asked me whether I had any means of estimating the number of births that escape registration, and I said that I had no data sufficient for the purpose. That answer generally I would give again; but it has been since called to my mind that estimates were made by my predecessor, Dr. Farr, and though the method he employed is one that does not appear to me to be likely to give trustworthy results, still I thought you would wish perhaps that I should apply it again, and I have done so. I find that it was estimated by that method, which, as I said, appears to me to be an unsatisfactory one, that, between 1841 and 1851, 6·5 per cent. of the births escaped registration; that in the next decennium, from 1851 to 1860, 2·9 per cent. of the births escaped registration; that in the next decennium, 1861 to 1870, 1·8 per cent. of the births escaped registration; and now, applying it myself to the next decennium, 1871 to 1880, I find that 0·91 per cent. of the births—rather less than 1 per cent.—escaped registration. As I have said, I do not think that these estimates are trustworthy, but for comparative purposes they might be used, and they would show that there has been a progressively increasing accuracy in the registration.

455. (*Mr. Whitbread.*) What was the process by which you arrived at that calculation; what were your data?—When a census is taken, you have the ages of people given, and you take the number of children living between 0 and 10 years of age. By means of a life-table you calculate to what number of births in 10 years that number of survivors corresponds. That is your estimated number of births. Comparing that estimated number of births with the number of registered births you find a certain deficiency in the latter.

456. (*Chairman.*) What is the main source of error in that calculation?—It assumes, in the first place, that the ages are returned accurately at the census, which is by no means the case. Secondly, the recognised weakest part of all life tables is that which relates to the first years of life; but this calculation assumes that the life-table at these ages is perfectly accurate, and not only that it is perfectly accurate, but that a life-table made for one period holds good for another period. Lastly, I should say that it appears to me to involve an argument in a circle, because the life-table itself is founded, to a certain extent, upon the very data which you are correcting, and to which you are applying it.

457. Do you think it would be sufficiently accurate to show that there had been a decrease in the percentage of unregistered births?—I think it might probably be so. I should not like positively to say that it is, but inasmuch as this method, applied decennium after decennium, leads to a result which *a priori* is very probable, I think that its tallying with what one would expect is an argument in its favour.

458. (*Professor M. Foster.*) But you believe it because it corresponds, though you do not trust the argument at all?—I do not trust it at all. The calculation leads to the conclusion that in the decennium 1871-80, under 1 per cent. of the births escape registration. That is under 8,000 in the course of the year out of 800,000. The difference is so small that when you have all these assumptions, every one of which is very doubtful, I do not think that a difference of under 1 per cent. can be trusted to represent the facts. Such a small difference comes well within the limits of error, which must be allowed in so uncertain a calculation.

459. (*Dr. Collins.*) I think you said when you were last before the Commission that you would be good enough to give us the deaths from chicken-pox for such years as they are available?—Certainly (*handing in a table. See Appendix II., Table G: page* 115).

460. Could you give us any information as to the age of those who died from chicken-pox?—I would rather say those who are returned as dying from chicken-pox, for I never myself knew a child die of chicken-pox. If you will give me one of the Annual Reports I can point out to you what were the ages.

461. I believe as a rule they are under five years of age, are they not?—Certainly.

462. You have just told us that you do not think that a child has ever died from chicken-pox; did you include such figures because you could not otherwise make the figures comparable?—I included chicken-pox with small-pox because I could not otherwise make the figures for the whole series of years strictly comparable.

463. Would you agree with the Registrar-General, who, in his Forty-ninth Report, says of chicken-pox, "As this ailment is rarely or never fatal, in all "probability most or all of these deaths were due to "small-pox"?—Yes.

464. I believe some authorities are of opinion that chicken-pox and small-pox are the same disease?—That is a matter that hardly comes under the statistician's consideration. I see that in the year 1880, the report for which year is put into my hands now, of 66 deaths of males attributed to chicken-pox at all ages, 65 were under five years of age.

465. I think that prevails throughout?—Yes. The deaths ascribed to chicken-pox are invariably of young children.

466. Have you any reason to suppose that those cases of fatal chicken-pox were cases of varioloid or modified small-pox?—I have no statistical evidence upon it; I can only express my opinion. The deaths were returned as deaths from chicken-pox, and they are so tabulated. My own opinion is that in all probability they were cases of small-pox.

467. Referring to Table L. of the Forty-third Annual Report of the Registrar-General, page xxii, could you tell me the formula by which those figures are calculated; are the death-rates mean annual rates, or is the total number of deaths taken upon the population in the middle year of a period?—The mode in which these figures were obtained was this: We have an estimate of the population divided out by ages for each year. We add the figures up for the years 1847-53; and so we get the aggregate population with their ages for the whole time; we have the deaths for the whole time divided out by ages in the same way; we add these up and we strike the rates from these data. The rates in the table are not the average of the annual rates. In some of our tables the rates are so obtained; but in the case of this table this is not the case, but it is prepared in the way that I tell you.

468. Then you accept such figures as the estimated population at different ages?—Certainly.

469. And they are not published, I think, in any returns?—They are published for the census years of course, but for other years we have the estimates in manuscript.

470. I mean the intervening years?—For the intervening years the number of the population is only estimated, and necessarily the ages will be an estimate.

471. With regard to the division into three periods which you have adopted, Sir John Simon told us that you would probably be able to give us information as to the selection of these periods?—They were selected by myself.

472. I think you told us in answer to Question 371, that you selected the period from 1854 to 1871 because you said that the Act of 1867 was inoperative?—Yes, I think I did say so. It would be more accurate to say that it was inoperative comparatively with the Act of 1871.

473. You say "Apparently it gave permission to "boards of guardians to appoint vaccination officers; "but apparently they did not comply with it in the "greater number of cases"?—What I intended to say was, that apparently in a great number of cases they did not comply with it.

474. Have you seen the report of the select committee of 1871?—Yes, I have seen it, but not for many years.

475. I see that they say there: "Your committee "are glad to find that wherever the Guardians "endeavour to carry out the law, it is very generally "and indeed almost universally enforced; but there "are some amendments by which they think the Act "referred to them might be made more efficient. By "sec. 28, the Guardians of any parish may appoint an "officer to promote vaccination, and to prosecute "persons offending against the Act; and it appears "that in the majority of the Unions such officers have "been appointed, and that the law in consequence is "more efficiently administered."?—If that be so, my language would have to be modified. When these periods were selected or taken, I took trouble, so far as I could, to inform myself as to the Acts. I read the Acts, and I inquired at the Local Government Board and at various places where the proper division was to be made; and after listening to all the evidence and reading all the evidence I could, I came to the conclusion that the division in the table fairly represented the facts, and that the Act of 1867 was comparatively inoperative.

476. Does the Report of 1871 make that clear?—Yes; the Act having been passed in 1867, in 1871 they found it necessary to pass a new Act. The fact that in such a short time after the Act of 1867 was passed it was found necessary to modify it seems to me to be a proof that the Act had been practically inoperative.

477. You think that it would be unfair to date the era of compulsory vaccination from the year 1867?—It depends upon what you mean by compulsory. Vaccination was compulsory after 1867 in the sense that the law said that the people were to do it, but it was not compulsory in the sense that the proper mechanism existed for enforcing the obligation.

478. Was there not an obligation upon the guardians to prosecute in case of non-compliance with the Act?—I do not know; there may have been. They had, I believe, the power of prosecuting, but whether they used it to any extent I do not know; but they had not got the mechanism of vaccination officers generally established throughout the country to give them the information that was the necessary antecedent to such a prosecution.

479. You do not think that it would be fair to say that what the Act of 1871 really did was to perfect vaccination registration rather than to perfect compulsory vaccination?—No. I cannot give you the figures which you will get probably more accurately from the Local Government Board; but I should say that such evidence as I could get showed that there was a much greater proportion of children vaccinated after the Act of 1871 was passed than there was before. There were a great many vaccinated during the epidemic; there was an enormous rise in the number of vaccinations in the year 1871, when there was a terror of small-pox; but if you go back a year or two before that, you will, I believe, find that the number of successful vaccinations in proportion to the number of births was much smaller than it was after the Act of 1871. But those figures I am not prepared to give you. You will get such as exist from the Local Government Board, but there were no full returns published until the year 1873, so that I could not get any official statement of the facts. Although, however, I hold that the division which makes the period of really compulsory vaccination begin in 1872 is the division which tallies most correctly with the facts, in order to satisfy your objection, I have re-arranged the periods as you apparently wish them to be re-arranged.

480. It would be interesting to hear the result?—I have made now four sub-periods, and have calculated the average annual death-rate for each sub-period at all ages, but not for each age-period separately. I have taken the whole period from 1838 down to the present time, and I have divided it into four sub-periods; the first is from 1838 to 1839 inclusively, these being the two years in which vaccination was not only voluntary but had to be paid for, and was not gratuitous. The mean annual mortality from small-pox was 827 per million living in those years.

481. In 1838 to 1839 there was an epidemic?—Yes, in 1838 there was an epidemic. Then in the second sub-period, 1840 to 1853 (with a gap of four years, as you know) vaccination was voluntary and gratuitous, being paid for at the public expense. The deaths from small-pox fell to 336 per million in those years. In the third sub-period, 1854–67, in which vaccination was nominally obligatory, but there were no vaccination officers, the small-pox deaths fell to 188 per million. Then in the period from 1868 to the present time, during which vaccination has been obligatory, and there have been vaccination officers, the small-pox deaths fell still further to 155 per million. So that the total fall from the time when vaccination was purely voluntary and had to be paid for has been from 827 per million to 155 per million. As I say, I do not myself think that that is a proper division; I think that the first period of two years is a great deal too small to found any just argument upon, and I think that the last sub-period should not begin with 1868 but with 1872.

482. I think you told us that there were some other diseases, including fever, which showed a considerable decline of mortality, could you give us the figures for the same three periods with regard to fever?—Yes, I have them here, and I can give them to you in a form like that of Table L. of the 43rd Annual Report of the Registrar-General. This Table L. has, however, as you are aware, been corrected in the table which I have put in (Table B.), by the addition of seven more years, bringing it down to 1887, and this table for fever gives the death-rates for the same three sub-periods as are taken in that corrected or enlarged table for small-pox. (*See Appendix II., Table C: page* 114.)

483. Would you give us the figures as to fever for all ages for the three periods?—In the first period the number was 1,139 per million; in the second period it was 870 per million; and in the third period it was 367 per million, showing a diminution of 67 per cent. in round numbers.

484. So that the decline of fever has practically been as great as that of small-pox?—Yes, nearly as great as that of small-pox.

485. Was not a similar decline in fever coincident with a similar decline of small-pox observed by Dr. Farr in the figures given for the earlier part of the century?—Your question is a double one, I think. Did Dr. Farr observe that there was a decrease in fever at the beginning of the century, and was that coincident with the decrease in small-pox?

486. Precisely?—I do not know.

487. Does it not appear from the returns that there was a decrease of small-pox at the beginning of the century?—There were no Registrar-General's returns at the beginning of the century.

488. Only Bills of Mortality for London. Could you give us the figures for typhus fever for the same periods?—We have not got them. Typhus was not separated from typhoid fever till a very late period; but typhus has admittedly declined very largely.

489. I think you observed that it was only within comparatively recent years that typhoid fever has been differentiated from typhus?—Yes, in our statistics it has only been differentiated since the year 1869.

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490. I take it, then, that if there were cases which were formerly not called typhoid and which are now called typhoid, it would rather tend to increase the apparent mortality from typhoid?—If there were cases now transferred to typhoid from some other heading that would increase it.

491. As a matter of fact, however, there has been a decline of typhoid?—There has been a large decline since the separation in 1869.

492. In the 42nd Report of the Registrar-General, at page xxix, he says: "It is only since 1869 that the "deaths from typhus, from enteric fever, and those "referred to the vague heading simple continued fever, "most of which are probably enteric, have been sepa- "rated from each other in our Reports. From that "time onwards, the deaths under each of these three "headings have almost continuously diminished, year "by year, and in 1879 each class of fever was at its "minimum. With them also has fallen remittent fever "which, in the majority of cases referred to it in this "climate is doubtless but an alias for enteric fever. "Had the deaths from one or more of this group of "cases fallen, while those from others in the same "group had risen; or had the fall been trifling; or the "totals dealt with insignificant in amount; it might "have been suspected that the alteration was a mere "alteration of name. But as the deaths under each "heading have declined; as the fall in the death-rate "from them has been enormous, 62·4 per cent. in the "course of ten years; and as the totals are by no means "small; it may be accepted as an indisputable fact that "there has in truth been a notable decline in these "pests, and it may be fairly assumed that the decline "is due to improved sanitary organisation." May I take it that you agree generally with that. Perhaps it is your own statement?—Yes, I agree with it thoroughly.

493. In estimating the decline of deaths from small-pox, which is also a member of the zymotic group of diseases, how much of the decline would you feel inclined to attribute to sanitary improvements?—Speaking roughly, I do not suppose you can attribute more than you can to the decline in the general death-rate. The decline in the general death-rate has been 9 per cent. in the period embraced in these tables. Therefore I presume that you might, in the absence of any other knowledge upon the subject, assume that the fall in small-pox would be about 9 per cent.. whereas it has been, as you know, some 72 per cent.

494. But I take it that the general death-rate includes cases of drowning, poisoning, premature birth, and so on, cases which should certainly be eliminated from any such consideration?—But the deaths from drowning and poisoning and the like are perfectly insignificant in amount, and surely cases of children dying from premature birth ought not to be eliminated from the account when we are considering sanitary measures.

495. Do you not think that it would be fairer to compare the zymotic death-rate rather than the total death-rate, or perhaps the death-rate from such a disease as typhus or typhoid fever?—Yes, I think it would be fairer.

496. Have you done so?—Yes.

497. Will you give us the figures?—I gave them for measles and whooping cough in answer to Question 352, and the table I put in (Table C.) gives them in greater detail for fevers.

498. That is for the three forms of fever combined under one head?—I cannot give them separately further back than 1869.

499. Could you give us them for those quinquenniads or decades for which you have the figures, from 1869?—I can give you the rates each year. One of the three headings into which the old general heading "Fever" was divided is "Simple or Ill-defined Fever." The greatest decline has been under this heading, the deaths having fallen from 239 to 18 per million. That is in great measure owing, doubtless, to the cessation of the habit of calling any feverish complaint a fever, that is to say, the cases which really were not fever at all are getting gradually eliminated.

500. What about typhoid?—Typhoid has fallen from 390 to 182.

501. That is a considerable fall?—Yes, more than half, 50 per cent., and it is still falling. During the last several years it has hardly fallen much, but it has fallen very greatly in the whole period since 1869. I can give you the figures in periods of five years.

502. That was what I was asking for—the quinquenniads?—In the quinquennium, 1871–75, the annual deaths per million from enteric fever, were 374; in the next quinquennium, 227; and in the next quinquennium, 215.

503. Now, with regard to the shifting of age of the mortality from small-pox, could you give us any information to show whether there has or has not been any similar shifting of age as regards the mortality from typhus?—No, the number of deaths from typhus are so extremely few that if you divide them out by ages you have not a sufficient basis to calculate rates. I can only give you the rates at different ages for fever in the aggregate, and that is given in this table (Table C.); and, as I said last Wednesday, it shows this great difference from the corresponding table for small-pox, that, whereas the decline in small-pox has been entirely limited to those under 15 years of age, there being an increase at every age after that, the decline from fever has been common to all ages.

504. I have here the figures for typhus separately, and I find that from 1871 to 1875 there are given 9,517 deaths from typhus, of which 2,483 were under 15 years of age; from 1881 to 1885, the last available quinquenniad, the total deaths were 3,015, and of those 466 were under the age of 15. The percentage of those under the age of 15 in the first period was 26, and in the second period 15?—Yes. I cannot of course say whether the figures are correct.

505. These figures are not taken as a whole from the Registrar-General's returns, but they have been collected by a Fellow of the Statistical Society?—I daresay they are accurate. Of course it is going rather beyond statistics, but I should say that typhus fever, as you are aware, is not a fever at all fatal in infancy.

506. It is apparently less a fever of infancy than it was?—Because of the improvement in the mode of stating causes. Where children would have been said in previous times to have died of typhus, they are not now said to have died of typhus, but the death is put down to typhoid or enteric fever, or to some other ailment. There is an increasing recognition of the fact that fatal typhus fever does not occur to any extent amongst children; and consequently as that fact is more and more recognised there will be an increasing diminution of deaths of children ascribed to that cause.

507. At any rate, that fact is not borne out by any statistical evidence that you have before you?—No. As I have already said, the number of deaths from typhus is so small that I should never dream of making rates for it at different ages.

508. Surely it is important to ascertain if it be true that vaccination and not sanitation is responsible for the shifting of the age of persons dying of small-pox, that a similar shifting has not occurred in the case of other zymotic diseases, more particularly in those which are specially analogous to small-pox?—Doubtless it would be so; but what I say is that in the case of typhus there is another cause of diminution which does not occur in the case of small-pox. In the case of small-pox you have a disease which does kill children, and which is practically unmistakable when it attacks children. In the case of typhus you have a disease which is not fatal to children; but the term typhus in the old time was used in a vague way, and cases which were not really cases of typhus were called by that name. That has ceased now, or is ceasing to be the case.

509. Does not typhoid show a similar tendency, but less marked?—The decline under fever has been common to all ages, and the chief decline has been among adults. The ages of 45 and upwards are ages at which there has been a very great increase in small-pox. I have not got the exact figures, but the death-rate of adults, above the age of 45, from small-pox, has increased, while the death rate from fever at that age has gone down from 1,388 to 323, a fall of 77 per cent.

510. What periods are you comparing?—The same sub-periods that you have in that manuscript table which you put into my hands just now.

511. I thought that typhoid was not distinguished before 1869?—I have not the figures of typhoid; they were not separated. The figures I have been giving are for fever generally.

512. Then you have not compared the figures, for periods for which the deaths from typhoid are available,

to see whether there is any age-shifting in typhoid as there is in small-pox?—No, I have not the figures. The great mass of the deaths from fever are from typhoid, and I have not the slightest doubt that had I the figures for typhoid separately the same result would come out as comes out for fever altogether.

513. I find that from 1871 to 1875 there were 43,769 deaths from typhoid of which number 7,617 or 17·4 per cent. were under 5 years of age; whereas from 1881 to 1885 there were 28,788 deaths from typhoid, of which only 2,678 or 9·3 per cent. were under 5 years of age. That would show a tendency less marked, but in the same direction?—Yes. Do you find that there is any age in which there is an increase?

514. In the absence of figures for the estimated population at different ages one is unable to get that?—Without the population, how did you get your rates?

515. The figures are given in the reports and show the percentage of deaths?—I misunderstood your figures. I thought you were quoting rates. The figures you give show doubtlessly that the decline was greater among children than it was at other ages.

516. At page xxiii. of the 42nd report of the Registrar-General, he says: "That the sanitary efforts "made of late years should have more distinctly "affected the mortality of the young is only what "might be naturally anticipated; for it is against "noxious influences to which the young are more "especially sensitive that the weapons of sanitary "reformers have been chiefly directed." That shows the great importance of the question of age-shifting, and of comparing zymotic diseases rather than the total death-rate, does it not?—Quite so. I said before, I think, that zymotic diseases were the better ones to compare small-pox with.

517. But you have not compared it with the zymotic diseases?—Yes, I have.

518. Not in this Table L.?—But here I give them you for fever, which is the main one. It is impossible to make similar comparisons in the case of scarlet fever or measles, and diseases that only affect children. Fever is the only one of the zymotic headings that you can take, because it is the only one that affects all ages to any extent. Fever is, therefore, the only one which it is possible to subject to this kind of investigation, and I have done it for that.

519. With regard to the decline of scarlet fever, you told us that you attribute that chiefly to the fact that the majority of deaths from scarlet fever now occur in hospitals?—Of course that is hardly a statistical matter, but incidentally I stated that in the last five years there had been a very marked decline of scarlet fever simultaneously with an enormous increase in the use of means of isolation; and I put those two things together.

520. Very properly, no doubt. Could you give us the percentage of deaths from small-pox which take place in hospitals?—No.

521. That could be similarly obtained, of course?—For London it could; it could be got, of course, by means of the hospital returns.

522. But I take it that similar isolation precautions have been adopted in the case of small-pox as have been adopted in the case of scarlet fever?—In the absence of figures I am unable to say whether there has been the same increase. In 1878, 7 per cent. of the deaths from scarlet fever in London occurred in public hospitals. The proportion rose year by year until in 1888 it reached 43·4 per cent. I do not expect that there has been any increase at all analogous to that in the case of small-pox, but there may have been.

523. Do not the same Metropolitan Asylums Board hospitals which take in scarlet fever take in small-pox?—There are hospitals that take in small-pox, doubtless.

524. Have you any reason to think that small-pox is less isolated than scarlet fever is?—I have not got the figures, and I cannot answer without the figures. I have no reason to think one way or the other.

525. With your experience as to the mortality from small-pox since 1838, what would be your opinion as to this quotation which I take from the evidence given by Dr. Edward Jenner before a Committee of the House of Commons. He says, "It now becomes too "manifest to admit of controversy, that the annihilation "of the small-pox, the most dreadful scourge of the "human species, must be the final result of this "practice," speaking of vaccination?—If your question is whether small-pox is annihilated, I reply that clearly small-pox is not annihilated.

526. My question is, rather, whether you think it possible to annihilate small-pox by vaccination?—Annihilation is a strong term. I think you have already diminished it enormously, and I think that if vaccination was carried out more thoroughly and universally than it is, and accompanied by re-vaccination, you would diminish it still further; but as for annihilation, I do not know about that.

527. I think you said in answer to Question 360 that from 1881 to 1887 there were no fewer than 2,032 cases of fatal small-pox certified to have been vaccinated by registered medical practitioners?—I gave you the figures. I have not looked to see whether those figures are accurately printed, but I have no reason to suppose that they are not.

528. If that were the case, the question of annihilation would be exceedingly remote, would it not?—I do not see why.

529. If 2,032 persons not only had small-pox, but died of small-pox, and were certified to have been vaccinated by registered medical practitioners, would that lend plausibility to the hope of annihilating small-pox by vaccination?—There is no evidence whether these 2,032 persons had been re-vaccinated. It is generally admitted that the protective effect of vaccination becomes weakened in time; and the fact that 2,032 persons who have been vaccinated, perhaps imperfectly, should die of small-pox, does not at all show that perfect vaccination accompanied by re-vaccination might not have saved all those 2,032 lives. I do not say that it would.

530. The present law says nothing about re-vaccination. May I take it that with our present facilities for vaccination and our present compulsory legislation, you can see no hope of annihilating small-pox?—Are you correct in saying that the present Act does not recognise re-vaccination? I think it makes it gratuitous.

531. I should correct myself by saying that it does not compel re-vaccination?—It does not compel it. I might, perhaps, be allowed to say that, looking at a single year, the year 1867, the vaccinated who died of small-pox were all over 10 years of age, with one single exception among males, and two exceptions among females.

532. How many deaths were there from chicken-pox?—In that year the whole number was 85.

533. (*Sir James Paget.*) At what ages?—They were all under five.

534. (*Mr. Bradlaugh.*) Referring to your answer to Question 371, to which allusion has just been made, that the Act of 1867, in your opinion, was inoperative; I do not know whether you have read the evidence of Mr., now Sir, John Simon before the Committee of 1871?—I have not read it recently.

535. Are you aware that Mr. Simon then thought that the working of the law of 1867 had fully doubled infantile vaccination?—Very possibly he may have said so.

536. If your attention had been drawn to that, would you have put it quite as positively that the Act had been inoperative?—I have already said that I should have said comparatively inoperative.

537. In your answer, you go on to say that the Act of 1867 apparently did give permission to boards of guardians to appoint vaccination officers, but apparently they did not comply with it in the greater number of cases. I do not know whether you have had your attention drawn to the evidence of Dr. Seaton given before the same Committee. In answer to Question 5495, Dr. Seaton says, "The majority of unions in-"spected last year certainly had" [appointed an officer "to find out that the Act was complied with], and so "have those which have been inspected this year, up "to the present time." If your attention had been drawn to that, do you think that you would have said that the greater number of the guardians did not comply?—I think I said in a great number of cases, not in the greater number of cases, as printed here; for as I had not got the actual figures before me, I do not think it is likely that I should have said the greater number of cases, which might have implied that I knew the exact figures. I was informed at the time when that table was made that such was the case, but I had no official means of knowing whether it was or not.

538. Then you had not regard to the report of the Committee to which your attention has just been drawn

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by Dr. Collins, when the Committee unanimously reported that in the majority of the unions the officers had been appointed to promote vaccination and to prosecute?—No. I found I may say in the debate in 1871, when that Act was being considered, figures brought forward which seemed to show (I do not know how they were got, but they were given in introducing the Act) that in four large parishes in London, only about 15 per cent. of the births were stated to have been successfully vaccinated, and I know that at the present time, the proportion is over 80 per cent., but the trustworthiness of those figures that were given in the debate, I am unable to verify.

539. I suppose I may take it from the answer that you have just given, and from the previous answer that you gave to Dr. Collins, that you were under some misapprehension in your answer to Question No. 350, when you say that you objected to 1868 instead of 1871, because 1868 was during the period when permission was granted to boards of guardians to appoint vaccination officers, but that they did not appoint them, except in rare cases?—Yes, clearly that is too strong an expression. If I said except in rare cases, as I dare say I did, as it is printed here, it was doubtlessly too strong an expression of my opinion.

540. In fact, from the evidence taken before the Committee of 1871, and the conclusion arrived at by the Committee, it would be rather the reverse; that is to say, that instead of its being in rare cases that the officers had been appointed, the Committee were of opinion, and the official evidence showed, that in the majority of cases the appointments had been made?—So you have read to me. I may say that I found on inquiry at the Local Government Board satisfactory proof, as it appeared to me, that the number of vaccinations had increased very largely after the Act of 1871 was passed.

541. And had also increased enormously, if it be true that they doubled immediately after 1867?—I can only say that the figures that were put before me did not show that.

542. Mr. Simon, as he was at that time, occupied a position which gave him access to the figures?—He is a far better authority in the matter doubtlessly than I am.

543. He was hardly likely, I suppose, to take figures too unfavourably to vaccination?—How do you mean too unfavourably.

544. I mean that if he said that the working of the present law (that is the law of 1867) had fully doubled infantine vaccination, that must be taken as not a statement from one who was an enemy of vaccination?—Quite so; but to double the vaccinations does not imply that you have very general vaccination; it depends upon what the number of vaccinations was before they were doubled. If you have only 10 vaccinations to a million people, doubling them would only give you twenty per million. I do not in the least suggest that these were the figures, but merely that doubling a small number does not necessarily imply the general carrying out of vaccination throughout the country.

545. Have you any means now accessible to you (I do not mean at this moment, but in your official capacity) of verifying or otherwise that statement of Mr. Simon's?—I have none, but you will probably be able to get some figures relating to that from the officials of the Local Government Board.

546. In your Annual Reports now you have a classification of deaths from cow-pox and other effects of vaccination, have you not?—Yes.

547. Can you say at what date you commenced that classification?—I began it shortly after I succeeded Dr. Farr; it was in 1881.

548. I am not aware whether the medical certificates which formed the basis upon which these returns are compiled, come directly to your office or not?—The certified copies come. The registrars make precise copies of the certificates into the Death Register, and we receive certified copies of that Register.

549. Are those books preserved at your office?—Yes.

550. So that if for any purposes of this Commission it becomes necessary to refer to them, they could be referred to?—Yes.

551. You have had your attention drawn to the Table L. on page xxii of the 43rd Annual Report of the Registrar General, and I think I understood you to say that for the matter of that, and the following pages, you are practically or really responsible?—This Report is signed by the head of my office, the Registrar-General.

552. You have a personal knowledge as to the matter?—Yes.

553. The table is followed by words which suggest a gradual and notable decline at all ages of the deaths from small-pox; should you on consideration think that there has been a gradual decline?—The table shows a gradual decline in the three successive periods, the numbers being 305, 223, and 156.

554. Without taking the periods arbitrarily, divided as they are in that table, would it be the fact that year by year, there is a gradual decline, or is it not the fact that the periods of decline are followed by periods of augmentation of the death-rate in eccentric fashion?—There have been, as I think I answered before, large fluctuations, and very irregular fluctuations. But, notwithstanding that, the table, which is there in print, shows that taking the whole period of years since civil registration began, there has been a very large decline in the later years as compared with the earlier years. There are 46 years in the table, and in the last 23 years, as compared with the first 23 years, that is dividing the whole period simply into two halves, without any hypothesis as to vaccination, you will find that the rate in the first 23 years was only twice under 100, while it was twelve times under that figure in the second 23 years.

555. Can you say, taking from the first period until now, whether there have been any periods, and if any, which periods, of five years, in which there has been a continuous decline?—The diagram which I put in last Wednesday will show that at a glance.

556. Will it be true that the most marked continuous decline came in the five years following 1864?—There is a continuous decline from 1864, through 1865, 1866, 1867, 1868, and 1869. The decline is continuous without interruption during that period.

557. I suppose it is only the official vaccinations that you are able to take statistical notice of at the office?—We take no notice of vaccinations in our office, beyond the certified vaccinational condition of persons who die of small-pox. The statistics of vaccination belong to the Local Government Board.

558. Do you happen to know whether it is only of the official vaccinations that they take statistical notice?—It is of all vaccinations. The method is this: The local registrars supply the vaccination officers with a list of all children born, and their addresses. The vaccination officer sees that all those children are accounted for, as it is called; that is to say, that certificates of their having been successfully vaccinated, or of their being incapable of vaccination, or of their having died, or of their vaccination having been postponed, have been produced, and that applies to all children whether vaccinated officially or unofficially.

559. But it would be to the representatives of the Local Government Board, rather than to yourself, that I ought to address any questions as to those statistics?—Quite so.

560. I think from what you have stated to the Commission it is clear that the reduction of small-pox mortality does not always coincide with general reduction of death-rate?—It has not coincided in amount.

561. Take, for example, the year 1875, in which you had a small small-pox death-rate, and a heavy death-rate from all causes?—The small-pox death-rate was 35 in 1875. You have in that year a high death-rate from all causes, and a low death-rate from small-pox.

562. Referring again to the 43rd Annual Report of the Registrar-General, page xxiv., the commencement of the first unbroken paragraph: "Before vaccination "came into use, few persons escaped having small-pox "at some or other time in their lives. The great majority "had it when young, and of these a large proportion "died." Do you agree in that?—That was the result of such evidence as I could obtain at the time when this Annual Report was prepared. Of course I had not got actual figures to deal with; I could only judge from general literature and the accounts of outbreaks in former times; so that doubtlessly it is impossible to prove the correctness of that statement by official figures.

563. Could you give the Commission any clue to the particular evidence which warranted you in supplying

those words?—No, I cannot on the spur of the minute. The passage was written seven or eight years ago. I can say, however, that there was no evidence that was capable of being expressed in precise statistical form.

564. If it were true that few persons escaped having small-pox, but that the great majority had it when young, and that of those a large proportion died, ought it not also to be true that deaths from small-pox would be an enormous percentage of the deaths from all causes?—I do not see that.

565. I take the words to affirm that very few persons escaped having small-pox, that the great majority had it when young (that is the great majority of the whole population), and that of those who had it a large proportion died?—Yes.

566. What would you consider a large proportion of the whole population?—It is not a large proportion of the whole population; what is said is that a large proportion of those who had it when young died.

567. I think you said that the great majority of the population had it?—Yes; that the great majority had it, and that the death-rate among them was high.

568. I understand that in these words which you have told us came, practically, from you; your view was that few persons escaped having small-pox, that the great majority had it when young (that is the great majority of the population), and that of those a large proportion (that is a large proportion of the population) die. I want to know from you what you meant by saying a large proportion?—The death-rate was a high death-rate. The proportion that died, as shown by the death-rate, was a high one.

569. I probably do not bring a statistical mind to bear upon this, but I understand the proposition to be that most people had the small-pox?—Yes, and the majority of them when young.

570. So that very few escaped it at some period or other of life; but that out of this very large number who had it at some time or other the bulk had it when they are young, and that of the bulk that had it the majority died?—That is exactly where we differ; I do not say that the majority died, but that a large proportion died.

571. You are quite right; you say that a large proportion died. What does that large proportion mean?—A sufficient proportion to cause a much higher death-rate than occurs now. The proportion that died was a large proportion, as compared with those who die at present, and consequently caused a high death-rate.

572. Do you happen to know what was the estimated proportion of deaths from small-pox before vaccination came into use?—I have seen tables in which the death-rates from small-pox are estimated, but I cannot tell you off hand what the estimates were. They never appeared to me to be based upon a sufficiently sure foundation to be worth very much consideration.

573. Did you ever see a prospectus of the Jennerian Society?—I do not remember to have seen it.

574. Do you happen to know that it was declared that half of mankind were exempt from small-pox?—No. Perhaps I might correct my answer as to the amount of small-pox before vaccination, and the number of people that died, by referring to an answer which I made last Wednesday. If you admit that the general death-rate was higher before sanitary interference than it is now, and if you admit, as the records show, that a larger proportion of that higher death-rate was caused by small-pox, it follows necessarily that the amount of small-pox then was much higher than it is now. For it caused a larger proportion of a larger number of deaths.

575. Have you any means of telling the Commission at all what was the estimated proportion of the total death-rate to be attributed to deaths from small-pox prior to vaccination?—I have answered that in the beginning of my examination. At Question 341, you will see the figures given.

576. But I do not see that that quite states, does it, the proportion of deaths from small-pox estimated out of the total deaths from all causes?—Yes; 20 in 1,000 deaths in the present century, in round numbers, are due to small-pox. Going back 100 years, the number was 97 in 1,000.

577. Is that 20 in 1,000 deaths?—In 1,000 deaths.

578. If 20 in 1,000 deaths were deaths from small-pox, and if the great majority of the population had small-pox, would 20 in 1,000 be what you meant by saying that a large proportion died?—Twenty in 1,000 is the number of deaths at the present period, or rather in 1871–80. There were 100 in 1,000 going back 100 years.

579. My questions have been directed to the time before vaccination; your answer is as to this century?—I compared the figures in three successive centuries.

580. Then, going back another 100 years the proportion is 66 per 1,000?—Going back 100 years it was 97 per 1,000, and going back another 100 years it was 67 per 1,000.

581. Would that percentage be what you had in your mind when you said, that before vaccination few escaped having small-pox, and the great majority had it when young, and of those a large proportion died?—The statement was not based upon these figures, although they corroborate it to a certain extent.

582. You would not think that it conflicted with them?—Not at all.

583. I do not know whether you know the figures given by Dr. Guy in his estimate of 250 years of small-pox in London?—I have seen them, but I have not got the figures in my mind.

584. You do not happen to know, then, that the figures which he submitted to the Statistical Society showed for the 18th century less than one death in 11 from small-pox?—That tallies pretty nearly with what I have given here, viz., 97 in 1,000.

585. Taking your own figures, you still think that they would bear out the statement that the great majority of the population had small-pox when young, and that of those a large proportion died?—I see nothing inconsistent in the two.

586. Is the number of deaths returned as from cow-pox and other effects of vaccination increasing or otherwise?—It has been irregular, but it is a very small number; I think that it has been less in the two last years. It has decreased slightly, but the number is so small and the returns comprise such a small number of years that I do not think I can safely say that it is decreasing or increasing. The number in 1886 was 45, and it was 45 also in 1887. If we take the first year 1881 it was 58, and practically, in a matter of that kind, 45 and 58 may be looked upon as the same figure.

587. Are you concluded in making your classification by what is stated in the official copies of the medical certificates sent to you, or do you ever make any inquiries into any of them?—If the medical certificate definitely states that the death was due to something produced by vaccination, it is put down to vaccination without any further inquiry at all. Supposing that you had a case put down as syphilis, due to vaccination in an infant, that would go down to the effects of vaccination. But in some cases the medical man puts down such words as "Bronchitis, vaccination." In that case we should write to him and ask him whether he meant to say that the vaccination produced the bronchitis or not, and we should be guided by his answer.

588. Have many cases occurred in which the necessity for inquiry has arisen?—Not many; probably there are five or six in the year.

589. Sometimes in such cases would there be corrections made which ultimately disconnect the cause of death from vaccination, although at first from vagueness it might have implied the cause of death to be vaccination?—Doubtless there would be cases which would not eventually be referred to vaccination, although the word vaccination occurred in the original certificate as "bronchitis, vaccination," because the medical man stated on inquiry that he did not mean that vaccination had produced bronchitis, or had anything to do with the death.

590. Taking your own illustration, if the certificate said "syphilis from vaccination" you would so record it without further inquiry?—Without any further inquiry.

591. It is only when the words used are not connected with each other that you make inquiry?—Quite so.

592. And the number of cases in which those imperfectly connected words come and are afterwards corrected is a small number?—Very small. I should say also (though it is not quite in answer to your question, but probably you would wish to know it) that there are cases added in which vaccination has not been mentioned in the certificate. That comes about in this way. We send out letters of inquiry in all cases in which the

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cause of death is put down as blood poisoning, and if the medical man says, "I think that this blood poison- "ing was produced by vaccination" (which has happened in one or two instances), that would go down to vaccination. Perhaps I may also add that, we send to the Local Government Board copies of every certificate of death in which the word "vaccination" is mentioned at all, in order that they may make inquiry; but with these inquiries we have nothing to do.

593. (*Dr. Bristowe.*) Mr. Bradlaugh directed your attention to the answer to Question 5495, in Dr. Seaton's examination before the Committee of 1871, in reference to the appointment of vaccination officers. I will read the next two questions, Questions 5496 and 5497:—"Have you the exact number of those" (unions) "who have such an officer and those who "have not?—(A.) For the last year I think I gave "them in my former examination. (Q.) You said: 'I "'may mention that out of 260 unions, all of them "'but six extra-metropolitan, inspected last year, I "'find by the returns that only 120 were reported as "'not having vaccination officers at the time the "'inspector went to them; a large number of these "'have got their officers since, but others have not.'" Does not that rea[illegible] bear out your view that the appointment of vaccination officers was very imperfect at that time?—It appears to do so.

594. Out of 260 unions, 140 only had vaccination officers?—Yes.

595. (*Chairman.*) I think that rather understates it, because I do not know whether you have seen a letter that was put in by that witness, stating that 121 unions were reported as not having appointed vaccination officers, and 127 as having appointed vaccination officers, and that, with regard to the remaining 12, which make up the 260, there was no report upon the subject.

596. (*Dr. Bristowe.*) Upon the whole, that bears out your statement, does it not?—Yes, judging from the figures which have just been read out, which would show that the majority in 1871 were not known to have got vaccination officers.

597. Then let me direct your attention to your answer to Question 351. At the last meeting you put in a table showing the changes in the death-rate attributable to small-pox in successive periods of life. Have you any explanation to give of the remarkable fact shown in that table, namely, that whereas formerly the mortality from small-pox had been chiefly among young children; in later years young children appear to have enjoyed special immunity and the deaths from small-pox have been mainly deaths of adults?—I think it is a very curious fact, and it is one for which, when I got these figures out, I was quite unprepared, I mean the fact that the mortality from small-pox, in proportion to the population, has increased after the age of 15. The explanation of that strange fact appears to be this, and it is given in the Registrar-General's 43rd Report, that in old times a large number of persons, indeed, a very large proportion of the population, had small-pox whilst they were young, and were thereby protected throughout life, for it is a very rare thing for a person to have small-pox twice; but that, since vaccination came in, the protection which is enjoyed by adults is only that of infantile vaccination, and that consequently, when people come to be of adult life, they are only protected by vaccination, and not by small-pox, and that the effects of vaccination gradually wear out; consequently, the death-rates are increased during the more advanced ages, because protection by vaccination has taken the place of protection by small-pox. If that be not the explanation, I can see no mode of accounting for the increased death-rate at the higher ages, except by supposing that the intensity of small-pox (which may be the case) has greatly increased. But, if the intensity of the small-pox virus has greatly increased, then the diminution of the general death-rate from small-pox, in spite of that increased intensity, becomes a still more remarkable fact, supposing vaccination has had no protective effect.

598. The escape of young children under such circumstances would be specially remarkable, would it not?—It is. I understood that you asked me if I could account for the rise in the deaths from small-pox at the advanced ages, and I say that appears to be only explicable by supposing, either that the upper ages have lost some of the protection which they had in olden times from small-pox, or that small-pox itself has become more intense. That small-pox has become more intense would lead one to the conclusion that vaccination is even more effectual than is usually supposed, because the death-rate of children has gone down notwithstanding this increased intensity. The other explanation I gave was that adults are now protected only by their infantile vaccination and not protected by a previous attack of small-pox. And in corroboration of that view, I should like to point out that since Table L. in the Registrar-General's 43rd Annual Report, which has so often been cited, was framed, a new table, which includes seven additional years that have since elapsed, shows a decline in the rates at the advanced ages; a decline due, as I suggest (I have no proof of it), to the increasing use of re-vaccination; an increasing proportion of persons being now re-vaccinated at 15 or thereabouts, and the protection in after life being thus better than it was some years back.

599. In your answer to Question 367, you allude to statistical evidence since 1881, which show that 50 per cent. of the deaths from small-pox in children during the first year of life occurred in the first three months, the remaining 50 per cent. being distributed amongst the remaining nine months; and you attribute this progressive diminution in the proportion of infantile deaths from small-pox to the fact that infants have been acquiring more and more protection owing to the increasing stringency in the enforcement of vaccination. Have you anything further to say upon that matter?—What I called attention to in that answer was the change in the proportions which has occurred in successive periods. Whereas between the years 1852 and 1860, 63 per cent. of the infantile deaths (by which I mean deaths in the first year) from small-pox, were in the last nine months of that first year, from 1860 to 1870 the proportion fell to 57 per cent., and then in the next period fell still further to 50 per cent.; so that there appeared to be some progressive protection from small-pox enjoyed by the last nine months as compared with the first three months, and this progressing protection I suggest might be due to the progressive stringency of the vaccination arrangements which would of course affect the last nine months of the first year of life more than the first three months. The actual fact that 50 per cent. die in the first three months is also, I may say, a very remarkable fact. Nothing of the kind occurs in any of the other zymotic diseases, which, as was pointed out, should properly be compared with small-pox. I can give you the figures for some of them. We say that in small-pox 50 per cent. of all those who die in the first year die in the last nine months of that year. Now taking measles I find that over 97 per cent. die within the last nine months of the first year. Taking scarlet fever, I find that over 95 per cent. die in the last nine months of the first year. Taking diphtheria, I find that 89 per cent. die within the last nine months. Taking whooping-cough, I find that over 82 per cent. die in the last nine months of the first year; whereas in small-pox only 50 per cent. die in the last nine months. That seems to me to imply that, if these diseases may be fitly compared with each other, the last nine months of the first year of life are for some reason or other protected against small-pox to a greater extent than they are protected against measles, scarlet-fever, diphtheria, or whooping-cough.

600. And to a greater extent than they were formerly protected?—And also to a greater extent than they were protected. But the argument I am now advancing is that at the present time the last nine months of the first year of life (the months which come after the time for compulsory vaccination) are protected against small-pox to a greater extent than they are protected against the other diseases I have just specified.

601. (*Chairman.*) Have you any means which enables you tell the average age at which vaccination takes place?—No; the end of the first three months is the legal time; but I believe that practically vaccination often does not take place till somewhat later.

602. (*Sir James Paget.*) Did your figures of those who die in the first year, include all deaths from small-pox?—Yes, I take all the deaths, and divide them into those which die in the first three months, and those which die in the last nine months, assuming the first three months to represent the unvaccinated, and the last nine months to represent the vaccinated.

603. So that your figures include the unvaccinated as well as the vaccinated?—Yes.

604. (*Mr. Picton.*) I should like a little supplemental information on one point. Over what period do your statistics extend when you say that 50 per cent. of the

small-pox deaths are in the first three months?—From 1881 to 1887 for small-pox. I was, however, only able to take five years out of those seven as my basis in measles, diphtheria, whooping-cough, and scarlet-fever, because the books for the other two were at the binders, and I had not ready access to the figures.

605. Have you any reason to say that formerly, before vaccination was made compulsory, a larger per-centage died in the last nine months of the first 12, than do now?—I cannot go back further than 1852; the figures do not exist further back than that.

606. In 1852 what proportion do you find?—From 1852 to 1860, 63 per cent. died in the last nine months. The per-centage fell in the next period, 1860 to 1870, to 57 per cent.

607. That was before you considered that efficient compulsory vaccination existed?—Those periods are not arranged in any way to coincide with the vaccination periods; they are taken by decennia, as far as I could that is to say from 1852 to 1860, from 1860 to 1870, and then there is a gap, and I take from 1881 to 1887.

608. Is there any reason to believe that small-pox is more affected by sanitation than the other diseases you quoted, namely, scarlet fever, and so on?—Not at all, if you exclude vaccination from sanitation; speaking for myself, I include vaccination in sanitation.

609. (*Dr. Bristowe.*) Have you known any outbreaks, or epidemics, of fever, simultaneously with outbreaks of small-pox?—I do not remember at present, in my personal experience, any village being attacked, in which there was anything like an outbreak of fever and small-pox simultaneously.

610. (*Sir E. H. Galsworthy.*) Have you found that the general mortality of the country and London, in times of epidemic from small-pox or fever, is relatively greater, or in fact, greater at all, than the mortality at ordinary times; that is to say, is the mortality of the country increased relatively by an outbreak of fever or small-pox?—I presume it is. May I ask, do you mean by your question to ask whether, if a large number of persons die of small-pox, that increases the death-rate?

611. Yes, of the whole population?—I take it for granted that it must. But if you wish to know whether as a matter of fact the general death-rate has been high in the years of epidemics, and will give me any individual year, I might answer the question. I could not say off-hand, without looking at the figures.

612. For instance, two years ago, in 1887, we had an outbreak of scarlet-fever; was the mortality of London at that time greatly, if at all, increased by that outbreak?—I can give you the exact figures. May I ask of which precise year you are speaking?

613. Of 1887 or 1888?—The general death rate has been going down as you doubtlessly know. Taking the year 1887, I find that the scarlet-fever rate in London went up from 166 per million in the previous year to 337, while the general death-rate slightly declined. In 1886 it was 19·9 per 1,000, and it went down in 1887 to 19·6; so that the general death-rate declined between those two years, while the scarlet-fever death-rate went up.

614. What was the effect on London at the time of the last epidemic of small-pox; did the mortality from that epidemic greatly increase the total mortality of London, comparing the years 1871–2 with other years?—The general death-rate went up from 21·4 in 1872 to 22·5 in 1873, whilst the small-pox rate declined; the epidemic came to an end. But comparing 1871 with 1870 I find that the general death-rate and the small-pox rate went up simultaneously.

615. (*Sir Charles Dalrymple.*) Sir John Simon made use of the expression "nearly every one had small-pox "in the last century, sooner or later." Is it known what proportion of the people never had it?—No.

616. It is admitted, is it not, that a large number never did have it?—Probably there must always have been persons who escaped; how many I cannot say; but doubtlessly fewer than now.

617. Do you ascribe the enormous change which has been made to vaccination?—Certainly I ascribe it to vaccination.

618. Is there any other cause besides vaccination to which you might ascribe the change?—The general change in the sanitary condition of the people has doubtless had some influence.

619. (*Chairman.*) I do not know whether it is a point upon which you would wish to reply; but do you think that the improved sanitary conditions will be likely to have more or less effect upon such a disease as enteric fever than upon small-pox?—I think that the improved sanitary conditions would have a great deal more effect upon enteric fever than upon small-pox. The cause which in my belief has led to the diminution of enteric fever has been the recognition of the fact that it is excremental matter by which this form of fever is caused, and that the ordinary mode in which that matter is conveyed to persons is by the pollution of water. The improved supply of water, which is of course included in sanitation, has especially effected enteric fever and diminished it more than any other disease to the best of my belief.

620. You were asked with reference to the Act of 1867, as regards the authorities that did not take effect until July 1868, I believe?—I am not certain whether it was July or January.

621. It came into operation upon the 1st of January; but the statement made by Dr. Seaton in 1871, was that as regards authorities it was to take effect from July 1868, that is to say, the first list of defaulters was to be presented to the local authorities on that date. He further stated: "There were many local authorities "who took action as soon as they were required to do "so; they obtained their lists, and they looked after "their vaccination from July 1868, the very beginning; "but others were more or less tardy. I think the "names of some unions that have been at work from "the beginning, were handed in the other day, among "them being Leeds, Wigan, Lancaster, Exeter, and "St. Luke's, Middlesex, the officer of which you have "had before you to-day, and there were a great many "besides. Other unions delayed longer; and the great "ground of delay with most of them, where there was "delay, was this, that they could not make up their "minds to appoint an officer to look after the work. "The 27th section of the Act imposes upon guardians "the duty of seeing that the children are duly vaccinated. The 28th section empowers them, if they "think fit, to appoint a person or officer to see that it "is done; but it does not require them to do this; "such appointment is merely permissive. A number "of them wanted to do the work by temporary ex-"pedients; they thought that in a little while the Act "would work itself. Our department had urged on "them from the first that it would be essential to the "working of the Act that there should be in each union "somebody whose special duty it should be to look "after the vaccination, and that the Act would not work "otherwise. However, that, of course, involved some "little expense, and therefore it was very much conned "over, and a very great number of boards hesitated, "at all events for the time being, at making fixed "appointments. But I may mention that out of 260 "unions, all of them but six extra-metropolitan, in-"spected last year, I find by the returns that only 120 "were reported as not having vaccination officers at "the time the inspector went to them. A large number "of these have got their officers since, but others have "not," so that the statement justifying the view of the Committee that the majority had appointed vaccination officers would appear to have been made in 1871?—Yes; not until 1871.

622. It would appear from that statement that although in 1870 only 120 were reported as not having vaccination officers, that had been arrived at by gradual appointment, and not by all at once adopting the Act?—Quite so.

623. (*Mr. Picton.*) I wish to ask you a question upon the point of the effect of sanitation on small-pox. If a table were furnished giving the number of small-pox deaths in a healthy district, and the number of deaths in an unhealthy district, would you expect there to be any difference between them?—Yes.

624. Then you do think that sanitation has an effect upon small-pox?—Certainly it has upon all diseases. The chances of catching small-pox are greater if the people are living in the close aggregation of over-crowded tenements, which is an insanitary condition; and again the chances of their dying are greater if they are neglected.

625. But you think that it has the same effect on small-pox as upon other diseases?—I attribute to it the same effect upon small-pox as upon other infectious diseases. I see no reason why small-pox should be affected by sanitary conditions more than measles.

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626. You are probably aware of the table on page xxix of the Supplement to the 35th Annual Report of the Registrar-General; you will see there that the country is divided into healthy districts, all England, and Liverpool, which was peculiarly bad at that time?—Liverpool always has a very high death-rate.

627. You will observe that in the "healthy districts" the number of deaths of children born alive from small-pox was 602 per million?—Yes.

628. And in all England, per million, 3,331?—Yes.

629. That I reckon as 18 and a decimal per thousand?—The table shows an enormous difference between the healthy districts and England in the mortality from small-pox.

630. Then, taking measles in the "healthy districts," there 5,257 died per milion, and in all England 11,507. There is a less difference there between the healthy districts and all England, in the case of measles, than there is in the case of small-pox?—Yes.

631. The number is ·5 per cent. and upwards in the healthy districts, and are 1·5 per cent. in the whole of England?—The difference is, as you say, much greater in the case of small-pox than of measles.

632. If you refer to enteric fever, which was mentioned just now, the number of children under five dying in the healthy districts of enteric and common fever, is 2,807, and in all England, 5,401. There there is still less difference. From that am I not entitled to say that the sanitary condition of a place has more effect upon small-pox than it has upon measles or upon fever?—You are misunderstanding, I think, the term "healthy districts" as used in the table. You mean by "healthy district" a district in which sanitary improvements have been carried out. The term as used in the table means a district in which it was actually found, during the period over which the tables ran, that the death-rate was low. It should rather have been headed "District of low death-rate" than "Healthy district"; and those districts of low death-rate were rural districts.

633. On the previous page I read, "Great as is the "influence of organisation itself, the differences of "external circumstances and sanitary condition exercise "a very real influence on life, disease, and death in "childhood." Then he goes on, "Thus, even in the "healthy districts of the country, out of one million "born, 175,410 children die in the first five years of "life." I take it from that that in using the heading "healthy district" he refers to the sanitary condition?—No. He selected all those districts which had a death-rate below a certain point, in order to make what he called a "healthy life" table. Those healthy districts were, as a matter of fact, purely rural districts, and are contrasted with those in which the death-rate was high, which were urban districts.

634. But you will observe that there is far more difference with regard to small-pox than with regard to measles?—That is what I should have expected. In order to produce small-pox you must have not only people capable of taking it, and not only unsanitary conditions, but you must have the small-pox virus introduced. The more rural the place is the smaller the chance of such introduction, and consequently the smaller chance of its having an outbreak of small-pox, and I have very little doubt that there may be hamlets in England where small-pox has never broken out at all. Consequently, I should have expected this difference to exist. Measles, however, is a disease common all over England, not a village escaping from it. But there are places which have never had a case of small-pox in the memory of the oldest inhabitant, and isolated rural districts such as these are really the places this table takes as healthy districts.

635. But if you run down the list, you will find that it is uniformly the case that the number of children dying in healthy districts of other diseases is larger in proportion than of the children dying of small-pox; and I still urge that the small-pox seems to be specially affected by the healthy character of those districts more than other diseases?—I can only say, as I said before, that we are using the term "healthy districts" in two different senses. I hold that "healthy district" does not mean a district in which sanitary improvements have been carried out, but a district in which, in the 10 years to which that table relates, there was a low death-rate; and these were, I know as a matter of fact, entirely rural districts, where small-pox is less likely to have access than it is to a town such as Liverpool, with which they are compared.

636. But would not the same thing be true of scarlatina?—No, it is not equally true of scarlatina. Outbreaks of scarlet fever are much more generally diffused all over England than outbreaks of small-pox. Whether it be that the poison is more easily carried or that there is more of it, I do not know, but for some reason or other it spreads more readily.

637. Then if you give your attention to the Liverpool district, which is still worse, you find that the proportion of small-pox cases is larger than that in the whole of England?—Yes.

638. Do you think that that had no connexion whatever with unsanitary conditions?—I should think it certainly was connected with unsanitary conditions.

639. What would you take as a test of the healthiness of a district?—One single test it is difficult to select. You might say the average general death-rate over a long period of years, after you have corrected it for differences of age and sex.

640 Do you think that those districts were selected on that principle?—They were selected on that principle.

641. But does not that show the good sanitary condition of the neighbourhood?—It shows that they were healthy places, but not that they were places in which sanitary improvements had been made. They were rural districts, that is comparatively isolated districts, such for instance as villages upon the top of hills in many places.

642. But the point is this: If there is that difference between places some of which are better sanitarily conditioned than others, would it not be reasonable to say that if we can improve the sanitary condition of the worst places, we shall produce a similar state of things there?—It would. I hold these places, which are rural districts isolated from the general traffic of the world, to be less likely than other places to have the poison of small pox brought to them. Doubtlessly, if you could bring Liverpool to the same degree of isolation, you would lower its small-pox rate. You can prevent small-pox from coming into a place more readily, in my opinion, than you can prevent measles; and that is the reason that you have measles everywhere, and not small-pox.

643. You have the contagion carried there?—The contagion of small-pox is carried into a district more rarely than the contagion of scarlet fever.

644. I am puzzled to know how it should be that the contagion of scarlet fever or measles and other diseases can be more easily carried than of small-pox?—It is more often carried, because there is more of it. There will be ten times as great a chance of the scarlet-fever contagion being carried as of the small-pox virus being carried, if the former is ten times as abundant.

645. If you could keep out the small pox virus, or isolate it when you have it, you could stamp it out?—Yes.

646. In a town if we could secure that the first small-pox case could be isolated, and not come into contact with the population, we should keep out the small-pox from the population?—If you could always effectually isolate the first case, doubtlessly you would not have outbreaks of small-pox in the town.

647. (*Chairman.*) You would have to isolate the cases which were brought in?—Yes. If you have any measures by which you can prevent the introduction of the necessary element of small-pox, namely, the small-pox virus, you will prevent all outbreaks in the place, in the same way as if you prevent the seed of a plant from coming into a place where the plant does not exist, it will not grow there.

648. (*Dr. Collins.*) You think there would be more chance of annihilating small-pox by isolation than by vaccination?—Doubtlessly entire isolation would be the most effective thing for suppression which you could possibly have.

649. If it be true that the decline of scarlet fever in recent years is due to the isolation of the scarlet-fever patients in hospitals, and if it is true that it is more easy to isolate small-pox than it is to isolate measles or scarlet fever ——?—I must not be understood as saying so.

650. You said it was more easy to prevent small-pox from coming into a district than measles, by adopting the principle of isolation?—No; I said there is less chance of its coming into the district because there is

less of it. Moreover if a case of small-pox occurs in a village, the news of it gets all over the district at once and people avoid the place; but nobody takes any notice of the introduction of a case of measles. No case of small-pox occurs in the country without the medical officer of health knowing of it in a day or so, but he knows of scarlet fever, as a rule, only when an outbreak has already happened.

651. You think that isolation properly applied would be as effective in reducing the mortality from small-pox as it has been in reducing the mortality from scarlet fever?—I think perfect isolation would be entirely effective.

652. Then, if it be true that scarlatina has been greatly reduced in London by means of isolation in hospitals, and if it were also true that similar isolation has been effective with regard to small-pox, would not much of the decline in small-pox of recent years be probably due to that more effectual isolation?—You are aware, probably, that there are reports made by the officers of the Local Government Board from which it appears that in their opinion concentration of small-pox patients in hospitals is not what I meant by perfect isolation, because they think that collecting patients together is a cause of increased virulence of the poison, and increases the chance of the disease spreading. If that be true, the accumulation of patients in small-pox hospitals in a town is not isolation, that is to say, it is not a separation of the rest of the population from the contagion.

653. You would advocate isolation without concentration?—I used the term "isolation" in the sense of protecting the population from all possibility of contagion reaching them. Merely putting a number of cases into small-pox hospitals in London is not, in the opinion of the Local Government Board officers, protecting the rest of the population from the chance of infection.

654. I think I understood you to say that the increase of mortality in later times from small-pox was probably due to the fact that adults were in times gone by more protected by small-pox than they are now protected by vaccination?—Yes.

655. May I take it, that so far as your information goes, the protection afforded to a person who is attacked by small-pox is greater, and possibly considerably greater than that afforded by vaccination?—I think there is no doubt about it.

656. (*Dr. Bristowe.*) Is it not probable that the large decline of small-pox in this country as compared with the continued prevalence of measles and scarlet fever, is due to vaccination rather than to sanitation? Otherwise would it not prevail as measles and scarlet fever do?—I think a great deal of the difference is due to vaccination, because vaccination has lessened the total amount of small-pox virus, but I also think that rural, and therefore comparatively isolated, places are more unlikely to be attacked by small-pox than they are to be attacked by scarlet fever.

657. (*Chairman.*) Do you think it would be an easy thing to enforce isolation such as you have indicated might be effective to prevent the spread of small-pox?—Of course, statistically, I have no information about it; I should have thought it would have been a very difficult thing to do.

658. You having been a medical officer yourself, that fact would give you some knowledge of the habits of people in towns?—I was a medical officer in a rural district, and there isolation was usually not a very difficult thing to carry out. There was very great terror produced by any case of small-pox, you had notice of it at once, and everybody was up in arms against it. The sanitary authorities, who, generally speaking, are very loth to spend money, were ready to go to any expense, and gave one means of isolation which they would not have given in respect to other diseases; and generally the medical officer was able, if he got hold of the first case, to isolate it quite sufficiently. For instance, I can remember on one occasion in a village they gave me authority to lock the garden door of the house in which the small-pox patient was and to have the food and necessary supplies for the family thrown in over the hedge; they paid wages to the father, and supported all the children during the whole time, and at the end of it they took the whole of the furniture and all the patients' clothes, and put them into a heap in the garden and burnt the whole thing; then they practically pulled down the cottage; they did not actually pull down the cottage, but they did so much to it that it almost amounted to the same thing. Such steps as these were effectual, and the small-pox did not spread.

659. In a town that could not be done without much more difficulty?—It would, I should have thought, been almost impossible.

660. (*Mr. Picton.*) You have no personal experience of a town in which that has been done?—No.

661. (*Mr. Meadows White.*) Is it possible that infection may be spread from small-pox at such a stage that the disease itself would not be known to exist?—It is. Small-pox can be given (I have known such cases myself) by a person who has not yet got the eruption on him.

662. So that a person, for instance, a tramp wandering into a town, might create several centres of infection before the disease had declared itself?—He doubtlessly does so.

663. That would make isolation in that case more difficult than usual, because you would have to deal with persons who had been infected before the disease had manifested itself upon the person?—It may also be conveyed by clothes.

664. I understand that the questions which have been put to you by several members of the Commission have chiefly dealt with the general falling off of the small-pox deaths compared to those of the general population; but are there not other tests which might be applied in considering the efficacy of vaccination as a prophylactic; for instance, supposing an epidemic of small-pox to exist, would you not consider the proportion of vaccinated to unvaccinated persons who are attacked in the place?—Yes.

665. Would that not be a test?—Yes.

666. Also the proportion of the deaths between those of the vaccinated and the unvaccinated?—Yes, I have already given such figures as I could with reference to that point.

667. And the relative severity of attacks of vaccinated and unvaccinated?—I have no statistical information as to the proportions, in which vaccinated and unvaccinated respectively are attacked, but only as to the proportions in which they die.

668. (*Mr. Hutchinson.*) Did I correctly understand you, speaking of the adult population only, to say that you think it is in greater danger now during an epidemic of small-pox than it was in pre-vaccination times?—Yes.

669. You think that is a strong argument in favour of compulsory re-vaccination?—I take it as a strong argument in favour of re-vaccination.

670. (*Dr. Collins.*) Would you think there was any truth in the assertion that the zymotic diseases which tend to die out, tend to die out upwards, that is to say, by shifting the age of incidence from the earlier periods to the later periods of life?—I do not think we have any knowledge as to diseases which are dying out. The only disease, I presume, to which you can refer as dying out is typhus, and of that we cannot get the figures. If you would kindly mention any disease that is dying out, I could state at what ages the decline is occurring.

671. I was speaking of typhus more particularly?—Typhus is a disease, not fatal to infant, but to adult life. The apparent diminution of typhus at the early periods of life is due, not so much to a real cessation of typhus, as to the cessation of the habit of calling typhus diseases which are really not that disease.

672. How do you know that?—It is the knowledge which I have, that typhus is not a fatal disease of infancy. That the registration of causes of death, especially in infantile diseases, is getting more and more accurate.

673. The question is, whether what it is now is what it was in previous periods?—Of course, the distinction between typhus and typhoid is a modern distinction, and the recognition of the fact that typhus is a disease rarely fatal in children is also modern.

674. I think, from the writings of Sydenham, one would gather that typhus affected all ages in his time?—In his time typhus and typhoid were not separated.

Mr. William Ogle, M.D.

10 July 1889.

675. Have you any evidence to show that typhus was or was not more of an infantile disease than it is now?—We have no evidence of it, because its existence as a distinct form of fever was not then known.

676. There was a distinction made, was there not, between *synochus* and *typhus* fevers?—I think you will find there was no distinction between typhus and continued fevers of other types until the time of Sir William Jenner.

The witness withdrew.

Mr. Richard Thorne Thorne, M.B., F.R.C.P., examined.

Mr. Richard Thorne Thorne, M.B.

677. (*Chairman.*) You are the Assistant Medical Officer to the Local Government Board?—I am.

678. How long have you held that post?—Some six years; but I have been permanently connected with the Medical Department of the Privy Council and the Local Government Board since February 1871.

679. And in that position have you devoted attention to the relation of vaccination to the diminution of small-pox?—I have, amongst other things.

680. I believe you propose to deal with the question from the date of the sitting of the last Committee?—Yes. I propose to show that the facts of the small-pox epidemic which was raging when the last Committee was sitting, when they came to be examined, afforded a very good illustration of the advantages of infantile vaccination and the need for its universal application.

681. That epidemic covered the period from 1870 to 1872?—It began in 1870 and continued until 1873.

682. In what way do you say the results observed in that epidemic confirm the view that infantile vaccination afforded protection?—Taking the case up historically, I would, in the first instance, refer to the report which was prepared in 1874 by Dr. Seaton, who was at that time Assistant Medical Officer to the Local Government Board, "On the recent epidemic of small-pox in the "United Kingdom in its relation to Vaccination and the "Vaccination laws,"—and with your permission I would hand in copies of this report. That report goes back to a date, in the first instance, when the Epidemiological Society of London represented in 1853 to the Home Office that the average rate of small-pox mortality in England and Wales was considerably more than double the small-pox mortality in any of those European states in which vaccination was compulsory either directly or indirectly; and the society urged upon the Home Secretary the need for establishing some effective control over the small-pox mortality, especially by vaccination in early infancy. I want to point out that at that time no less than from 70 to 80 per cent. of the entire small-pox mortality in Great Britain and Ireland occurrred under five years of age, 25 per cent. of it being under one year of age. Now it was in the year 1853 that the Act was passed, which made vaccination compulsory in England and Wales. Ten years later—that is, in the year 1863, came the first compulsory law for Scotland. Then, with your permission, I would point out how in this report there is a contrast between the effect of the vaccination laws in England and Scotland and in one or two other European countries, those countries being selected (namely, Prussia and Holland), because from them the facts were sufficiently accurate to enable one to judge as to the effect of the vaccination laws upon the mortality from small-pox. I am now dealing with page 20 of the reprint of that report. Taking Holland, for example, when the epidemic occurred, there was no vaccination law at all, and it was only in certain communes that a regulation existed requiring children to be vaccinated before they entered the communal schools; but even this was not enforced in many instances. As a matter of fact, it was often found that the children were at least two years old before they were vaccinated, and sometimes six and seven years old. Then referring to Prussia—in Prussia there was a vaccination ordinance which did require children to be vaccinated within one year of their birth; but no penalty attached to disobedience to the law, and the result was that children really often only came to be vaccinated when they applied for admission to the State schools, a certificate of vaccination being then required of them. Coming next to England, as I have already stated, a compulsory Vaccination Act was passed in 1853, but that Act was very imperfect in its provisions, and the machinery for registering compliance with the Act was also very inefficient; but at the same time the mere fact that a law did exist requiring vaccination within a prescribed period from birth had proved sufficient, from the first, to double the number of yearly public vaccinations.

683. (*Mr. Picton.*) Are there statistics to show that?—There doubtless are; but I am now only referring to the matter historically, explaining what the department has on record. Such a statement could not be written without statistics. I cannot say that I am prepared at this moment to give those statistics.—Then parallel with its operations, the proportion of small-pox deaths under five years of age fell in 15 years from 75 per cent. to 55 per cent. Then came the Vaccination Act of 1867. By this Act machinery for registering compliance with the law was established, and vaccination authorities throughout the Kingdom were empowered to appoint vaccination officers to institute inquiries, to give warnings to parents, and also to take proceedings. But here again the Act was a permissive one, as regards the appointment of officers who had to enforce the Act, a circumstance which largely discounted its usefulness; and when the epidemic of 1871 invaded this country, it was found that the Act was being carried out with very varying efficiency in different districts of the country. Then (referring to page 17 of the Report) I would state the experience of Scotland. Under the Act of 1863, if vaccination, or postponement of vaccination, or the death of an infant were not registered within six months of birth, the parents got a notice reminding them that they were bound to produce the necessary certificate, and in the event of its non-production, a penalty was incurred. As the result of this legislation in Scotland, from 1864 to 1871, it was found that only 3½ per cent. annually of the births were unaccounted for. And the percentage of the small-pox deaths under five years to similar deaths at all ages fell from 74 to less than 50, and finally to a little over 20 per cent. The table at the top of page 19 shows that, in the main. So that when the epidemic of 1871 invaded Scotland, the Scotch population under seven years of age was presumably better protected against small-pox than that of the other countries I have referred to. Now, in illustrating the effect of one and another sort of vaccination law upon the small-pox mortality, it will be more convenient, instead of taking the countries as a whole, to take certain parts of a country that were really exposed to the influence of small-pox, as shown by the actual prevalence of small-pox in them. Reverting to Holland for that purpose, eight of the chief towns were selected, Amsterdam, Rotterdam, the Hague, Utrecht, Leyden, Groningen, Arnheim, and Haarlem. Those towns have together, a population of 693,080, and during the small-pox epidemic of 1871–72, their death-rate from that disease was 1,009 per 100,000 living. In Prussia where there was a slightly more efficient law, and taking Berlin and Leipzig, with a population of 971,895, the small-pox death-rate during the same period was 772 per 100,000. Then taking England, there was London, with a population of 3,254,260 and a small-pox death-rate during the two years amounting to 297 per 100,000. Further, taking 17 unions which most nearly correspond to 17 of the principal towns on the Kingdom (as set out on page 34 of the report) and having a collective population of 2,446,353; in these districts during the same period the rate was 312 per 100,000.

684. Then there was no great difference between London and the large towns?—No, the results were broadly the same in the large towns. Then in Scotland, where the most efficient law was in operation, I would take eight of the chief towns that were affected by small-pox and had an aggregate population of 1,073,608. There the small-pox death-rate in 1871–72 was 223 per 100,000.—Then I would come to the point of the measure of success of the vaccination law as shown by the share of the total small-pox mortality which was borne by children under five years of age; and again I would take the same countries and towns in the same order. In the Dutch towns which I mentioned, where no vaccination law was in operation, the share of the total small-pox mortality borne by children under five years of age was 60·7 per cent. In the Prussian towns where there was some nominal compulsory vaccination of children, the share of small-pox

mortality borne by children under the age of five years was 46·6 per cent. of the total; and it was 36·7 per cent. in London, and 34·3 in the 17 unions corresponding with the 17 large towns where infantile vaccination was more largely practised. Then coming lastly to the Scotch towns where there was a still more efficient law in operation, the share of the small-pox mortality in children under five years of age was 23·7 per cent. of the total. In other words, the figures I have quoted suffice to show, and this quite irrespective of degrees of small-pox prevalence, that there was a direct relation between the greater and the less stringency of the vaccination laws, and the less and greater share of small-pox mortality borne by children under five years of age.

685. (*Chairman.*) Did the epidemic of 1870 to 1873 afford any contrast in respect to any previous epidemic of which you have statistics?—We have not statistics for comparison of this with other countries in former years. This information applies solely to the particular epidemic. If I were to take the small-pox deaths under five years of age in proportion to the total small-pox deaths in Holland, where the rate was largest, as being a constant hundred, the figures I have put before you would show that in the Prussian towns it was 75; in English towns, first taking London, it was 60, in the other 17 towns it was 56; and in the Scotch towns it was 38. I may perhaps hand in a table in which a great deal of this is summarised. (*The table was handed in. See Appendix III., Table A: page* 116.) I would further point out that notwithstanding the satisfactory effect which was apparent as the epidemic proceeded both in England and Scotland, of the compulsory vaccination law in restraining the small-pox mortality among children, it became at the same time evident that there was, owing to the abundance of small-pox, an excess of small-pox mortality both under five years of age, and over five years of age, compared with any other period since there had been any compulsory law in operation. And perhaps the least satisfactory part of the evidence which became apparent was the fact that a very large proportion of the total small-pox deaths of adults was amongst people who had at some time or another been vaccinated. I am now comparing the 1871–72 epidemic with previous prevalences of small-pox which we have known since compulsory vaccination came into operation. This of course called for an explanation, and it became a question of how far the magnitude of the excess of small-pox mortality amongst older persons was due either to the exceptional virulence of the epidemic of 1871 or to other causes; and especially as to how far it was due to any question of the thorough and efficient method in which vaccination was performed in younger as compared with its inefficiency in older persons. I would like to put in here a table which, although the data are not recent, embodies Mr. Marson's experiences upon this point, right up to the period at which he gave evidence before the Vaccination Committee in 1871. I may say that it is an experience covering 13,755 cases of small-pox occurring in 32 years from 1836 to 1867, and it contrasts that which, I think, has not been contrasted before, the percentage of deaths uncorrected as well as corrected, he having corrected his rates according to whether when patients died from small-pox they were suffering from some other superadded disease; and the two sets of statistics for the whole period are here embodied in one table with distinction of corrected and uncorrected. (*The table was handed in. See Appendix III., Table B: page* 116.)

686. And the cases of small-pox are classified according to the vaccination marks shown. Those who have been vaccinated but without leaving any appearance; those who have one mark, two marks, three marks, and four marks, and then the percentage of deaths in each class is given?—For each of two periods.

687. From 1836 to 1851, and from 1852 to 1867?—Yes, the second period being that which he added when he gave his evidence before the Vaccination Committee of 1871.

688. Then in each case the percentage is first given uncorrected, and then corrected?—Quite so.

689. What exactly is the cause of the correction?—The terms "uncorrected" and "corrected" are used to signify the inclusion or exclusion of those fatal cases of small-pox in which the patients suffered under some other disease superadded to the small-pox; but whether the table is looked at in its corrected or uncorrected form, the results are practically similar, the diminution in the deaths from small-pox depending upon the number of vaccine scars which the patients exhibited on their arms.

690. (*Sir James Paget.*) Have you any knowledge at all what was the nature of the other diseases from which they might have died; were they such things as pneumonia and pleurisy, such things as might occur in small-pox?—I have not absolute evidence as to that, but I am tolerably sure a number were phthisis, and a certain other number were, I suspect, parturition, in which even the mildest attack of small-pox is risky and even fatal, abortion being a frequent consequence of even a mild attack of small-pox in a pregnant woman. As regards the other causes of death, I should imagine that the evidence given before the Select Committee in 1871 would contain the information. I now find on reference that Mr. Marson mentioned in answer to Question 4116, bronchitis; and again, erysipelas, gangrene, inflammation, phthisis; he does not appear to mention parturition, so that I assume that did not come into his statistics, but it very commonly affects small-pox mortality.

691. (*Chairman.*) Have these or similar statistics been continued?—I was going to give some additional ones which are embodied in Dr. Seaton's Report, at from page 40 to 44. He summarises on page 41 a number of statistics by Mr. Marson:—"Summarily, the 32 years' observations show that, of 13,765 reputedly vaccinated patients admitted to the Hospital during that period the vaccination was very defective in 11,172, of whom 1,027 died; was reasonably good (as represented by three characteristic marks) in 1,079, of whom 21 died; and was quite up to the now acknowledged standard in 1,505, of whom only 13 died." Then he refers to some of the observations made in the Stockwell and Homerton Small-pox Hospitals, as to which he says, on page 42, "that of 2,382 patients having marks of vaccination, 1,866 had characteristic marks (one or more), and 516 had marks which were bad or indifferent. Of the former 70 died, or 3·9 per cent.: of the latter 129, or 25 per cent." Then he goes on to the Leeds Hospital:—"In the Leeds Hospital the deaths amongst the patients whose marks of vaccination were noted as imperfect were above 12 per cent., but among the patients with characteristic marks, 2·75 per cent. only; and there were 48 cases treated, having three or more characteristic marks, but none of them was fatal." Then he gives some experience from Glasgow, where, in the fever hospital, the mortality of small-pox cases amongst those vaccinated with bad marks was 21 per cent., but of those with characteristic marks, only 3·8 per cent. died, and none died having more than two characteristic marks. Then he refers to a report by Mr. Dyke, the Medical Officer of Health at Merthyr Tydfil, in which Mr. Dyke reported that "as to vaccination in *every case* of small-pox, fatal or not, known to have occurred within the district, . . . among 308 fatal cases which occurred there were but 30 in persons having three or more marks of vaccination, though 1,070 cases having this number of marks came under observation; and that of those 30 six only were among that portion of the cases (418 in number) which had four or more vaccine cicatrices. The death-rate," he says, "among the patients with one cicatrix was 8·5 per cent.; of those with two cicatrices, 6 per cent.; of those with three, 3·7 per cent.; and of those with four, 1·5 per cent.; of 22 patients who had more than four marks none died. The death-rate among the unvaccinated was 51·1 per cent." As far as one can judge from these statistics, which relate to patients of all ages, the influence of age in connexion with vaccination did not appear to have been apparent to Dr. Seaton when he wrote this report.

Adjourned till Wednesday next at 1 o'clock.

Fourth Day.

Wednesday, 17th July 1889.

PRESENT:

THE RIGHT HON. THE LORD HERSCHELL IN THE CHAIR.

Sir JAMES PAGET, Bart.
Sir CHARLES DALRYMPLE, Bart., M.P.
Sir W. GUYER HUNTER, K.C.M.G., M.P.
Sir EDWIN HENRY GALSWORTHY.
Mr. WILLIAM SCOVELL SAVORY.
Mr. CHARLES BRADLAUGH, M.P.
Dr. JOHN SYER BRISTOWE.
Dr. WILLIAM JOB COLLINS.
Mr. J. STRATFORD DUGDALE, Q.C., M.P.
Professor MICHAEL FOSTER.
Mr. JONATHAN HUTCHINSON.
Mr. F. MEADOWS WHITE, Q.C.

Mr. BRET INCE, *Secretary.*

Mr. Richard Thorne Thorne, M.B.

17 July 1889.

Mr. RICHARD THORNE THORNE, M.B., F.R.C.P., further examined.

692. (*Chairman.*) You were asked on the last occasion, at question 683, whether there were statistics to show that the mere fact that a law did exist requiring vaccination within a prescribed period from birth had proved sufficient from the first to double the number of yearly public vaccinations, and you stated that doubtless there were such statistics. But that you were only referring to the matter historically, and explaining what the department had done. I believe that upon that you wish to make a statement?—I can give the statistics now. They are taken from the Poor Law Returns, and they are embodied in Dr. Seaton's evidence before the Committee of 1871. They are as follows:—The number publicly vaccinated under one year of age, taking the average of the four years 1848 to 1852, was 180,960. Then came the Act of 1853, and in the following year, 1854, they mounted to 408,824; that is to say, they had more than doubled.

693. On the last occasion your evidence was directed to show how the share of small-pox borne by children varied with the stringency of the vaccination law, and how in this country the fatality of small-pox varied with the amount of vaccination possessed by the individual, apart from the question of the quality of the vaccination or the age of the patient; what is the point to which you now proceed?—I would now proceed to deal with small-pox fatality in this country according to the age of those attacked and the quality of their vaccination scars. I may say that after the last Committee of 1871 the Vaccination Act of 1871 was passed; and I believe that the Commission have had statistics from the Registrar-General's Office to show that for the country, as a whole, the small-pox mortality has since then been greatly reduced, and that this reduction has been especially marked in the case of young children. I would further point out that the disproportionately large rate of small-pox mortality at ages over five years, which was so marked a feature of the epidemic of 1871–72, was not at that date fully understood. I indicated on the last occasion that some of this increase might have been due to the exceptional virulence of the epidemic of 1871–72; and that it was also believed to have been in part due to the wholesale imperfections in the method of vaccination, as that operation had been carried out before State supervision of public vaccination came into operation. It was not until the Registrar-General issued his decennial report for 1861–70 that we were able to compare the small-pox statistics during that decennial period with the statistics for the period 1851–60; and the records of these 20 years rather gave the notion that the excessive amount of small-pox over five years of age witnessed in the epidemic might possibly have been altogether an exceptional experience. I would hand in a table of comparison showing, for each of the several registration divisions, after the enactment of compulsory vaccination and antecedent to the epidemic of 1871, the decline in small-pox mortality among the infant population, and the decline or stability of small-pox mortality among populations above infancy. (*The table was handed in. See Appendix III., Table C: page* 117.) The column headed "0–5 years" shows that, whereas from decennium to decennium there had occurred in each of the several divisions of the kingdom a diminution, and in most cases an enormous diminution, of small-pox mortality under five years of age, there was not (as will be seen from the column "five years and upwards") then apparent any notable increase of the small-pox death-rate at ages over five years. In six of the 11 divisions of the country the actual small-pox death-rates in the decennium 1861–70 were for ages over five years less than in the preceding decennium, whilst in the remaining five divisions such actual increase as had taken place was not large. The latter divisions are London, the Eastern, the North-Western, York, and the Northern. In other words, whilst the actual rates of small-pox mortality at ages five and upwards had remained at something like a standstill, the rates under five years of age had, with few exceptions, enormously decreased concurrently with the increase of infantile vaccination. Then after the conclusion of the great epidemic of 1871–2 the small-pox throughout the country remained at a very low ebb; and such epidemics as occurred, for example in the years 1882–84, were in the main confined to London; and there, as the Commission are doubtless aware, the prevalence of small-pox is a more complex matter owing to immigration and other circumstances than it is in any other part of the country. But notwithstanding this the London epidemics, for example those of 1876–78 and 1880–82, sufficed, when they came to be studied, to demonstrate that the marked increase of small-pox at ages over five years that had been noticed in the epidemic of 1871 had really been the expression of an alteration in the behaviour of small-pox in this country.

694. I see that in the districts that you have given us there would appear to be perhaps some relation between the change in the small-pox death-rate at ages over five and under five; that is to say, the cases where over five years of age there had been an increase in the death-rate were cases where, under five years of age, the decrease had been very small. For example, in London the decrease in cases under five years of age was from 130 to 116, and there had been an increase from 13 to 14 over five years of age. Again, in the York Division the decrease had been only from 116 to 107 under five years of age, and there was an increase from 8 to 10 over five years of age. Whereas in the Welsh districts, where the decrease under five years of age had been from 164 to 54 (which was a very large decrease), the decrease over five years of age was from 17 to 9?—That is so to a large extent.

695. (*Mr. Meadows White.*) Do you observe what it is in the North-western division?—In the North-western division it is not so striking.

696. (*Chairman.*) It is, perhaps, to some extent an exception?—Yes.

697. In London and in the York Division the diminution in the infantile small-pox death rate appears to have been considerably less than in the other districts; can you account for that at all?—I think it may be accounted for by the fact that, as we know as regards London, for example, and some of the mining districts, the quality of the infantile vaccination was very inferior to that which obtained in other parts of the country. The quality as well as the quantity of vaccination may therefore, in those days have affected the infantile rates. The eastern district, again, to some extent, is really governed by London, a very populous portion of the eastern district is in fact, a portion of the metropolis.

The northern district, again, has been striking in that respect, containing as it does the Northumberland and Durham coalfields. I will not at the moment say that this is a sufficient explanation of it, but it is a pretty well-known fact that the custom of vaccinating in one place, for example, instead of four, has been very habitual in some parts of London, and it has also been to a large extent practised in colliery districts.

698. (*Professor M. Foster.*) If we had the differences in per-centages it would be clearer. In the eastern district, for instance, there is a very great diminution under five years of age, from 47 to 27, coincident with an increase from five to six in ages above five?—Yes.

699. And in the north-western district it is the same to a less extent. That would rather militate against the general deduction that you were drawing, would it not? —Possibly, so far as mere quality of vaccination is concerned.

700. (*Mr. Bradlaugh.*) There are several mining districts to which it does not apply?—Yes.

701. (*Chairman.*) What struck me was that there are only two districts where you may say that the diminution under five years of age is very small indeed—in London 130 to 116, and in York 116 to 107; and in each of those there is an increase of small-pox over five years of age?—Yes.

702. (*Sir Guyer Hunter.*) You stated just now, did you not, with reference to the small diminution in London and York, that in London and the mining districts the quality of the lymph was probably at the bottom of the evil?—Not the quality of the lymph, the method of vaccination. I was referring to the habit of vaccinating in one place instead of four, which has been very habitual in some parts of the kingdom.

703. But why should that apply specially to London? —I think you know what the sixpenny doctor in London is and what he does, and he prevails in London more than anywhere else.

704. That applies to York also?—It applies to the York Division and to the colliery districts especially; but I am not prepared to give you that as the whole of the explanation, and perhaps I may supplement my answer later on.

705. (*Chairman.*) The striking feature of this appears to be the very small diminution in London and the York Division in the infantile death rate as compared with all the other districts. They vary considerably, but none of them show a diminution anything like so small as in the London and Yorkshire districts?—It always is so in London. We never get rid of small-pox in London to the extent to which it is got rid of throughout the country as a whole. How far it is due to the method of vaccination in the York Division, and how far to differing amount of small-pox, I would not say at the moment; but I will endeavour to find out if I can offer you any fuller explanation of it. It would involve a very detailed examination of statistics of a number of places in order to enable me to do so. So far as this table is concerned it ought to be accurate in every respect, but I may perhaps say that some of the tables do not profess to be absolutely accurate because they are in part compiled from statistics which, in some respects, the Registrar-General does not profess to give in an absolutely trustworthy shape.

706. Will you proceed with your statement?—I was endeavouring to show that the failure to reduce the death-rate over five years of age, whilst the death-rate under five years of age was being so enormously reduced, was apparently, so far as we can judge, due to an alteration in the behaviour of small-pox in so far as it has affected this country. Dr. Ogle has pointed out to the Commission from the 43rd Annual Report of the Registrar-General how this has operated, and he has given statistics showing this; and I may say that the same point was insisted on by Dr. Buchanan in his Annual Report for 1884. For example, at page xiv. of the reprint of that Report Dr. Buchanan writes: "The "resistance to adult small-pox, formerly afforded by an "infantile attack of small-pox, was almost complete and "lifelong. It has been exchanged nowadays by a larger "number of people for the resistance furnished by the "average English *vaccination*"; and then he refers to the Registrar-General's statistics as bearing this out. That Report shows, along with the fact I have mentioned, the vast superiority, as a protection against small-pox, of that sort of vaccination which is required of all vaccinators whose work is subjected to State supervision as compared with that which is not so supervised. For example, Dr. Buchanan, dealing with this point at page 6 of the reprint, deduces the fact which he says is creditable to the public vaccination of London, that it protects against small-pox much more than private vaccination; and on the next page he says, in referring to children who died from small-pox under 10 years of age: "There was one child, and "only one, of whom it could be said that vaccination "had apparently been performed in the manner con-"templated by the Board's instructions, and yet had "died of small-pox contracted whilst it was in its usual "health"; and, again, as regards this age-period "the "very great bulk of the vaccinations performed by "public vaccinators have been protective against death "by small-pox during the recent epidemic." I would hand in here a table which bears upon this point, and which is an analysis of a report which Dr. Gayton of the Metropolitan Asylums Board made of 10,403 cases of small-pox. (*The table was handed in. See Appendix III., Table D: page* 117.) He shows the fatality per cent. of the attacks, and there he divides (a matter which I have not before referred to) the scars according as they were good or imperfect. If you will look to the first part of the table you will see that there is, with four good scars an absolute immunity from death up to the age of 15; and with good scars, whether one, two, or three, there is an absolute immunity from death from small-pox up to the age of five. In other words, the very period of life at which small-pox in its natural state is most fatal, is the period at which when the scars were good no death whatever took place. The second part of the table shows the same thing when all the good vaccinations and imperfect vaccinations respectively are lumped together. It shows, for example, that from 10 to 15 and from 15 to 20 years of age the "good" vaccination afforded just three times the amount of protection against small-pox death that the "imperfect" vaccination afforded. In fact the whole table shows the special value at each of the age periods mentioned of what Dr. Gayton terms "good" as opposed to "imperfect" vaccination. Then with regard to the increase of small-pox at ages over five years, both Dr. Ogle's and Dr. Buchanan's conclusions are to the same effect, namely, that it is due to the fact that the almost complete resistance to adult small-pox which was formerly afforded by an infantile attack of small-pox has, as one vaccinated generation has followed another, been exchanged for the protection which is afforded by the average English vaccination.

707. Do you mean to point out that the protection of infantile vaccination is less than the protection of infantile small-pox?—That is so; and the tables and all the material which we have now collected go also to show that for many persons the protection against attack afforded by vaccination is of chief avail for the first few years after that protection has been obtained, and that, as a complete protection against death from small-pox infantile vaccination cannot be relied on as lasting throughout adult life.

708. (*Sir James Paget.*) Are there any returns anywhere of the number of cases of second attacks of small-pox in former days?—I do not see how they could have been collected. A number of authors give occasional records; Aitkin, for example, in his "Theory and Practice of Medicine" mentions instances of small-pox occurring several times in the same person, but does not always give the number of attacks. But, as a matter of fact, one attack of small-pox has been generally held to be a practical protection against a renewal of the disease during lifetime.

709. In the column in your table headed "Four or more Scars, Good," it is only the period between the ages of 15 and 30 in which there are deaths with good scars?—Yes, I imagine that the paucity of the numbers at the ages beyond, namely, 30 to 40 and beyond 40, had to do with it; few cases at those ages coming under consideration. Of course it is a limited experience by one single officer.

710. (*Professor M. Foster.*) I was going to ask you how these cases were recorded and what was the nature of them?—They were the cases which Dr. Gayton had under his care at the hospitals with which he was connected.

711. Is there any statement anywhere of the number of cases at the respective ages?—Yes, in his paper on the Value of Vaccination. With regard to the absence of death in persons over 30 years of age with four or more good scars, I may add that there were very few people in the hospitals at 30 and 40 years of age who

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had anything like the quality of vaccination that is now required of public vaccinators.

712. (*Chairman.*) What is the next point that you desire to put before us?—I was dealing with the point that in former days primary vaccination was often performed comparatively late in life, and that hence the protection it afforded lasted to a much higher age than it does now; and the result was that post-vaccinal small-pox was of less common occurrence, whereas now vaccination is essentially an affair of babyhood, and although the protection lasts as long as it did in former days, yet a period arrives in the lifetime of nearly everyone when the influence of the primary vaccination has been to a great extent lost.

713. Have you any statistics as to the extent of re-vaccination in the country?—No, we cannot obtain any. Re-vaccination is a purely optional practice, and although public vaccinators are required to perform it, yet a vast amount of re-vaccination is not done by public vaccinators, and any statistics as to that performed by public vaccinators would give no clue to the total amount of re-vaccination that is done.

714. I suppose that a large proportion of the re-vaccination might probably be done by private practitioners without any record of it?—It often is. It is frequently done under the influence of panic from small-pox; people go almost anywhere where they can get it done. The fact of the age at which primary vaccination is now performed being that of the earliest childhood and infancy, small-pox, when it does become epidemic, finds its victims at a time of life correspondingly remote from the period when that vaccination was performed; and the interval, of course, must necessarily increase, as a larger number of people are vaccinated in early childhood instead of at any period they choose, say, for example, in adult life.

715. What is the next matter to which you wish to refer?—I wish now to point out that the best sort of vaccination in infancy is no less necessary than it was before, in order that renewed susceptibility to fatal small-pox may be delayed; and that the Local Government Board have in consequence insisted that all persons desiring to escape from small-pox during the later periods of life should not only be vaccinated as infants, but should be re-vaccinated, as the protection which is given in infancy tends to wear off.

716. (*Sir Edwin Galesworthy.*) Did you say that you had not the numbers for each quinquennial period in explanation of Dr. Gayton's table, because this is headed for 10,403 cases. There are some very curious results brought out here that seem entirely inconsistent, and can only arise, I take it, from the very small number at some ages; and we ought to have those numbers?—The actual numbers at all ages are given in Dr. Gayton's pamphlet, and if it be a fact that he is going to give evidence before the Commission he will probably put it in. The table I have put in has been compiled from his table in which he gives the actual number admitted, those who died, and the mortality per cent. at each age according to sex and according to the quality of the vaccination.

717. It seems to me that this table is not to be much relied upon. In the case of one good scar between the ages of 30 and 40 the fatality is 8·1 per cent., whereas with two or three good scars it is actually higher, being 13·5 per cent. (the inference being that you are better off with one scar than with two), and with four good scars the mortality is 0?—That is so; and I have no doubt that it is largely a matter of numbers; and for that reason I have grouped together all grades of "good" and all grades of "imperfect" vaccination in a second table, and there I think you will see that the rate per cent. of mortality steadily increases in each group as the age advances.

718. (*Mr. Meadows White.*) Can you explain in the first column the difference between the fatality per cent. of the attacks in the case of unvaccinated persons between the ages of 20 and 30 and the ages of 30 and 40?—I should have pointed out that, taking the second table for example, whereas amongst those under five years of age there was no death in those who had good vaccination, the per-centage was 56·5 amongst the unvaccinated; that from 5 to 10 years of age the fatality was 0·9 per cent. for those who had good vaccination, and it was 35·2 per cent. for those who were not vaccinated; that from 10 to 15 years of age the fatality was 1·1 per cent. for those who had good vaccination, and 23·3 per cent. for those who were not vaccinated; that from 15 to 20 years of age the fatality was 1·9 per cent. for those who had good vaccination, and 42·1 per cent. for the unvaccinated; that from 20 to 30 years of age the fatality was 3·9 per cent. for those who had good vaccination, and 49·8 per cent. for the unvaccinated; that from 30 to 40 years of age the fatality was 9·5 for those who had good vaccination, and 40·7 for those who were not vaccinated; and then, lastly, that for those over 40 years of age the fatality was 12·5 per cent. for those who had good vaccination, and 43 per cent. for those who were unvaccinated.

719. The special figures to which I call your attention are the 49·8 between the ages of 20 and 30, and 40·7 between the ages of 30 and 40; it is a very much smaller per-centage in the one case than in the other?—It really is, I think, a matter of the small number admitted which makes the figures at that age not so absolutely trustworthy for the purposes of comparison. Not many unvaccinated persons, I expect, in London, reach the age of 30–40 years before getting small-pox. Dr. Gayton's figures are divided according to males and females, as well as according to ages, which makes it difficult for me at the moment to give you the total number of attacks at any one age; but, as I have already stated, if Dr. Gayton is going to be called, he will have the whole thing, I have no doubt, at his fingers' ends. Referring once again to the change in the age-incidence of fatal small-pox in this country, I will now put in another table. It carries us beyond the period of 1870, which was dealt with in the previous table put in. It is a table showing, for each of the several registration divisions and during successive decennia, the general decline, since compulsory vaccination and during its completer enforcement, in small-pox mortality among the infant population, and the fluctuations of small-pox mortality among the populations above infancy. (*The table was handed in. See Appendix III., Table E: page* 118.) You will observe in the column headed "0–5" that in nearly every instance, as regards both London and the several divisions of the country, there has been a diminution, decennium by decennium, of the rate of small-pox mortality. In some instances the reduction from the first to the last period is enormous, as, for example, in the South-western division, where the small-pox death-rate per 100,000 was 95 for the period 1851–60, and it dropped to 1 per 100,000 during the period 1881–88. In the West Midland the reduction is hardly less striking; the fall is from 123 per 100,000 to 6 per 100,000. In the North Midland it is from 69 to 3; in the North-western from 113 to 4; and in the Welsh districts it is again very striking, from 164 down to 1. I may just point out, incidentally, that the fall in the York division has been from 116 to 7, although that 7 includes the whole infant mortality of the recent Sheffield small-pox epidemic. As regards the column "five +", you will see that the point which I have named is brought out rather strikingly, namely, that, although under five years of age, there is this remarkable saving of life from small-pox, increasing almost uniformly as period has succeeded period, the same thing cannot be said for ages over five:—there is a frequent fluctuation with, on the whole, increase in the small-pox death-rate at that age.

720. There seems to be a special increase from 1871 to 1880?—That is unquestionably so. During the 1871–80 period the population in England were put to the test, and in a very severe way, by much small-pox, and it was essentially above the age of five that the excess of mortality took place; for, notwithstanding that the epidemic in 1870–72 affected nearly every district of the kingdom, there was a diminution in the small-pox mortality under five years as compared with the two previous periods.

721. (*Chairman.*) I see that in every district there is an increase in the period 1871–80 over 1861–70 at ages over five?—That is so.

722. (*Professor M. Foster.*) And there is an increase under five years of age only in the northern district, where there is a very considerable increase?—Yes, that is so. And, as regards ages over five years, we believe increase to be the result of the bad infantile vaccination that used to be carried on in the northern district, that division including colliery districts where we know a large amount of vaccination has been very imperfectly performed.

723. Can you formulate that evidence as to bad vaccination?—I imagine that it would largely be formu-

lated in the way of showing that formerly the amount of vaccination done by public vaccinators was small compared with the total vaccinations performed, but I will take a note of it and see whether I can put it before you in an intelligible way.

724. (*Dr. Collins.*) Would not that apply to the York division also? You applied it to the York division in the former table, whereas there is a considerable decrease in the York division in this table.

(*Professor M. Foster.*) The question I asked was this: can you formulate distinct evidence that there was less perfect vaccination in the Northern Division during the decennium 1871–80 than in any other district?—I should be obliged to ask you to defer that matter; and as regards Dr. Collins' question also. The previous table did not include the period 1871–80.

725. (*Dr. Collins.*) You mentioned in connexion with the former table that the diminution in the case of the York Division was so small owing to the fact of its being in a mining district and the mode of vaccination there being less perfect. I understand you in the latter table to give us that explanation for the northern division?—Yes, I included York as one of the divisions which I believed was affected in the way I have mentioned.

726. In the latter table you see that in Yorkshire there was a considerable decline from 1861–70 to 1871–80?—Yes, and I am unable to say that it is not due to a great improvement in infantile vaccination. We are dealing with a totally distinct period, and different amount of small-pox.

727. You have distinct evidence that there was an improvement?—Yes. As I have already stated, I will endeavour to supply that information.

728. (*Mr. Meadows White.*) You observed that York Division was the most favoured in 1871–80 as compared with 1861–70?—Yes, under five years of age.

729. (*Dr. Collins.*) As it was not favoured in the previous table?—No I have a table here which I would hand in which deals with the same matter as regards London. It is a table showing, since compulsory vaccination and during its completer enforcement, the general decline in small-pox mortality among the infant population, and the fluctuations of small-pox mortality among the population above infancy. (*The table was handed in. See Appendix III., Table F: page* 118.) The periods are five year periods. We can get facts for London in a more detailed manner than we are able to do for the whole of the country and the other divisions, and the effect of epidemics is, of course, made much more prominent by diminishing the length of the periods. For example, the effect of the 1871 epidemic is very marked by a rise to 192 per 100,000 deaths under five years of age, there being a still greater rise among those over five years of age.

730. (*Mr. Meadows White.*) Is there any other period than the period 1870–74 when there was a special epidemic?—The period 1882–84 was a period when there was an epidemic in the country generally, but it was a small one compared with the epidemic of 1871; the epidemics which have occurred since 1871 have, with the exception of Sheffield, been almost entirely limited to the metropolis, so that they would not show so much in statistics as to the country as a whole.

731. (*Chairman.*) Was there any epidemic in the periods of 1843–46 or 1847–49?—1843–46 is the period which I expect Dr. Ogle has explained to you. There are no statistics available as to causes of disease during that period; in fact, there is a gap there in the Registrar-General's returns.

732. (*Dr. Collins.*) Does that gap apply to London as well as to England?—It does not apply to London.

733. (*Chairman.*) Was there in London any epidemic in the periods 1843–46 or 1847–49?—Yes, there was what may be regarded as amounting to an epidemic in 1844, that is to say, the annual rate of mortality from small-pox per million living reached 890 in the year 1844, and the epidemic continued into 1845; constituting an epidemic in 1844–45. Then there was also a large increase in 1848, when the death-rate per million rose to 724.

734. (*Professor M. Foster.*) Do you mean a greater increase than in 1844–45?—In 1844 it was 890; in 1845 it was 440, that being doubtless a continuous epidemic; and then in 1848 it was 724.

735. (*Mr. Meadows White.*) Have you a table of the annual number of deaths in London for each year successively?—No, I have not at the moment. The whole of that, of course, is obtainable from the Registrar-General.

736. You seemed to be reading from a table?—These are rates. The rates per million are contained at page lix of the 50th Annual Report of the Registrar-General of England.

737. (*Chairman.*) Have you concluded what you have to say about the continuous fall in London in the number of infantile deaths from small-pox?—Yes.

738. What is your next point?—I was then desirous to show that we had endeavoured in the Local Government Board to get all the knowledge that we could upon the subject of age in relation to post-vaccinal small-pox, not only as regards liability to fatal small-pox, but as regards liability to attacks of small-pox, of any sort, however trivial. As regards the metropolis there is an amount of evidence which has been collected as the result of the epidemics of 1881–82 and 1876–78. With regard to liability to death from small-pox, I would refer to a report which was prepared by the Vaccination Committee of the Epidemiological Society in 1886. It is a somewhat lengthened report, but the chief facts are summarised as follows:—As to the liability to death from small-pox of persons aged 20 and under, suffering attack, it was found that it was "in the vaccinated and "in the unvaccinated respectively, influenced by the "age of the patient at the date of attack." For example, "among the unvaccinated small-pox patients "more especially, liability to death is influenced by "the condition of age. Among them it is at its maximum in the first five years of life; at its minimum "from 10 to 15 years of age; and after fifteen it "somewhat rapidly increases again. Among vaccinated small-pox patients liability to death, though "influenced to some extent by age, is in the main "governed by the character of the vaccination possessed "by the individual patient, as evidenced by his vaccine "scars at the date of his attack." As to this latter point, the Vaccination Committee say: "There can be "no doubt whatever, then, that as a protection against "death by small-pox 'good' vaccination—*i.e.*, vaccination producing persistent well-foveated scars,—is "upon all counts pre-eminent."

739. (*Dr. Collins.*) May I ask who composed the committee from whose report you are quoting?—The committee was composed of Dr. Robert Cory, Dr. John MacCombie, and Mr. Shirley Murphy. They issued to a very large body of practitioners throughout the country a series of questions asking them for statistics, upon which their report is based.—But as regards attack as distinguished from death, perhaps the most striking instances of the value of vaccination and of its affording protection against small-pox, especially up to five years of age, and as showing how the protection against small-pox has varied according to the quality of vaccination, are embodied in the report which has recently been submitted to the Local Government Board by Dr. Barry on the Sheffield epidemic. I assume that Dr. Barry will give evidence before the Commission, but with your permission I would just point out one or two of the more salient features of that report in illustration of matters that I have brought before the Commission in my evidence. For example, at the foot of page 179, and extending on to the next pages, there is a long statement, of which this may be regarded as a summary: Apart from questions of different degrees of exposure to infection and different qualities of vaccination, the following appears to be the rate of attack among the population generally of the vaccinated and the unvaccinated respectively. I assume that 1 represents the rate of attack amongst the vaccinated in each age class that I shall name, and then we have the following rates amongst the unvaccinated: In the first place, at all ages, 6·2; 0 to 5 years, 18; 5 years to 10 years, 54; 10 years to 15 years, 20; 15 years to 20 years, 8; 20 years to 30 years, 3·9; and over 30 years, 2·4. Or, dividing the whole of the population of Sheffield, which was enumerated for the purposes of Dr. Barry's inquiry, into persons under 10, and persons over 10 years of age, we have for every one attack among the vaccinated under 10 years, 20 unvaccinated attacks; and for every attack among the vaccinated over 10 years of age we have five unvaccinated attacks. Then on pages 181 and 182 there is very striking information as to the different incidence of attack on vaccinated and unvaccinated in houses that were actually invaded by small-pox; and here, again, I take the vaccinated irrespectively of the

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quality of their vaccination, and compare them with the unvaccinated. To every one attack among the vaccinated at all ages there were 3·3 among the unvaccinated; under 5 years of age, for every vaccinated attack there were 15 unvaccinated attacks; from 5 to 10 years of age, for every vaccinated attack there were nine unvaccinated attacks; from 10 to 15 years of age, for every vaccinated attack there were four unvaccinated attacks; from 15 to 20 years of age, for every vaccinated attack there were two unvaccinated attacks; the same for the ages 20 to 30; and also for those over 30. Or, dividing as I did before, the population of Sheffield in the invaded houses into persons under 10 and over 10; for each attack under 10 years of age amongst the vaccinated, there were 11 amongst the unvaccinated; and the corresponding figures at over 10 years of age are 1 amongst the vaccinated as opposed to 2·4 amongst the unvaccinated. Then as regards the effect of the quality of vaccination on attack (which the previous records did not touch), I would refer here to page 190, where the different character of the disease is shown according to the quality of the vaccination in the children under 10 years of age. For example, where there was no visible mark or one cicatrix only, 75·7 per cent. of the children attacked had mild or discrete attacks, and 24·3 per cent. had severe or confluent attacks. Where there were two cicatrices, 88 per cent. of the attacks were mild and 12 confluent. Where there were three cicatrices 95 per cent. had mild attacks and 5 per cent. had confluent. Where there were four or more cicatrices 97·5 per cent. had mild attacks and 2·5 had confluent attacks. In other words, the question of the disease being severe or mild was shown to be related to the number of cicatrices which the child exhibited; the severe attacks varying from 24·3 per cent. amongst those who had no mark or one cicatrix only, to 2·5 per cent. amongst those having four or more cicatrices.

740. (*Mr. Savory.*) The term "severe" is synonymous with "confluent"?—"Severe" means "confluent," and "mild" means "discrete."

741. "Confluent" is a more definite term than "severe"?—Yes, it is a better term; but I believe Dr. Barry included under the term "severe" a number of cases of "co-herent" small-pox.

742. (*Mr. Meadows White.*) On the page that you are referring to, I see that there is another term, "followed by pitting"?—Yes, I do not go into that to-day. Dr. Barry will enter into all those details.—Then again, the fatality per cent. of persons actually attacked was shown in the same way to vary according to the amount of vaccination as shown by the resulting scars. Here, again, I take the number of the cicatrices quite irrespective of their quality. In the Borough Hospital, for example (page 212), where there was no visible cicatrix or only one cicatrix, the fatality was 13·7 per cent. of attacks in that class, where there were two primary cicatrices it was 9·3 per cent., where there were three primary cicatrices it was 5·7 per cent., and where there were four or more primary cicatrices it was only 2 per cent. These data relate to all ages. Then, again, precisely the same thing is shown at page 214 as regards the other hospitals. For example, in the case of the Lodge Moor Hospital, where the division made is a little different, it appears that where there were less than three primary cicatrices the per-centage of attacks that were fatal was 16·2, and where there were three or more cicatrices it was only 4. Then at the Ecclesall Bierlow workhouse, in the cases in which there were less than three primary cicatrices, the mortality was 50 per cent., and where there were three or more cicatrices it was only 1·7 per cent. But as regards these two latter hospitals the figures dealt with are smaller than in the case of the former one.

743. (*Chairman.*) You mean that there was a smaller number of cases tested for the per-centage?—Yes, there was a smaller number of cases to judge from.

744. It has been suggested that the diminution in small-pox mortality is due rather to the improved sanitary condition of the country than to vaccination; have you any statements which you wish to make with regard to that?—Yes, I might say, in the first instance, that the whole body of the evidence relating to vaccination in connexion with small-pox goes to bear out the view that it is vaccination in the main that has had to do with the diminution of the small-pox mortality that has been recorded in the various statistics which have been brought before the Commission. For example, as the efficiency of the vaccination law has increased so, taking sufficiently long periods, there has been a corresponding diminution in the fatality from small pox. As the number of scars produced on the arm has increased so has there been a diminution of severity and fatality from small-pox amongst the vaccinated. And, again, as the quality of the vaccination, as shown by well-foveated marks, has increased so there has been a progressive diminution of small-pox fatality. And then there is the striking point, that diminution in the amount alike of fatality and mortality has taken place precisely in accordance with the nearness of the time to the vaccination at which the patient was attacked by small-pox; and not only so, but the greatest protection which has taken place against attack by small-pox has been at periods near to the operation of vaccination, whether it be primary vaccination or re-vaccination. So also, the greater the remoteness from the date of vaccination the greater has been the incidence of small-pox and the fatality of small-pox upon those attacked. The facts are of moment in reference to the definite relation which has been shown to exist between the fall of small-pox and increase of vaccination; the safeguarding is essentially in the years immediately subsequent to vaccination, and the gain especially as regards infant life. For example, at the present moment it is essentially infants who are getting vaccination, and the great saving of death from small-pox affects essentially the infant population. I may say further that we have made every effort in the Medical Department of the Local Government Board to ascertain whether there is any other ground for this reduction as regards these ages, that is to say, during infant life, and so far as we have been able to gather there is absolutely no other explanation for this marked reduction of small-pox mortality amongst children, except the mere fact that children are nearest in point of time to the date at which they were vaccinated. Then, again, the increase of small-pox deaths at later ages whilst the infant death rate has been actually declining seems absolutely inexplicable, so far as I can judge, apart from vaccination. Children have a recent vaccination and their lives are saved from small-pox. As the interval increases between the date of vaccination and the date of attack by small-pox so does the mortality from small-pox begin to increase, and this is especially marked in the instances which I have brought under the notice of the Commission as regards the saving of life under five years of age. Then, again, I may point out that there is no such diminution of mortality of infants side by side with increase of mortality among older persons, as regards any other disease which you would, I think, regard as at all comparable with small-pox. The Medical Department have prepared a return in a diagrammatic form for England and Wales giving the average annual death rate per million living at all ages during three decennia 1851–60, 1861–70, and 1871–80, and also during the seven years 1881–87,—that is to say, for four periods. (*The diagram was handed in. See Appendix III.; facing page* 120.) The diagram shows the annual death rates per million from small-pox, measles, scarlet fever, and whooping-cough, and distinguishes in each instance the share of the all-age mortality borne by children under five years of age; the darkly shaded portions representing the mortality, and the whole height of the columns representing the death rates at all ages. So that, for example, assuming the tall column as to scarlet fever to represent 100, that is the total mortality, 64 out of every 100 would be children under five years of age; and the remainder, that is to say, 36, would be persons over five years of age. Now, if you will look at the small-pox diagram you will see that under five years of age the share of small-pox death has gone down, and the diagram looks like a series of steps. It has gone down from 62 per cent. of the total in 1851–60 to 24 per cent. of the total in 1881–87; whereas if you look at measles, you will see that instead of diminution in infant share of death from measles, the figures have been practically the same during all the four periods. If anything there has been rather an increase during the last period than a decrease, the amount per cent. being 91 for the period 1881–87 as opposed to 90 for the period 1851–60. If you take scarlet fever you will there again see that the share of mortality borne by children under five years of age has been almost alike throughout the whole of the four periods, namely 64, 64, 66, 64. Precisely the same applies to whooping-cough, the share under five years of age there being per cent. 96, 96, 97, and 96. So that I think this table shows for the whole of England and Wales that what is taking place as regards small-pox does not find its counterpart in any other infectious disease which is at all properly comparable with small-pox; the distribution of mortality

in those diseases having remained practically constant as regards the population under five years of age. Throughout this long period 1851–87, sanitary improvements have been steadily going on; and as far as their influence extends, there is nothing to show of changed incidence upon age, accompanying change in the total prevalence of disease.

745. (*Dr. Collins.*) Have you any objection to adding the figures for fevers?—In the first place I would say that they could not be added—that they are not to be had.

746. The figures for fever comprising typhoid and typhus and simple continued fever are to be had, I believe?—I suppose it would be impossible to instance any word which is more utterly worthless as an indication of disease than the word "fever." I was going to say that I am sure my questioner would agree that "fever" was a term which had absolutely no value, or to say the least no value for statistical purposes, until Sir William Jenner's day.

747. (*Chairman.*) You mean because it was a vague general term which included several kinds of disease?—Many a child who died with a hot skin, for example, was said at one time to have died of "fever"; pneumonia was put down as "fever"; bronchitis was often put down as "fever"; in fact, I have always understood that it was generally admitted that the term "fever" was so worthless that the Registrar-General found it necessary before his statistics as to "fever" could be of any value at all to differentiate between three sorts, typhus, typhoid, and simple continued fever.

748. (*Dr. Collins.*) That objection would not apply, would it, to figures since 1869?—No, that one objection would not wholly apply, but there are many other objections, at least there are other objections. In the first place, I never heard it suggested that enteric fever and small-pox were at all alike as regards their causation. The right means of prevention has been applied to enteric fever, namely, the provision of proper water supply and of sewerage; and I think the right means of prevention has been applied to small-pox, and the consequence is that in both there has been reduction of mortality.

749. (*Chairman.*) Is enteric fever contagious?—In a limited sense it is; but the diminution which has taken place in enteric fever is not solely a diminution under five years of age, and that is what I am now speaking of. The whole burden of what I say now is that there is this remarkable difference between small-pox and any other known disease, namely, that it has enormously diminished under five years of age, whereas there has been no corresponding diminution under five years of age as regards any of the other diseases I have referred to. With regard to typhus, which Dr. Collins has mentioned, I never knew typhus to kill children under five years of age. I have been physician to a hospital where I have had as many as 200 cases of typhus at a time, and the difficulty was to keep typhus children in bed at all, so trivial was their ailment; whereas in former days, when all these diseases were lumped together as "fever," no end of children died of what was called typhus.

750. (*Professor M. Foster.*) Would it involve a great amount of labour to get statistical results, including in the first instance all fevers from 1837 downwards under five years of age and over five years of age, and then, since the time when they were discriminated, having a double result, thus showing when they were put together and when they were separated?—The Registrar-General gives it in rates per 1,000,000 from 1838 down to the present date.

751. At different ages?—No, he does not give it at different ages. No one but he could do it.

752. Would it be a great labour?—I should think it would be a superfluous labour.

753. (*Mr. Bradlaugh.*) Why?—I do not know how many years the Commission is going to sit, but to go through those statistics from 1838 at all ages would be a tremendous task.

754. (*Professor M. Foster.*) When I say "all ages" the distinction has been drawn by yourself between under five and over five years of age, and by Dr. Ogle and by Sir John Simon, between over 15 and under 15 years of age; and you have assured us that the rates of death were very different in those two categories?—Quite so.

755. The question has been asked whether these curves will apply to any other disease; and what I ask now is, whether, acknowledging the difficulties with regard to nomenclature touching fever, taking fever as one term until the distinction was made, and then having a double result afterwards when the distinction was made, it would be a very great labour to obtain statistics of the death-rate, say, since 1837 under five, or under 15 and over 15 years of age?—I do not think that I am capable of answering it; it has nothing whatever to do with my work. It would be a matter for the Registrar-General, and the amount of labour that it would involve would be a matter that he would be able to explain. My point was that you do not get fatal typhus amongst children, and, therefore, there is nothing to compare. I do not think I ever saw a child under five years of age die of typhus.

756. (*Dr. Collins.*) Does not the Registrar-General record deaths of children under five years of age from typhus?—Oh, yes; but our work in the country often deals with alleged typhus which is no more typhus than it is small-pox. There is still a large body of medical practitioners in the country who were educated before the day of Sir William Jenner, who, I am sorry to say, do not now know the difference between typhus and typhoid fevers.

757. (*Dr. Bristowe.*) And there have been many educated since who do not recognise the difference?—I am sorry to say there are. We are constantly getting reports from medical officers of health in which typhus is put down as the cause of death, and the health officer is obliged to put a footnote to the effect that although the death was so registered he knows that it was not typhus. In fact, I think it is a matter of general knowledge that amongst a certain class of practitioners, if there is any bad case of typhoid fever, in which the temperature rises very high, and there is a certain sort of delirium, and what we term sordes appear about the lips, the case is put down to typhus, and I have been over and over again told of typhoid running into typhus. You might as well talk of a horse running into a donkey or a dog. They are absolutely distinct diseases, due to totally distinct poisons, and they are prevented by totally different methods. But whatever we can get out for the Commission on that point, we will:—if it is only specifically put before the Medical Department of the Board.

758. (*Professor M. Foster.*) That is why I asked whether it would involve great trouble; if the trouble would be very enormous, then, probably, the difficulties introduced by nomenclature would render it undesirable; but if it could be done with no great difficulty it seems to me that it would afford a datum which could be used with discrimination, at all events?—With a very large amount of discrimination. My point is that you do not get, under five years of age; mortality from those two forms of fever which will compare with the small-pox mortality, and that, therefore, there is, practically, nothing to compare. Whereas, when you come to those infantile diseases, which may to some extent be regarded as favoured by conditions that, in a limited sense, do also favour small-pox, such as dense aggregation of people on areas, and the dense aggregation of people within houses; then (as for instance with measles, scarlet fever, and whooping-cough) you have the very opposite to what you have in the case of small-pox. The infantile share of the mortality from such diseases is maintained notwithstanding all the sanitary measures which have been adopted. In small-pox it has gone down step by step with the steady increase in the efficiency of administration of the vaccination law, and with the steady improvement in the method of vaccination, until it is now (during the period from 1881–87) only about a third of what it was during the period 1851–60.

759. (*Chairman.*) Would improved drainage and water supply be likely to have had the same effect in reference to small-pox as they would in reference to certain classes of fever?—Typhoid, I presume, is the class of fever your Lordship means. I can best answer the question by saying that in the Medical Department of the Privy Council and of the Local Government Board we have, now for 20 years been trying our utmost to ascertain what are the chief factors of disease, and I may say that I do not remember any one of our inspectors ever hinting that improved water supply and improved drainage had had any influence whatever over the causation of small-pox, whereas in the case of typhoid fever those measures have had a great restraining influence.

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760. (*Dr. Bristowe.*) That is because the poison is conveyed by the fæcal matter with which the water may be contaminated? — The poison of typhoid is diffused by sewage and polluted water.

761. (*Chairman.*) So that the disease is contracted through those means, and almost exclusively through those means; but I suppose they would not be the means to any extent of causing an attack of small-pox whether they influenced it or not?—I neither know nor have I heard anyone suggest that they are. I might in that connexion quote a few words from the writings of one who cannot certainly be regarded as a particular friend to vaccination. Dr. Creighton, writing in the "National Review," says of a non-medical critic: "It "is odd that he should name in that connexion certain "forms of sanitation which I did not mention—sewer- "age, water supply, and nuisance removal. These, of "course, are valuable against the morbid poisons or "disease germs that reside in the soil; but I am "entirely of the opinion of my critic that they have "comparatively little influence upon small-pox." I myself never heard it suggested that they had.

762. (*Sir James Paget.*) I suppose the mortality from small-pox in a given number of cases might be expected to be greater in ill-ventilated and unsanitary places than it would be in sanitary places?—I imagine that in respect of every disease the fatality is greater if the patients are not placed under proper sanitary conditions.

763. Therefore you would not say that sanitary conditions have any influence on the frequency of small-pox, although they have upon the mortality attending it?—I am speaking upon the question of sewerage and water supply; I do not know how far water supply would affect recovery of a small-pox patient. Even if the water supply contained the specific poison of enteric fever, I do not know how it would influence a small-pox patient during the acute stage, but, generally speaking, insanitary conditions, including sewerage and drainage, do operate for evil upon all persons who are ill, and to that extent tend to prevent recovery.

764. (*Chairman.*) Unsanitary conditions would not, necessarily, increase the number of small-pox cases?—I should be sorry to say that overcrowding, either on area or in houses, would not tend during an epidemic to increase it, because it is a poison which is diffused aërially, and overcrowding would tend to increase it in precisely the same way as it would tend to increase scarlet fever, whooping-cough, and measles; and it is for that reason that I have put those four diseases together in the diagram. They are, I believe, in this respect, fairly comparable, but when you come to general insanitary conditions, such as faulty drainage or water supply, I confess I have no knowledge that such conditions have ever produced a single case of small-pox since small-pox has been in existence. Then, again continuing upon this point as to sanitary circumstances, I would point out that the special saving of infant life from small-pox has by no means been limited to the well-to-do classes, to those who are well housed, well fed, well clothed, but that it has in certain instances been actually greatest amongst the poorer classes who live under inferior sanitary circumstances. For example, Dr Buchanan has shown that in London the saving of life from small-pox amongst infants has been greater amongst children getting their primary vaccination at public vaccination stations than amongst those who received their vaccination at the hands of private practitioners. Now it is well known that those people who get vaccinated by private medical practitioners are, as a rule, of the upper classes who can afford to pay, and who wish to pay for their vaccination, and that, taking those who attend the public stations as a body, they are of the poorer classes who cannot afford to pay a private practitioner, and who are therefore presumably living under less eligible circumstances, and are certainly not so well clothed nor so well fed. Then there is another point which I think is extremely striking, and that is when you are able to compare in the matter of liability to small-pox persons who are living in precisely the same circumstances. For example, I take the question of the nurses living in hospitals. In the Report of the Committee of the Epidemiological Society to which I referred a short time ago, there is an account given of a total of 734 nurses and attendants at the Metropolitan Asylums Board small-pox hospitals; the material for these figures having been provided by Dr. Cory, Dr. MacCombie, and Dr. Sweeting. We may separate those 734 into three classes. 79 were persons who had suffered from small-pox before taking service at the hospitals; they were, I believe, to a large extent small-pox patients who after recovery elected to take service as nurses. Not one of them contracted small-pox, and these, for the present purpose, I may eliminate. Then there remain 655. Now, 645 out of the 655 had not only been vaccinated in infancy, but had also been re-vaccinated before entering on their duties at the hospitals. Not a single one of them took the small-pox. Here we are dealing with large figures. The 10 that remain had like the others been vaccinated in infancy, but they had not been re-vaccinated before entering on their duties at the hospital. Every one of them contracted small-pox at some period or another of their service. Now, here you have people living on the same premises, getting the same food, wearing very much the same quality of clothing, having the same water supply, the same sewerage, the same drainage, and the same housing. The small-pox absolutely passes over the 645 who had been re-vaccinated, and deliberately seizes upon every one of the 10 who had not been unvaccinated. Then, on the other hand, as regards typhus, which has been referred to, there are a number of instances in striking contrast with those as to small-pox. For example, here is a case from Newcastle-upon-Tyne, whence the medical officer of health reports that during 1882, 14 nurses were employed at the Newcastle-upon-Tyne Infectious Hospital in attendance on cases of typhus. Of the 14, nine contracted the disease, and two of them died. In the adjacent pavilion nine other nurses were in attendance on small-pox patients. Of this nine, all but one, who had recently had small-pox, were re-vaccinated before coming on duty. None of them contracted small-pox, but one did contract typhus. Thus, where the prophylactic of vaccination was applied, it absolutely prevented the nurses from getting small-pox; where no such prophylactic could be applied, that is to say, in the case of typhus, one of the small-pox nurses, although in a different building, did contract this fever. Now here, again, you have people living under precisely the same sanitary circumstances, drawn from the same class of life and comparable in every way but one—some were purposely protected against the disease with which they were in contact, the others were not. Then during the same epidemic the Gateshead medical officer of health writes: "Every nurse who has been more "than a fortnight in the typhus wards has suffered "from typhus. On the other hand, the only officers "who took small-pox were two kitchen girls whom I "neglected to vaccinate." So that there again you have the same people living under the same sanitary circumstances; small-pox deliberately seizes upon the only ones whom the medical officer of health had forgotten to vaccinate, the others passing through the epidemic scatheless. That sort of evidence, I may say, is to be found in many an officer of health's report from one end of the kingdom to the other. These are not exceptional incidents.

765. Do you know if any record has been kept of the conditions of the nurses as to typhus in the hospitals of the Metropolitan Asylums Board? You have given us from the records the facts as to a large number of nurses in relation to small-pox, do you know if in their fever wards any record has been kept of how many have taken the disease?—I cannot give particulars of the Metropolitan Asylum Boards hospitals, but I feel certain that their records are such that you would get similar evidence from them. I may say as to typhus that at the London Fever Hospital, of which I was formerly physician, no physician, no resident medical officer, no servant, no nurse was even engaged—when we took typhus patients into that hospital—without being asked whether they deliberately elected to expose themselves to the grave risk of contracting typhus, so fatal was the risk to the staff.

766. (*Sir Guyer Hunter.*) You stated that a certain proportion of nurses who had not been re-vaccinated had contracted small-pox; do you know the type of small-pox they contracted and the mortality from it?—I am afraid that that is not given in the paper I quoted from. From the records of the Metropolitan Asylums Board I have no doubt that you would be able to get that point if you wished it, but it does not appear to be given in the report I have been quoting. Then, there is another interesting little bit of information which bears upon the same point; that is to say, Dr. Cory, in dealing with out-patients at his hospital, and in dealing with parents and adults who bring children to be vaccinated at the public vaccination stations, that

is to say, dealing always with one class of persons, has for many years taken note of those who bear evident marks of small-pox, and he has tabulated the age at which they contracted their small-pox. For instance, taking 148 cases;—of those stated to have been vaccinated, but as to whom he could find no mark of vaccination, the average age at which they contracted small-pox was 10·8 years, practically 11 years. Those having one vaccination cicatrix did not get small-pox till they were 17 years old; those having two cicatrices did not get it until they were 18; of those having three vaccination cicatrices the average age of attack was 19, and it was the same as regards those having four. Amongst those who were admittedly unvaccinated the average age at which they had contracted small-pox was seven years. So that here you have people drawn from the same class of life, living under much the same sanitary circumstances, — for they were nearly all London people, — and the difference between contracting small-pox at 7 or at 19 years of age was the difference of being either unvaccinated or having three or four vaccination scars.

767. (*Chairman.*) What hospital is Dr. Cory's?—St. Thomas' Hospital. Another very striking experience comes from Sheffield. At Sheffield upon the whole of the enumerated borough Dr. Barry was able to give data as to people living:—first, in the sanitary area as a whole; secondly, in those houses of that area which were actually invaded by small-pox. Amongst the first class, *i.e.*, persons living in one and the same town, taking children, for example, under five years of age, for every one who died amongst the vaccinated there were 1,100 died amongst the unvaccinated. For every single death between 5 and 10 years of age amongst the vaccinated there were 800 amongst the unvaccinated; for every single death amongst the vaccinated between the ages of 10 and 15 there were 453 amongst the unvaccinated, and so on. In the second class he deals with people living together in houses with small-pox patients. Here, for every death of the population amongst the vaccinated, there were 858 amongst the unvaccinated under five years of age. Between 5 and 10 years of age for every single death amongst the vaccinated there were 149 amongst the unvaccinated, and from 10 to 15 years for every single death amongst those vaccinated there were 78 amongst the unvaccinated.

768. (*Mr. Savory.*) To make that table complete you would want the proportion between the numbers of the vaccinated and the unvaccinated at the respective ages?—I will, if necessary, supply the actual numbers.

769. (*Mr. Dugdale.*) Are you referring to any particular page of that report?—You will find it on page 174; it is a table headed "XCIII.," only that I have very much abbreviated the table. I am not, however, professing to give evidence upon the whole body of Dr. Barry's report.

770. (*Chairman.*) You were merely calling attention to certain points supporting the suggestions you were making to the Commission?—Quite so.—I may add that a very similar inference as to the respective influence of vaccination and sanitary circumstances is to be drawn from certain classes of people, such as postmen. In a speech, for example, which Sir Charles Dilke made in the House of Commons in 1883, when he was President of the Local Government Board, he said, "In the case "of persons permanently employed in the postal service "in London, averaging 10,504, who were required to "undergo vaccination on admission unless it had been "performed within seven years, there had not been a "single death from small-pox between 1870-80, which "period included the small-pox epidemic, and that "there had been only one slight case of the disease." Now postmen are very largely drawn from the classes who do suffer from small-pox attack and small-pox death, and they are compelled by the very nature of their duties to go to houses infected with small-pox and actually to deliver letters, and in that way to come into contact with persons who are in attendance on the sick, and it is well known how attendants on the sick can convey the poison about with them and distribute it aërially to those with whom they come in contact. Dr Barry gives very much the same evidence in the case of Sheffield, at page 206 of his report:—"There are 290 men and boys employed on the "permanent staff of the Sheffield Post Office. The "whole of these, in accordance with the Post Office "Regulations, had been re-vaccinated before engage-"ment. It is scarcely necessary to point out that the "duties of letter carriers, telegraph boys, &c. continu-"ally bring them into personal contact with infected "persons and things, yet up to the present date "(August 1888) no member of the permanent staff of "the Sheffield Post Office has contracted small-pox." I think it would be impossible to affirm that postmen live under sanitary conditions different from those of the general body of the population, and yet they, who are so constantly brought into direct contact with the infected, escape altogether from contracting disease; and this, I maintain, as the result of their re-vaccination before engagement. There are other points which might be brought forward in illustration, but I should only be repeating again and again in more detail facts of the sort which I have already brought forward. I may certainly say that, although we make every effort in the Medical Department of the Local Government Board to understand the nature and etiology of these infectious fevers, we have not an iota of evidence to show, that apart from the protection afforded by vaccination, any sanitary circumstance materially affects the question of death or attack from small-pox.

771. (*Professor M. Foster.*) You have said, I think, that in former years adult vaccination was more common than it has been recently?—Yes.

772. And that that had influenced the greater relative mortality of those in the later years of life?—It is absence of adult primary vaccination which has largely determined the different incidence of small-pox death upon age during recent periods as compared with remoter periods.

773. I suppose during the epidemic of 1871-72 there was, owing to the alarm felt, a very great increase in adult vaccination?—We have no actual figures as to the adult re-vaccination, but I may say that, taking vaccination as such, an epidemic always leads to a large increase in the amount of vaccination amongst all classes, and on looking to the vaccinations, for example, which took place at the public stations, they increased enormously during the period 1870-73.

774. My question referred, of course, to adult vaccination?—So I understood.

775. (*Chairman.*) Would this statement include re-vaccination as well as vaccination, or are they separately returned?—No statement would include all re-vaccinations; re-vaccination not being compulsory we have no record which would be worth anything at all as to it.

776. But I mean when a public vaccinator re-vaccinates, does he include those in the return of the number of people he vaccinates?—He includes it in his register, but he makes no return of it to the Medical Department of the Local Government Board; it is, of course, included in his return to the guardians for the purpose of payment.

777. But would it be included in his total of people vaccinated in a given time?—No, we never include it; in fact, the figures I have before me, and which relate to the very large increase of vaccination during the epidemic of 1870-71, distinctly do not include re-vaccination.

778. (*Dr. Collins.*) Were not the adult re-vaccinations included in the figures before 1872 along with primary infantile vaccinations in the returns made to the Local Government Board?—Whatever took place then takes place now. I am not aware that they were. Of course the Local Government Board was really not formed till the year 1871. We certainly have no returns at the Local Government Board as to the number of re-vaccinations that are performed in the country.

779. (*Professor Foster.*) My point was, supposing there were a great increase of adult vaccination, owing to an alarm of epidemic, or at the time of an epidemic, do the returns show any effect of that in the ages of the mortality in subsequent years?—As far as I know, the Registrar-General does not, year by year and for the several divisions of the country, divide small-pox deaths according to age; he only could provide the Commission with them for the years since 1881, for example.

780. (*Mr. Meadows White.*) The Sheffield report of Dr. Barry is summed up in the introduction, which was signed by Dr. Buchanan?—Yes.

781. Had you any part in the preparation of that introduction?—I had not.

782. It appears to me to be a very able summing up of the evidence on Dr. Barry's report?—I had no part

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in the preparation of that; it is absolutely Dr. Buchanan's own work.

783. Can you give me at all the statistics before 1851 which may be compared with this per-centage of ·62?—I am afraid there is no decennial report of the Registrar-General antecedent to 1851, and the figures upon which my table for small-pox, measles, scarlet fever, and whooping-cough is based are taken from the decennial reports.

784. I asked you that question because the proportion or per-centage in infant mortality in measles and whooping-cough appears to be stationary in your table?—Yes.

785. And the statistics of infant mortality from small-pox seem to fall in decennial periods?—To show this, was the object of my diagram.

786. I want to know whether you could give the figures previously to 1851 to show whether in old times small-pox was an infantile disease in greater proportion than ·62?—Of course it could only go back as far as 1847 if it were available, because just before that date there occurred that unfortunate break in the statistics, and there is absolutely nothing available as to the number of deaths from different causes; that is to say, from 1843 to 1846 there was a break in the continuity of the statistics.

787. There was vaccination before 1851, though not so general, and therefore that might perhaps furnish additional evidence to show the proportions of infantile mortality to the mortality of all ages previous to 1851; but you have no such statistics?—I am absolutely confident that they are not procurable, not even the number of deaths from small-pox.

788. Nor from general reading could you tell me whether it was considered in old times an infantile disease?—I am sure there is abundant evidence to show that small-pox was a disease, especially in children under five years of age, apart from the question of vaccination.

789. Your period from 1851 to 1860 begins with the ratio of ·62?—May I give you an extract from a work by Dr. Black on the mortality of the human species in 1788. He says, in reference to natural small-pox being an infantile disease, "In every large metropolis small-"pox is an annual epidemick. In country towns and "open districts its invasions are more distant; at "uncertain intervals of some years, when numbers con-"tiguous are attacked at the time. Very few of the "human species escape small-pox, especially in popu-"lous cities and towns. Therein there is always lasting "variolous fuel. * * * * It might be easily de-"monstrated that in London, and probably in all other "large cities, variolous ravages are principally amongst "children under five years of age." Then he goes on to say, referring to a special period, "A mere handful "of the native progeny of the metropolis can be sup-"posed to have escaped an infection with which they "are constantly enveloped." That is, of course, merely general evidence bearing upon the point.

790. You have no precise statistics to carry you back before the date of 1851?—I believe no trustworthy rates as to the age incidence of the disease were taken out before that date. I do not know how far this might bear on the point. Dr. Grieve, who was superintendent of the Hampstead Small-pox Hospital, writes, "Unvac-"cinated infants under one year rarely recover," that of course shows a heavy mortality in infant life.

791. There is one point which attracted my notice in this diagram as to scarlet fever, there is an immense fall in the mortality of scarlet fever in the period from 1881 to 1887—I see it is not for the decennial period—is that the cause?—It is not the cause; there has unquestionably been a very marked diminution in the total amount of scarlet fever, although infants have not benefited by it in so far as the share per cent. of deaths is concerned. This period of diminution from 1881 to 1887 is in some respects very difficult of explanation, my own impression is that it is a phase of scarlatina which we can hardly rely upon as lasting. I know that some people attribute it to hospital influence; but wherever we have been able in a given large town to enquire how far any diminution has been due to isolation, we cannot make out that the diminution has in any sensible way been due to that practice. The truth is that the decline of scarlatina in London commenced at a time when only about 7 per cent. of the total deaths were taking place in hospital; that is to say, not a very large proportion of the total persons attacked with scarlet fever were in hospital. Then, taking Leicester and Warrington, I presented a report to the Local Government Board upon the influence of isolation on infectious diseases, and I was keenly disappointed to find how little effect the isolation of scarlet fever cases in Leicester and Warrington had had on epidemic scarlet fever. In both of those towns there is compulsory notification of infectious disease. For instance, taking Leicester during the epidemic, from September 12th to December 31st, 1879, there were 64 deaths from scarlet fever, 159 cases having been admitted into the hospital, the hospital therefore was at work, but notwithstanding that, in 1880 117 deaths occurred, although 230 cases were admitted into the hospital. But again in 1881, the epidemic being still in progress, the number of deaths increased to 152, and this although a still increasing number, namely, 387 cases, had been admitted into the Borough Hospital. But the case of Warrington is even more striking. Taking a period of months from June 1880 to February 1882, I will just read together the cases notified to the authority, and the number of cases admitted into hospital. In June, 2 notified, 1 taken to hospital; in July, 3 notified, 2 taken to hospital; in August, 22 notified, 20 taken to hospital; in September, 7 notified, 7 taken to hospital; in October, 10 notified, 9 taken to hospital; in November, 7 notified, 7 taken to hospital; and so on, right away to the end of July 1881, as the following table will show:—

TABLE showing Cases of Scarlet Fever notified to Warrington Sanitary Authority and removed to Hospital.

Date.			Cases notified.		Cases admitted to Hospital.	
1880	June	- -	2		1	
	July	- -	3		2	
	August	- -	22		20	
	September	- -	7		7	
	October	- -	10		9	
	November	- -	7		7	
	December	- -	11	115	8	101
1881	January	- -	4		3	
	February	- -	4		4	
	March	- -	3		3	
	April	- -	10		9	
	May	- -	6		6	
	June	- -	7		7	
	July	- -	19		15	
	August	- -	38		36	
	September	- -	66		60	
	October	- -	83		57	
	November	- -	69		49	
	December	- -	53		32	
1882	January	- -	42		26	
	February	- -	25		21	

By that date no less than 101, out of a total of 115 cases notified, had been removed to the hospital; in some months every case had been removed to the hospital, and yet we now find the number is mounting up—38 were notified in August and 36 were removed to hospital; the next two months 66 were notified and 60 were put in hospital; the next month it went to 83 and 57 were put in hospital; I believe they could not take the total into the hospital; but the epidemic instead of decreasing from June 1880 has been steadily increasing right up to the end of 1881, and it was still continuing in 1882, although the efforts of Warrington as regards isolation can only be admired for their strictness and for the care with which they were carried out. They did all that can be done to know of every case of disease and they did their utmost to isolate them all, yet notwithstanding, this took place. I am sorry to add that we have evidence quite recently within the last few months of precisely the same thing; they have done their utmost to isolate nearly every case of scarlatina and have failed to arrest the epidemic; the poison appears to be so ubiquitous that the epidemic of last year at Warrington went on steadily increasing.

792. Is scarlet fever a fever in which infection can pass before the disease declares itself?—Certainly, before it is recognised by the public.

793. The infection may therefore be spread before the isolation of the patient?—Yes, it may be so. I am now endeavouring to show that, although some people would be inclined to attribute that fall which is shown in this diagram to hospital isolation, I cannot believe that it is in any great measure due to that.

849. (*Dr. Collins.*) I have here the last report of the Metropolitan Asylums Board, which gives recent evidence for the year 1888, and I find on page 49 in the report from Dr. Birdwood that he says: "In revaccinating, I have continued the practice of doing so in one place only. The results are quite as protective as if five or six vaccination scars had been produced. No person employed at the Ships has contracted Small-pox during the year. Of 69 persons revaccinated, 45 succeeded, 15 failed; in 9 the result was not known"?—I think that fully confirms what I have said, that even one good mark protects for a certain period. Nurses do not remain for the whole of their lives in these Ships, and therefore the period of observation must necessarily have been a limited one.

850. I see that in the 24th volume of the Medical and Chirurgical Transactions, 1841, a paper contributed by Dr. Gregory, of the Small-pox Hospital, upon vaccination and small-pox, especially with reference to the theory of vaccine influence, and the relations between the cicatrix and the character of the variola. On page 23, after detailing several cases, he says: "I think from these cases the cicatrix cannot be relied on as affording any certain test of the degree to which the constitution has imbibed an anti-variolous influence"; so that it would appear from Dr. Gregory, who apparently had as abundant opportunities of investigating as Mr. Marson, that his observations had led him to an opposite conclusion?—I cannot pretend to go behind Dr. Gregory's facts; I never read his paper.

851. You will agree that there was evidently diversity of opinion upon the subject?—That seems to be so from the particular passage which you have quoted.

852. Perhaps you are aware, with regard to the protection of nurses by revaccination, that the experiment was tried at the South Dublin Union Hospital of not revaccinating nurses?—I believe that is doubted, but I do not happen to have the facts in my mind at present, and I could not speak upon that point.

853. I see in the Medical Press and Circular for March 27th, 1872, a paper read before the Surgical Society of Ireland, and Mr. Frank Thorpe Porter, who was attached to the Small-pox Hospital in Dublin, says: "With reference to revaccination, I have no faith in it. Not one of the 36 attendants at the South Dublin Union sheds has taken small-pox. Only 7 of the number were revaccinated, and as the remaining 29 enjoy the same immunity, wherein is the necessity of the operation?"—Does he happen to say whether they had had small-pox before?

854. He does not?—Then I should say that the evidence is of no value whatever without that information.

855. Could you give us any idea as to the per-centage of vaccinated persons in England and Wales at the present time?—About 95 per cent. of the population are supposed to be vaccinated.

856. Does that apply to the metropolis as well as to England and Wales?—I spoke of England and Wales.

857. I wish to ask you whether you think London would show a higher or a lower proportion?—I should be sorry that my answer should be taken as being worth much, but I know that in St. Pancras of children over one but below ten years of age over 99 per cent. were found to be vaccinated.

858. But could you give us any information as to people over that age?—As regards Sheffield, you will find it in Dr. Barry's report.

858. I was asking about London?—At the moment I cannot recall how far London differs from the country in that respect, but there are always more unvaccinated children in London than in England and Wales taken as a whole.

860. Do you think that London is much better vaccinated or much more vaccinated now than it was before the epidemic of 1871?—I see, taking the returns for 1885, that 7 per cent. of the births in the metropolis are unaccounted for as regards vaccination. That would to some extent answer one of your questions.

861. Could you tell me whether the per-centage unaccounted for would have been much larger before the epidemic of 1871?—I really do not know. I know that a vast number of people in London were vaccinated and revaccinated during that epidemic, and therefore I should assume that there are now more vaccinated people in London than there were before the period of the epidemic.

862. What I want to know is whether you can give me any estimate as to the per-centage of Londoners who were vaccinated in 1871?—I cannot.

863. With regard to the table respecting fevers, which you have put in to-day, could you tell me what proportion the deaths from remittent fever would bear to the deaths from all classes of fevers?—I have not separated them.

864. You could not tell me whether the deaths from remittent fever represent a large or a very small proportion of the total deaths?—I have compared them with the deaths from enteric fever, not with the total deaths from "fever."

865. I take it that the columns represent the total death-rate from fevers?—I can add them up for any given year if you wish it.

866. I understand that these columns represent the total death-rate from fever.

(*Professor Michael Foster.*) Not the total number of deaths.

(*Dr. Collins.*) I quite see that. My point is that the columns represent the total death-rate from fever. I want to know what proportion the death-rate from remittent fever bears to the death-rate from all kinds of fever?—I have not got it. The term "remittent fever," as I have already stated, is about as valueless as the "non-specified" causes.

867. We want to know what is left after taking away remittent fever?—If you will give me the figures I will answer any question you like upon them.

868. (*Professor Michael Foster.*) Can you not translate total deaths into death-rate in the case of remittent fever for 1881?—You want the total deaths from all fevers, and the number of remittent fever deaths in 1881.

(*Dr. Collins.*) Yes.

869. (*Professor Michael Foster.*) I think what Dr. Collins means is the death-rate from remittent fever for the periods 1861–70, 1871–80, and 1881–88?—It is quite impossible for me to do that sitting here at this table. I have not the books to enable me to do it for more than the year 1881.

870. (*Dr. Collins.*) Leaving that for a moment, I see that Dr. Ogle told us, in answer to question 516, that he thought it would be better to compare small-pox with deaths from zymotic diseases in order to ascertain how far sanitation was responsible for the decline of either, rather than with deaths from all causes; would you agree with that?—I am bound to say that I look upon the term "zymotic" as so vague, that taking these zymotic diseases as a group the term is almost valueless for such a purpose.

871. Then you would not agree with Dr. Ogle?—I would to this extent: that it must be diseases taken out of the zymotic group with which it must be compared; but as I said last time I would not dream of comparing small-pox with diseases like whooping-cough, because they have absolutely nothing in common so far as causation is concerned

872. I thought whooping-cough was one of the diseases which you compared with small-pox?—I did, and I showed you how absolutely different the results were. The one is due to one cause, and the other is due to another.

873. Then you were comparing things which were incomparable?—Not for my purpose then; but if I were to compare them now for the purpose, which I understand you have in view, I should be comparing things which are incomparable.

874. Dr. Ogle also told us that for a similar purpose it would be impossible to compare small-pox with scarlet fever or measles and things that only affect children. He said, "Fever is the only one . . . that you can take, because it is the only one that affects all ages. Fever is, therefore, the only one which it is possible to have it for," *i.e.*, for purposes of comparison with small-pox?—That bears out what I said as regards not taking the group of zymotic diseases.

875. Then you think fever would be the most comparable class to compare small-pox with in estimating the effect of sanitation upon either?—On the contrary, I told you distinctly last time that it would be utterly valueless for the purposes of comparison. I agree with Dr. Ogle that you cannot take the whole group. From what you read to me it would appear that he said that you could only take one out of the group for purposes of comparison.

Mr Richard Thorne Thorne, M.B.

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876. Fever not the whole group ?—I thought that you were speaking of the group of zymotic diseases. Then I must ask you to repeat your question.

877. Which do you think would be the class to compare small-pox with most fairly in order to ascertain the effect of sanitation upon the decline of the death rate, and upon the age incidence of the death rate ?—I think I gave you most clearly my view in the diagram which I put before you on the last occasion. There are a certain number of diseases more or less spread by the aggregation of people on area and within houses, and those I put together in a diagram last time. They were measles, scarlet fever, and whooping-cough, and those diseases, from that point of view, are comparable with small-pox.

878. You think that whooping-cough is fairly comparable with small-pox in order to ascertain the effect of sanitation upon either?—No, I have distinctly said that I limit sanitary influence to the aggregation of people upon areas and the aggregation of people within houses. I should say that those three diseases, apart from typhus, which is absolutely lost in the term "fever," are from that point of view most comparable with small-pox.

879. (*Professor Michael Foster.*) You would apparently agree with this: that if we had the same accurate statistics with regard to typhus fever as we have with regard to small-pox you might fitly compare the two; but the statistics are wholly unequal?—You never find any of these diseases behaving as small-pox, and for this simple reason: if you look at the small-pox mortality you will see that although the rate under five years of age keeps going down step by step as there is improvement in the administration of the Vaccination Acts, the amount of small-pox above a certain age literally jumps up; and there is no other disease, I say, in which this occurs. There is thus no disease that is comparable with small-pox in this respect amongst the zymotic group.

880. (*Dr. Collins.*) That is not quite the point The point is that if you wished for a disease of that group to compare with small-pox you would choose typhus fever if the statistics of typhus fever over a sufficiently long period were trustworthy?—In so far as the two diseases may be regarded as influenced by the overcrowding of houses and of people.

881. I meant simply a general comparison of the statistics?—I do not like to compare two diseases that I know to be so different, and for which I know the means of prevention to be absolutely different.

882. (*Mr. Savory.*) I think upon the last occasion you pointed out a contrast between the two, that whereas typhus never kills under five years of age, small-pox has killed chiefly under five years of age?—I did. In fact at nearly every point they are incomparable, except as regards the one particular that I have named.

883. (*Dr. Collins.*) I think you have told us in your evidence to-day that in earlier times, when there was no vaccination, the deaths from small-pox under five years of age were something like 80 or even 90 per cent. of the total deaths from small-pox?—I will accept the proportions; I do not know that I named those proportions precisely.

884. But I want to know precisely, if possible?—I read this from Dr. McVail. "Its death rate under five "years of age was thirty-five times greater than it is "now."

885. What would that be per cent. I thought you mentioned the words "80 or 90 per cent."?—I think you misunderstood me.

886. (*Dr. Bristowe.*) I think you stated that in some case out of 1,000 deaths 800 died under five years of age?—Yes, that was in Geneva. I quoted that from Sir John Simon's papers.

887. (*Dr. Collins.*) Do you think that nowadays, apart from vaccination, that per-centage of mortality would obtain under five years of age?—I should not like to hazard an opinion. I know that the main incidence of small-pox on the unvaccinated is in the case of those under five years of age.

888. Do you mean more than 50 per cent.?—I have given you tables, and I think that Dr. Gayton's tables show in one instance that in the unvaccinated the fatal attacks amounted to 56·5 per cent.

889. That is not the point that I am asking you about?—No, it is not, I see. I do not know that I am prepared to give you a per-centage upon that point. The broad fact is that the main incidence of natural small-pox has been upon the unvaccinated under five years of age.

890. I find that in 1881–87 there were 3,099 deaths from small-pox returned by the Registrar-General as unvaccinated small-pox deaths. Of those, 1,210 were under five years of age. That I think would give 39 per cent.?—I do not doubt it.

891. What conclusion would you draw from the fact that whilst before vaccination was introduced the small-pox deaths under five years of age were 80 per cent. of the total, now the unvaccinated small-pox deaths under five years of age are only 39 per cent. of the total?—Assuming your figures to be correct, I imagine that it is largely a matter of the virulence of the poison at any one period. You have selected a non-epidemic period.

892. I selected the only period for which the figures are available, because before 1881 they were not differentiated into three classes?—That would not constitute it an epidemic period: and it is unquestionable that the mortality does differ very much according as it is an epidemic period or a non-epidemic period.

893. We are dealing with three thousand deaths; it is a considerable figure?—That was during a period when unvaccinated children had less opportunity, I should imagine, than they ever had before of contracting small-pox.

894. Surely we are comparing two things which are perfectly comparable. We have three thousand unvaccinated small-pox deaths, and small-pox deaths before vaccination was introduced. In the latter case 80 per cent. were under five years of age, whereas now only 39 per cent. are under five years of age.

895. (*Mr. Savory.*) Where was the table of the 80 per cent. taken from?—It was taken from Geneva during the period 1580–1760.

896. (*Dr. Collins.*) That leaves 96 per cent., I think, under 10 years of age?—Very likely. Unless I knew the conditions of small-pox in Geneva 300 years ago, which it is impossible for me to know, I really could not help the Commission at all by answering a question of that sort.

897. Have you observed the figures given in that table to which you were referring, Mr. Simon's table on Geneva and Paris?—I say again that I do not profess to give any evidence that will be of the slightest value to this Commission on the past history of small-pox and vaccination. I have not made it a study, and I can only say that I do not know sufficiently about it to give the Commission any information that would be of the slightest value to them on that point. I quoted a figure from the table as to Geneva in answer to a question that Mr. Meadows White asked me. I cannot explain why the incidence was at that special rate at that special time about which I know nothing.

898. Do you wish us to infer that apart from vaccination there has been no shifting of the age incidence of fatal small-pox?—I should be sorry to put it in that absolute way. I do not think that anything that I have said could be so interpreted.

899. May I ask your attention to your answer to question 744, where you say, "So far as we have been "able to gather there is absolutely no other explanation "for this marked reduction of small-pox mortality "amongst children, except the mere fact that children "are nearest in point of time to the date at which they "were vaccinated"?—Precisely so; so far as we can gather that is so; but as I said just now I have no information on the point beyond that.

900. You have not ascertained these deaths of unvaccinated persons from small-pox for such years as they are available, with a view to test that question?—I personally have not.

901. Perhaps I ought almost to apologise for reading to you a passage from a work by Miss Florence Nightingale, upon nursing, in order to ask what your view is of it. She says:—"I have seen with my eyes and smelt "with my nose small-pox grow up in first specimens, "either in close rooms or in over-crowded wards, where "it could not by any possibility have been caught, but "must have begun. Nay, more, I have seen diseases "begin, grow up, and pass into one another. I have "seen, for instance, with a little overcrowding, con-"tinued fever grow up; and, with a little more, typhoid "fever; and, with a little more, typhus; and all in the "same ward or hut"?—I am sorry to say that my own

view would be very much what I said on the last occasion, that you might as well talk of a horse turning into a dog.

902. I understand you to hold then, that the acute specific diseases are absolutely unalterable?—I never said so. Acute specific disease is one term, and I was talking of another. You were asking me as to small-pox, typhus, and typhoid. They are only certain of the specific diseases.

903. You would wish to qualify it?—I beg your pardon. It is you who put words into my mouth which I did not say.

904. Will you qualify it?—I did.

905. Will you kindly give us your view as to the way in which overcrowding can assist in the production of or cause these acute specific diseases, namely, small-pox, typhoid, and typhus?—I never heard it said that overcrowding produced typhoid.

906. Or typhus?—If you will ask me one question at a time, I will answer you; but you put a lot of diseases under different headings together, and then you want a simple answer to about the most complex question that you yourself could possibly devise. Are you speaking of typhus, of typhoid, of simple continued fever, or of small-pox?

907. My question was "or typhus"?—If you will kindly put your question again I will endeavour to give you such information as I have.

908. I understood you to say that you were of opinion that nobody suggested that typhoid was originated by overcrowding. I then said, "What about typhus"?—I should be sorry to speak of its origin; I know nothing of its origin, but its spread and diffusion by means of overcrowding is a well known fact, whereas that does not apply in the same sense to typhoid.

909. I see that Mr. Spear in a valuable paper, in the supplement to the 16th Annual Report of the Local Government Board, on Typhus in England, says:—"The frequency with which the early cases "are mild in character so as to pass unrecognised, "and the constancy with which they appear under "circumstances of destitution and squalor, may sug- "gest the possibility of the germination or growth "under such conditions of a morbific agent possessed "of potential capacity, thereafter progressively develop- "ing, of infectiveness and specificity—a theory which, "in relation to apparently simple sore-throat and diph- "theria, has been brought under notice by Dr. Thorne "Thorne." Would you approve of Mr. Spear's conclusion or suggestion?—As to diphtheria?

910. No, as to typhus?—It is extremely difficult to answer when one is asked about what other people have written. If you will ask me my own views I will give them you, but I cannot criticise other people on a passage merely snatched out of a report of theirs.

911. I thought you would probably be familiar with the report?—These reports are coming into the Local Government Board two and three a week, and I cannot recall them all.

912. (*Mr. Picton.*) In answer to question 744, you spoke of the effectiveness of vaccination being in part dependent upon the number of scars; is the effect of vaccination in the body entirely local, that is to say, does it only extend to the part affected by the immediate pustule?—I imagine that a patient who has one or more pustules is suffering from an acute specific disease, namely, cow-pox, which affects the whole system.

913. It does pervade the whole system then. Would the same amount of matter put into one incision have less effect on the system than if it were put into four incisions?—I am not prepared to answer the question; it is a very difficult question to answer.

914. You speak of the disease of cow-pox, and I wish to know whether the cow-pox disease would be made more severe or acute by the same amount of matter being distributed over four incisions than it would be by that matter being put into one incision?—I am not prepared to differentiate between the local and the general effect on that point.

915. Is it not supposed to have a spreading effect upon the blood?—We really know absolutely nothing as to the effect of the specific poisons upon the blood.

916. But do you not believe that cow-pox is self-multiplying when once inserted in the body?—I am not prepared to answer that as regards cow-pox.

917. Do you think that the quality of the lymph, apart from the number of incisions, has nothing to do with the effectiveness of vaccination?—No; I have said nothing, I think, that would justify such an inference.

918. You emphasised very much the number of incisions, or the number of pustules, and I did not notice that you said anything about the quality of the lymph; do you attach importance to the quality of the lymph?—We attach the very greatest importance to the quality of the lymph, in so far as it can be judged of.

919. How can you judge of it?—By the local effects that it has produced upon those from whom it was taken.

920. Has not some lymph a genealogy which shows it to have produced different effects upon different people?—It might do, but I could not say that it would be the lymph alone that did it. The same lymph will produce different effects upon two different children according as those two different children are in a different state of health, and are exposed to different circumstances.

921. Are you able by the microscope or by any other mode of investigation to find any difference between one lymph and another, apart from the symptoms induced by its insertion?—I am no skilled microscopist, but speaking generally of what is termed good lymph, I believe there is no difference detectable under the microscope.

922. Have you yourself examined it under a microscope?—I am no microscopist.

923. Do you hold that it is essential to the purity of the lymph to exclude all blood corpuscles?—Purity is a term which is a little difficult for me to define. Of course it is adulterated if it has blood in it from the point of view of purity.

924. That is to say if it has red corpuscles in it?—Yes.

925. May it not have white corpuscles in it without their being visible at all?—Under the microscope they should be visible.

926. In case any disease is transferred with the lymph, do you hold that it must be through blood corpuscles having been taken?—I may say that I have not at all prepared myself to answer the question with regard to disease, because I understood from his Lordship that it was not to be gone into during my evidence.

927. I do not at all wish to press you upon that point. I wish to ask you about the effect of insanitary conditions; I understood you to say that they could not have much influence upon the spread of small-pox; am I right in that?—I believe that apart from that one influence of crowding together either on area or within dwellings, the influence of sanitary circumstances is so insignificant that it is hardly worth naming in connexion with the subject that is now before the Commission.

928. Then, you do not, of course, ignore the fact that small-pox in times of epidemic, has generally been more prevalent in crowded neighbourhoods than in more thinly populated neighbourhoods?—No; that is precisely what I do admit. The opportunities for contracting the infection are, of course, the greater according as the sick and healthy are in closer contact.

929. You account for it altogether, then, by the facility of infection which exists in crowded districts?—I do not think I have said altogether.

930. You would allow some effect to the sanitary conditions?—The truth is this: that if sanitary conditions, apart from the one that I have named, have any influence upon small-pox, it is so absolutely overwhelmed and masked by the influence of vaccination that it is not apparent to my mind.

931. Is it not the case that when vitality is low, when there is a condition of physical weakness in the organism, it is more susceptible to infection?—From what disease?

932. From small-pox?—I have no knowledge. I have heard one great authority as regards scarlet fever (I refer to Dr. Gee) say the opposite; in fact, he told me that he had often met scarlet fever prevailing largely amongst children soon after their holidays, and when they were in the best state of health; but I believe that very little is known upon that point which would be worth bringing before the Commission.

Mr. Richard Thorne Thorne, M.B.

4 July 1889.

933. You would probably be able to answer something about the epidemic at Sheffield. You of course have studied the report that has been issued on the subject?—In a very superficial way. Would you mind deferring questions on it until Dr. Barry comes; because my evidence in regard to the Sheffield outbreak could not compare with his in point of value?

934. I find that in answer to Question 764 you said this:—"Dr. Buchanan has shown that in "London the saving of life from small-pox amongst "infants has been greater amongst children getting "their primary vaccination at public vaccination "stations than amongst those who received their "vaccination at the hands of private practitioners." I suppose I should be right in interpreting that as equivalent to saying that the operation, as carried out at public stations, has been more effective in preventing small-pox, than the operation as carried out by private practitioners?—That is so.

935. I suppose you have seen the curves drawn out by Dr. Alfred Russel Wallace?—I never read his book or his pamphlet.

936. Beginning with the year when we first had, I believe, the return of official or public vaccinations, 1861, you had the persons successfully vaccinated at the expense of the rates, am I right in saying that that number was 425,739?—That statement is not prepared in the department in which I serve, and I could not tell you.

937. Then you can only tell us about the incidence of small-pox?—I think I have told you a great deal in my evidence, and if you will cross-examine me on it, I shall be delighted to say all I can; but upon somebody's else's figures it is very difficult to answer straight off whilst sitting here at this table.

938. Between 1862 and 1863 did the number of official vaccinations rise considerably?—The number rose between 1862 and 1865 from 437,693 to 578,583.

938*a*. Would you kindly give me the number from 1862 to 1863?—I am quoting from the book that you have handed to me.

939. But it is an official book?—True. I am only doing it in answer to your question; I am not putting in any evidence upon this point. In 1862 there were 437,693 persons successfully vaccinated at the expense of the poor rates; the corresponding number for the subsequent year 1863 was 646,464.

940. That is a considerable increase is it not?—It is an increase.

941. Is it the case that small-pox increased that year in 1862-63?—I have not the figures before me.

942. My point of course is, that it did increase very considerably?—I think I may say that the number of infantile vaccinations in a given year, can have absolutely no bearing upon the total amount of small-pox in that year at all ages.

943. But we are told that the official vaccinations have more influence upon preventing small-pox, than any private vaccinations have. My point (and I make no concealment of it) is, that if you follow the line of official vaccinations, and follow the line of the growth or decrease of small-pox, you find that as the official vaccinations increase small-pox increases, and as the official vaccinations decrease, small-pox decreases, which is scarcely what we should expect. I believe that can be proved, but I have great difficulty in getting at the exact figures. That goes on for a considerable number of years, and the curves are parallel instead of there being an increase?—You are ignoring altogether the question of the age incidence of small-pox which lies at the very root of the whole of this question. You are taking infantile vaccinations at public stations and comparing them with the incidence of small-pox on the total population at all ages quite irrespective of where and when they got their vaccinations. I do not myself quite see what there is for comparison.

944. But one main object of this Commission is to inquire into the practical effectiveness of the vaccination laws, and my point is that the operation of the vaccination laws does not decrease small-pox. I do not go into particulars; I take the general results?—The facts you want are, I believe, given in the table that was prepared for the Commission. (*See Appendix IV.; pages* 122 *and* 123.)

945. They are given for different parts of the country and not for the whole?—Whatever we can give you, you shall have. That table was prepared at great labour, although we do not see the value of it.

946. Did you prepare the table?—I did not, but I had it prepared.

947. You handed it in as a correct return?—No, I do not hand it in. I distinctly told his Lordship that I did not like to hand in as part of my evidence a paper which I believed to be of no value.

948. (*Sir James Paget.*) But is it correct?—Yes, it is correct.

949. (*Mr. Bradlaugh.*) Could you tell us whether it was prepared in your department at the request of the Chairman of this Commission?—At the request of Mr. Picton, I think it was.

(*Mr. Picton.*) It was through the Chairman, of course.

950. (*Mr. Bradlaugh.*) Did you write to the secretary with it, saying: "Herewith I enclose a table showing "what we have been able to do in order to comply with "the request made to me by Lord Herschell"?—Yes, it evidently was at the Chairman's request.

951. Is it a statement which was compiled in your department in compliance with that request?—Yes.

952. Does that statement show, for each of the years 1872-87, the number of deaths from small-pox, and the number of infants vaccinated in (1) England and Wales; (2) England and Wales, excluding the Metropolis; (3) the Metropolis; (4) each of the counties of England and Wales?—I have no doubt it does. I accept your reading of the headings.

953. Had you not seen the paper before you sent it on with your own letter?—No. So far as I folded it up and put it in an envelope, I saw it.

954. Did you, in consequence of the communication made to you by Lord Herschell, give some instructions for the preparation of it?—Yes, I did.

955. Was this paper the result of obedience to your instructions?—Yes, if you like to call them instructions.

956. Have you any reason to doubt that the statement has been correctly prepared in accordance with whatever request or instructions or directions you gave?—I have already said that I believe it to be correct.

957. (*Mr. Picton.*) I should like to have the total. The figures are distributed over a large number of counties, and, of course, it has not the same effect as if you see the whole together. But, however, may I ask you questions on this paper?—I have never read the paper.

958. (*Sir Edwin Galsworthy.*) When was the paper put in?—It was never put in. I brought it myself and handed it to Mr. Bret Ince, and I told him that the paper was prepared in compliance with the joint request of Lord Herschell and Mr. Picton.

959. Since our last meeting?—I think it was after the first meeting of the Commission.

960. We have had no opportunity of looking at the paper?—I was not a witness when this was prepared.

961. (*Mr. Bradlaugh.*) Will you kindly tell the Commission who is the gentleman who prepared the paper, and whom we might examine upon it if we wished to examine anyone?—It has simply been prepared by a clerk in the Local Government Board, who copied the materials from books and other documents which are in the possession of the Board.

962. Would you kindly give us his name?—I believe it was a Mr. Hicks.

963. You have no reason to doubt that he prepared it accurately?—I accept it as accurate. If you will ask me what you want in addition I will promise you that you shall have it.

964. Does this paper contain the totals?—I do not know what it contains. I do not even know what it is about.

965. Would you kindly show the totals in each column for the whole population of England and Wales, including the metropolis, still preserving, however, the separate totals for the metropolis, and for England, and also for Wales, and also the number for the counties. I do not want anything to be taken out but I want something put in?—I will endeavour to do so.

966. (*Professor Michael Foster.*) Does that table give the total number of deaths, or the death-rate?—The total number of deaths.

967. (*Mr. Picton.*) Would there be any difficulty in adding the rate per million of official vaccinations and

794. The fall is very considerable from 1861 to 1870 and from 1871 to 1880?—It is very remarkable.

795. Then there is a very remarkable fall in the next decennial period?—Yes.

796. I thought you might be able to point to some cause for that fall, whether improved sanitation or improved understanding of the disease?—It is a remarkable decline.

797. (*Professor M. Foster.*) But, apart from hospital isolation, has not there been a remarkable increase in activity against contagion, much greater knowledge of disinfecting processes, which possibly have had a very marked effect upon the spread of the disease?—All that is perfectly true. There is one other point, I think, of even more importance, and that is the extreme care that is taken in schools now to isolate children; the Education Department have an Education Code under which the managers of all elementary schools are compelled, on receiving notice from the sanitary authority, either to exclude scholars coming from infected areas or to close the school for a certain specified time, and I know from the number of the appeals against this action which come before us that this method of preventing the spread of such diseases as scarlet fever is very general throughout the kingdom, and my own opinion is that measures of that sort have really had more to do with the fall of scarlet fever than isolation.

798. (*Chairman.*) Have the same means been adopted in the case of small-pox?—It is never necessary to adopt the same rule in small-pox—there is very little difficulty about isolation as regards cases of recognised small-pox; there is such a general fear of it that if any child were known to have small-pox it would never get admitted to the school; but as a matter of fact small-pox is being eliminated from our schools as a result of vaccination—small-pox is not occurring to any large extent during the elementary school ages. The fall in scarlet fever has attracted our attention, and I believe Professor Foster suggested one reason for it. I, for my part, think the school influence is another very potent element, although I would not for a moment say that hospital isolation has had nothing to do with it.

799. (*Dr. Collins.*) I think it is part of the duty of the Local Government Board to supply vaccine lymph to registered medical practitioners?—They do so. I do not know whether it is their duty or not.

800. Can you give the Commission any information as to the sources from which lymph is derived?—It is all derived from public vaccination stations, either where human lymph is used, or from the calf station in Lamb's Conduit Street.

801. I was asking rather as to the remote origin than the immediate origin from the arm?—I am afraid that my opinion upon the remote origin of vaccine lymph would be of very little interest to the Commission. I have never studied the question; I have a great deal to do, and I have not taken up that point. It has been a matter of little importance to me where it came from so long as the results as regards small-pox were what they are.

802. I suppose recently when the calf lymph establishment was contemplated it became necessary to obtain a supply of calf lymph with which to originate the inoculation?—It did.

803. Did that come within your department?—It did, but I was at that time a travelling inspector in the country, and did not even know of it till I read it in the reports.

804. Who would be able to give us information as to this point?—Dr. Buchanan will be able to give that information.

805. Do you know whether there have been any recent instances of cow-pox in this country from which lymph has been derived for the purpose of vaccination?—We have, as far as the Local Government Board is concerned, adhered absolutely to the original sources, namely, that at Lamb's Conduit Street, and the humanized source from specially selected public vaccination stations; I know of no change.

806. Now with regard to Dr. Seaton's Report to the Local Government Board in 1874, which you put in as evidence, may I take it that, in addition to having read the work, you are satisfied of the facts and figures therein contained as being tolerably accurate?—I accept Dr. Seaton's facts and figures. I have not verified them; it would be several years' work to do so.

807. I see on page 9 that it is stated, "The esti- "mated annual small-pox death-rate of England in the "last century was 3,000 per million of population." Could you give us any notion how that was ascertained?—I cannot. I have not the data on which this Report was compiled. Dr. Seaton is unfortunately dead; and I may say, as the result of a very laborious search which was made for some of his original papers, that we have not been able to secure them.

808. We have been told that there is no means of ascertaining, with any degree of precision, the population of this country in the last century; if that were the case, I presume the figures of 3,000 per million of the population could not be vouched with any accuracy?—It is given here merely as an estimate; I suppose it was estimated from the best means he had.

809. You are not aware of the basis on which it was founded?—I am sorry to say we have not the data upon which Dr. Seaton compiled his work.

810. Now I see that there are several tables given here relating to small-pox in Scotland and Ireland; could you tell the Commission whether, before the epidemic of 1871 and subsequent years, Scotland and Ireland were considered to be well-vaccinated countries?—I could not tell you. I really, as I said at the time, handed this book in and gave one or two of its essential features simply from a historical point of view, as showing the basis for the action which the Local Government Board were taking with regard to vaccination. I have no doubt that at the time the facts and figures were verified, and the Local Government Board have practically accepted them as the trustworthy and honest production of Dr. Seaton.

811. I see that in the Blue Book for 1871, at page 253, Question 4389, Dr. Wood, in reply to the question, "Can you state whether the operation of the Act "of 1863 has largely diminished the amount of epi- "demic small-pox in Scotland?" stated, "Very largely. "Both the Registrar, in his Reports, and the Board of "Supervision have testified to the extreme value of the "Scotch Act," and in the next column he gave figures showing the decline from 1,646 deaths from small-pox in 1863 to 15 in 1868, 100 in 1869, and 150 in 1870. Now I find that in the year 1871 there were 1,442 deaths from small-pox in Scotland, in 1872, 2,446; in 1873, 1,126; in 1874, 1,246, making a total in four years of 6,260. Do you think, if the decline then claimed for the administration of the Vaccination Act of 1863 were attributed to the operation of that Act, that the excessive mortality in the following years would render that previous conclusion an unfair or an unjustifiable one?—I should imagine that the increase during that period of epidemic was precisely on the same footing as the increase which we had in England, and that the arguments which have been used with reference to England would apply in the same way to Scotland, but with reference to legislation in Scotland, I have no detailed information as to its influence. One would have to examine these statistics and see how far it was a matter of age incidence before one could say that vaccination had not protected the population for a certain period of years after the performance of the operation.

812. You do not think there was rather a tendency there, which possibly has been imitated elsewhere, to claim that when small-pox has subsided coincidentally with the extension of vaccination, vaccination has been responsible for stamping it out, whereas a subsequent epidemic has disproved that observation?—I should say that no epidemic that we have any actual details about has ever disproved the value of vaccination. What the 1871-72 epidemic has done has been to make more certain that the claim originally made as to protection for the whole of life from one vaccination was an unsound claim, and that the protection afforded is one limited in its duration. Whatever claim may have been made before that date was made in ignorance of the fact, which has become so perfectly clear since we have studied the effect of the epidemic of 1871-72.

813. But if the value of general vaccination were held to be demonstrated by the decline from this year, 1863, would not the large epidemic which followed immediately afterwards tend to falsify that conclusion?—Not necessarily. You might, for example, during the present time put children into a hospital and claim that hospital isolation was the sole cause of diminishing scarlet fever; and then we might have an extremely virulent period of scarlet fever epidemic, when that would be disproved. But such epidemic prevalence of

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scarlet fever, in spite of hospital as one measure of prevention, would be no ground for discontinuance of attempts to control the disease.

814. Might I now ask your attention to Question 4008, page 231, Dr. Lyon Playfair asked the following question: "I hold in my hand a circular from the Poor Law "Commission Office in Dublin of the 20th of September "1869. In that circular is the following passage: 'It "'is encouraging, however, to observe that the present "'total cessation of the disease in Ireland has been "'gradually approached since the compulsory vacci-"'nation of children has been put in force under the "'Act of 1863, the annual mortality by small-pox "'having been for many years previously about 1,000 "'deaths, on the average representing, of course, a "'very much larger number of cases of attack and "'disfigurement. The course of decrease in the mor-"'tality has been as follows: In 1864 the number of "'deaths was 854; in 1865, 347; in 1866, 187; in "'1867, 20; in 1868, 19; in the first quarter of 1869, "'3; and in the second quarter, none.' Does that, in "your opinion, represent fairly the action of the Vacci-"nation Act in Ireland"? To which Sir Dominic Corrigan replied: "I am sure it does." Would you agree with Sir Dominic Corrigan in that conclusion?

(*Chairman.*) It is qualified by saying that some credit must be given to the improved state of health of the people.

(*Witness.*) I do not know that I could, with reference to any passage picked out from the middle of the evidence of some man whom I never met or saw, state whether I agreed with it or not; but I might say, as I have said before as regards England, that where we can study the details of the operation of the vaccination law, there is no question whatever in my mind that vaccination, recent vaccination above all things, is operative to prevent death from small-pox.

815. I find that in 1871 in Ireland there were 665 deaths from small-pox; in 1872, 3,248; in 1873, 504; in 1874, 509; and in 1875, 565. I was anxious to ask whether you think the results of that epidemic in Ireland in 1871, 1872, 1873, 1874, and 1875 would tend to alter in any way the opinion which apparently was then expressed, that the operation of the Act of 1863 was the cause of the decline in the preceding years?—I would beg leave to answer that question at my further leisure. It contains a number of figures and hypotheses, and relates to a country of which I know nothing.

816. Then may I ask your attention to the figures which are contained in Dr. Seaton's Report of 1874. I find on page 19 a table which gives for the year 1871 the deaths under 5 years of age per cent. of the total small-pox deaths in several groups of districts in Scotland; I find in them a considerable variation. In the mainland rural districts the per-centage was 13·6, while in the small towns it was 26·3. Would you think that that difference was due to the better vaccination of the mainland rural districts than of the small towns?—I really have no data upon which I could give an answer as regards Scotland. I would like to add to my answer, that where we have the data we do know that it does depend very largely upon the quality of the vaccination, and I think I have given abundant evidence of that to-day.

817. I was going to ask you whether you would agree with Dr. Seaton at page 36, when he says: "If I have "not adverted to any influence which general sanitary "conditions may have exercised on the small-pox "mortality at home or abroad, it has been because the "amount of any such influence is known to be wholly "insignificant as compared with that of the presence or "absence of effective vaccination in controlling small-"pox mortality, especially in young children." I take it from what you have told the Commission to-day that you would cordially agree with that?—I would agree with that. "And it is undoubtedly to the application "of this great prophylactic measure to children" (as contrasted with older persons) "at a sufficiently early "age that the remarkable saving of life exhibited by the "facts brought together in this section, is to be "attributed."

818. That being so, when you find so considerable a diversity in the figures as that shown by the table on page 19 of 13·6 per cent. under five years of age in the mainland rural districts, compared with 26·3 in the small towns, would you attribute the whole of that difference to the difference as regards extent and quality of vaccination rather than to the difference as regards rural healthiness?—I have already said that the fact of the aggregation of houses on areas, and of people in houses, does affect small-pox to a certain extent, and it is well known that is one of the reasons why small-pox is more frequent in towns than in rural districts. Then, again, they have much more frequent means of communication in towns than in rural districts; I think it is a matter of universal experience that small-pox is more prevalent, and consequently that amongst others children under five years of age are more exposed to it in towns than they are in rural districts.

819. I do not quite see how that is consequent upon the previous conclusion; it is doubtless true that in the mainland rural districts the chances of introduction of small-pox are less, but why should that affect the proportion of deaths under five years of age to the total deaths?—You are really asking me to give information as to circumstances upon which I have absolutely no information; if you will kindly limit yourself to the circumstances of England on which I have information I will willingly give it you, but I am afraid if I went to Scotland and Ireland there is no knowing that my answers would be at all satisfactory.

Adjourned till Wednesday next at 1 o'clock.

Fifth Day.

Wednesday, 24th July 1889.

PRESENT:

THE RIGHT HON. THE LORD HERSCHELL IN THE CHAIR.

SIR JAMES PAGET, Bart.
SIR CHARLES DALRYMPLE, Bart., M.P.
SIR EDWIN HENRY GALSWORTHY.
MR. WILLIAM SCOVELL SAVORY.
MR. CHARLES BRADLAUGH, M.P.
DR. JOHN SYER BRISTOWE.
DR. WILLIAM JOB COLLINS.
PROFESSOR MICHAEL FOSTER.
MR. JONATHAN HUTCHINSON.
MR. J. ALLANSON PICTON, M.P.
MR. F. MEADOWS WHITE, Q.C.

MR. BRET INCE, *Secretary.*

Mr. Richard Thorne Thorne, M.B.

24 July 1889.

MR. RICHARD THORNE THORNE, M.B., F.R.C.P., further examined.

820. (*Chairman.*) I believe that you wish to supply a further answer to a question put to you by Mr. Meadows White as to former small-pox mortality under five years of age?—I do. My answer to question 788 was not very complete. In the first instance I would point to page xi of Dr. Buchanan's reprinted report for 1884 and I would quote these words, "In former "centuries, out of a thousand persons dying from small-"pox, some 800 would have been children under 5 "years of age, and 150 of the remaining 200 would have

" been between 5 and 10 years of age." These statistics are based on information contained in Mr. Simon's papers relating to the History and Practice of Vaccination. On turning to those papers I find further, from a table at page xxx, that the death-rate from small-pox amongst children under five years of age in Geneva from the year 1580 to the year 1760 was at the rate of over 800 per thousand of small-pox deaths at all ages as opposed to 155 only out of each thousand at from 5 to 10 years of age and 20 at from 10 to 15 years of age. Then again in Dr. Buchanan's report, at page xviii, I find that in Kilmarnock, for example, between the years 1728 and 1764 the contribution, at ages from 0 to 10 years, was 988 out of a thousand small-pox deaths at all ages. At page 26, of the same report, Dr. McVail writes as follows, "Its" (the small-pox) " death-rate under 5 years of age was 35 times greater " than it now is. The mean age of death from small- " pox was 2½ years in the last century, and is now " nearly 20 years."

821. Then I believe you wish to give a further explanation with reference to a question which was spoken to by you at the last sitting of the Commission in relation to the diminished death-rate amongst infants and the discrepancies which appeared between particular districts? — I wish to hand in two additional tables which I may call amended ones for this reason: that on reading through my evidence I find that I failed to make my meaning plain as regards the subjects which are dealt with in questions from 695 to 705. In putting in Table C., which was then in question, I desired simply to show that, whereas in every registration division of England and Wales, the small-pox death-rate per hundred thousand, at ages under five, had, during the period 1861–70, decreased, and in some cases enormously decreased, as compared with the previous decennium, there had been no such corresponding decrease at ages over five years, the rates at those ages showing a tendency to oscillate and even increase; and when I put in Table E., which reproduces to some extent Table C., I wished to show that this diminution in the death-rate under five years of age had been almost uniformly maintained for two more decennia, whilst the rate over five years of age had, on the contrary, undergone a remarkable increase during the decennium 1871–80 as compared with the two previous decennia. More than this the table did not pretend to show. But the questions put to me as to the comparative behaviour of small-pox in one and another division could only be answered after the examination, over a number of areas in each division, of a number of matters of detail, such as the amount of small-pox that prevailed in each area, the extent to which one and another population was exposed to small-pox, the quantity and quality of the vaccination, and the date at which on an average such vaccination was obtained. Thus in the South Midland Division there are actually 150 unions involved, and doubtless they all varied in those days, *inter se*, as regards a number of matters affecting the administration of vaccination. But since the questions put to me by the Commission implied a desire to get behind some of these figures as to Divisions, an attempt is being made in the Medical Department of the Local Government Board to supply facts more in detail in cases where certain urban sanitary areas either correspond or sufficiently correspond with the unions, which are the administrative areas for vaccination, to enable this to be done with any degree of accuracy. In the meantime, if you will allow me, I will put in the amended tables *Ea* and *Fa*, which contain several additional columns; and I think these columns will largely supply the information which Professor Michael Foster was desirous of having. (*The tables were handed in. See Appendix III., Tables Ea and Fa: pages* 119 *and* 120.) Column (*e*) of Table *Ea* shows the annual small-pox death-rate per 100,000 at all ages. Then in columns (*f*) and (*g*) an attempt has been made to show, if the ratio observed in the 1851–60 period of the all-ages death-rate to each death-rate at specified ages had remained unaltered through subsequent periods, what the death-rate at the specified ages would have been. And in one further column added near the commencement of the Table, the per-centage of small-pox deaths, under five years of age, to the total small-pox deaths is put in. This was a matter as to which Professor Michael Foster desired to have information. I think that, in the absence of details as to the areas within the several Divisions, these tables sufficiently supply the information that appeared to be lacking on the last occasion.

822. Is there any other point that you wish to mention?—There is. Professor Michael Foster was also desirous of having information as to fevers, in connexion with the diagram that I put in showing the respective mortalities under five years of age from small-pox, measles, whooping-cough, and scarlatina. We have therefore had prepared in the Medical Department a new diagram, in which the rates of death from causes described as "fever" are shown. (*The diagram was handed in. See Appendix III.; facing page* 120.) I should like, if the Commission would allow me, to give some explanation of this diagram, especially to show how utterly untrustworthy it is. Amongst other names under which continued fevers are returned by medical practitioners in addition to typhoid, typhus, and simple continued fever, there is one that has been very commonly used to signify typhoid fever when it occurs in children, and the name is "infantile remittent fever." This disease has nothing to do with ague or intermittent fever; and if, indeed, there be a disease of malarious origin in England properly to be called "remittent," the name of "infantile remittent" certainly has nothing to do with it. Now, apparently acting on this knowledge or belief the Registrar-General up to 1880 put deaths certified as from "remittent fever" under the head of remittent fever, but only if they were over five years of age; whereas, with hardly an exception, he took the deaths among infants under five years of age certified as of infantile remittent fever, and he put them into the group of the continued fevers; and so far as we can judge he appears to have placed them with enteric fever. Then the Registrar-General in 1881 turns over a new leaf, and in that year the deaths from infantile remittent fever are placed with remittent fever; the result being, as you will see from the figures given, that in that year there is a sudden appearance of 154 deaths amongst children under five years of age in the column for remittent fever; whilst at the same time the deaths amongst children under five years of age from enteric fever had suddenly dropped from 968 to 538, and the share of the fever deaths borne by children at 0–5 years also drops suddenly from 14·3 to 9·7 per cent. Now, in part, this has doubtless come from the sudden dislocation of those 154 deaths, and I cannot say that this dislocation is the only one by which the infantile "fever" would be affected. There is, for example, a threefold increase in the second of those two years of deaths from "ill-defined" causes at all ages; and in putting this table in I wish to make it plain that new classification is probably the cause of the great fall which takes place in the proportion of "fever" borne by children under five years of age which is exhibited in the last period. For example, in 1851–60, in 1861–70, and in 1871–80, the only variations of the proportion of children under five years of age are 21, 19, and 18. Then comes a sudden drop down to 11. This drop actually occurs at the very period at which, as I have pointed out, there was this remarkable change of classification as regards remittent fever. It was changes of this sort that I meant originally when I said that it was almost useless to talk of "fever." One might almost as well take the group of "ill-defined" or "not known" causes and base some sort of argument upon that.

823. (*Dr. Collins.*) May I ask your attention to the answers that you gave to questions 777 and 778. You say in answer to question 777, "The figures I have " before me, and which relate to the very large increase " of vaccination during the epidemic of 1870–71, " distinctly do not include re-vaccination;" and again in answer to question 778 you say, "Of course the " Local Government Board was really not formed till " the year 1871. We certainly have no returns at the " Local Government Board as to the number of re- " vaccinations that are performed in the country." May I ask whether the figures that you refer to in the answer to question 777 were the figures given on page 338 of the 17th Annual Report of the Local Government Board?—No, I can say at once that they were not. The figures that I gave related only to certain stational vaccinations.

824. Then, as I understand it, there are other figures with reference to the per-centage of successful vaccinations to births, besides those which are given in the Local Government Board reports?—I quoted from the report of the medical officer to the Local Government Board.

825. That is what I am quoting from?—But not from the same table.

826. Then there are others?—There are in that report certain figures which I quoted,—which I had before me. The point was this, as I understood you, whether we

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are able to form any proper judgment as to the amount of re-vaccination performed in the country.

827. No: the question was, whether before 1872 adult re-vaccinations were not included along with primary infantile vaccinations in the returns made to the Local Government Board. You apparently said that you were not aware that they were?—I am sorry to say that matter does not come within my province at all, and I do not know.

828. In answer to question 787 you said, referring to figures before 1851, "I am absolutely confident that "they are not procurable, not even the number of "deaths from small-pox." Are we to understand that there are no figures for deaths from small-pox for England and Wales before the year 1851?—The question here relates to the proportion of infantile mortality to mortality at all ages previous to 1851.

829. But you add, "not even the number of deaths "from small-pox." I did not quite understand the answer, and I only wanted a little further information?—I know that they happen to be contained in a report of a Commission. They may be somewhere else, but I am sorry that I do not happen to remember where they are.

830. The reason I was asking the question was this, because Dr. Ogle directed our attention to a table which gave the deaths from 1847 to 1854 from small-pox at different ages?—I would of course bow absolutely to Dr. Ogle; it comes within his province, and it does not come within mine. I may have been in error, indeed I obviously have been in error, if Dr. Ogle gave you the information.

831. May I ask your attention to the table which you have put in from Mr. Marson of the small-pox hospital; do you notice that comparing the figures from 1852 to 1867 with those from 1836 to 1851 in every case of the vaccinated those with one mark, two marks, three marks, and four or more marks, the mortality is higher in the latter period than in the former, whether corrected or uncorrected?—It is so.

832. Could you give us any suggestion as to the explanation of that?—I am sorry to say that I have no knowledge as to what was the quality of small-pox during those periods, or as to whether at one period more than another the severer cases only were admitted and not the milder ones; in fact I really have no knowledge that would explain it.

833. But do you think that that points to the fact that small-pox was more virulent in the later than in the earlier period?—I should say that it must have been more virulent amongst those patients whom Mr. Marson had under treatment.

834. If that be the case, do you observe that in the unvaccinated the mortality is lower from 1852 to 1867 than it is from 1836 to 1851, whether corrected or uncorrected?—I do notice it.

835. Do you also notice that in the period 1852–67 the mortality of those stated to have been vaccinated, but having no cicatrix, is higher than in those confessedly unvaccinated, whether corrected or uncorrected?—I do. Those two figures very often correspond; in fact there are a great many people of whom it is affirmed that they have been vaccinated because they are afraid that something will happen to them for having broken the law.

836. But I see that there is an excess of 5 per cent. in those who have been vaccinated, but who show no cicatrix, over and above those who are unvaccinated?—That is so.

837. Would you wish to draw any conclusion from that fact?—I do not think that I could draw any conclusion from that fact unless I knew the circumstances, including facts as to age, of those two periods, 1836–51 and 1852–67, and I do not.

838. Do you think it at all possible that in that class the invisibility of the cicatrix and the virulence of the disease were in both cases referable to the abundance of the eruption?—I must decline to speak as to those periods, but I can answer you as regards present hospital experience. Patients now, I am told, hardly ever, if ever, come into a hospital with the eruption so abundant or at such a stage that it is not quite practicable to see whether there is a vaccination mark or not.

839. Was Dr. Gregory, the predecessor of Mr. Marson at the small-pox hospital, an authority?—I do not know.

840. You are aware that he was a predecessor of Mr. Marson?—I am sorry to say that I had forgotten the fact.

841. I have before me a paper of the Medical and Chirurgical Transactions, volume xxii., 1839, which contains a very interesting article by Dr. Gregory on small-pox, in which he says: "Great difficulties were "necessarily experienced in determining who had been "really vaccinated of those who assumed to have "undergone that process. The cicatrix was our chief "guide, but this often failed us from the swollen and "pock-covered condition of the arm at the time of the "patient's admission." Do you not think it possible that the same difficulty may have occurred in Mr. Marson's case, and that that might explain the anomaly with regard to those having been vaccinated, but having no cicatrix?—Your question is hypothetical. I can only say that at the present time I am told that no such difficulty arises. I can quite understand that in olden days people may have been taken to hospital at a stage when they were covered with confluent small-pox; but that does not happen now, I am told.

842. (*Mr. Savory.*) Mr. Marson's statements are explicit on that subject of the absence of the cicatrix?—They are. The patients are stated to have been vaccinated, but having no cicatrix.

843. There is no reference in Mr. Marson's writings to the difficulty of recognising the cicatrix?—I cannot recall that, but I am perfectly confident from what I knew of Mr. Marson that he would never have put down "having no cicatrix" if he did not know that they had no cicatrix.

844. (*Dr. Collins.*) I see in the 36th volume of the Medical and Chirurgical Transactions, 1853, a paper by Mr. Marson, from which these figures from 1836 to 1851 have been taken, and at page 374 he says: "Patients were never entered as vaccinated in the "register unless the account of the vaccination was "a tolerably clear one." There, again, do you not think that the possibility of the doubt in the case of those stated to have been vaccinated, but having no cicatrix, may have been due to the obscuration of the cicatrix by the abundance of the eruption?—I should not like to base any answer on a mere quotation from a paper of that sort without reading the paper.

845. I see that in Dr. Seaton's report upon the 1871 epidemic, at page 43, under "Causes of Imperfect Vaccination," he puts down a complete ignorance of the rules laid down by Jenner as essential for the efficient performance of vaccination. Can you tell us what was the rule of Jenner as to the number of marks that were required for complete protection?—I think I might mislead the Commission if I attempted to go into the early history of vaccination. I think I said on the last occasion that it is not a subject that I have studied in any detail.

846. Are you aware that Jenner in his "Further Observations," at page 109, said, "A single cow-pox "pustule is all that is necessary to render the variolous "virus ineffectual"?—I believe you are perfectly correct; I remember the statement, and it is one of a number of statements on which Jenner's experience was not, I assume, sufficiently lengthened and exhaustive to guide us at the present day.

847. (*Sir James Paget.*) May I ask whether that statement of Jenner's did not apply to his custom of inoculating variolous virus very shortly after vaccination?—I do not remember. Perhaps I may say that I believe there is no doubt that one good typical scar does have a protective influence against death, at least for a considerable period; and that in former days people were vaccinated late in life, and if they got such a good single typical vesicle it protected them for a considerable number of years; and I have very little doubt in my own mind that it is due to that, in part, that Jenner so expressed himself. It seems to me a very natural statement for him to have made, but we have since learnt that this is not so.

848. (*Mr. Bradlaugh.*) I understood Professor Michael Foster to put it to you whether other authorities of later date on vaccination had not repeated the declaration of Jenner, they having had opportunities of experience which Jenner had not?—I am very sorry not to be able to give a definite answer, but the early history of vaccination is not a subject with which I profess to be well acquainted. My experience of vaccination mainly refers to comparatively recent years.

the small-pox deaths for each year?—I cannot say what that would involve, but I will do my utmost to procure the information.

968. (*Mr. Bradlaugh.*) I suppose there is a copy of that paper at the office, is there not?—Yes, no doubt.

969. I understood you rather to object to some questions put to you by Dr. Collins upon the very fair ground that you could hardly give evidence to the Commission of any value upon the past history of vaccination?—I did raise that objection.

970. In the evidence which you have given in reply chiefly to the chairman, there are a large number of statements which solely relate to the past history of vaccination, are there not?—Yes, there are.

971. Would your own statement in qualification apply to those?—No, not altogether; I endeavoured to give certain facts affecting the history of vaccination, in so far as those facts had influenced the attitude of the Medical Department of the Local Government Board towards this question of vaccination.

972. And you think it would be unfair to press you with any questions testing the soundness of those on the ground that you have not examined into any other portion of the subject, is that so?—No; I think I am bound, if I can, to answer any questions as to any point that I have brought before the Commission.

973. Now, for example, not as putting it upon you at all, but simply as a matter which you would give to the Commission for what it is worth, taking the point that arose as to the reduction of deaths from small-pox amongst the unvaccinated, from a possible 80 per cent. to 39, would not you think that that reduction must be attributable to other causes than vaccination?—One set of those figures related to pre-vaccination days, namely, in Geneva from 1580 to 1760; the 39 was since vaccination was enforced, from 1881–87.

974. Do you think that that would not be a fair percentage to take of the deaths amongst the unvaccinated, say from 1881 to 1887 inclusive?—I would not think it unfair at all. I would personally accept that figure as prepared by Dr. Collins.

975. You think it would be unfair to compare deaths amongst the unvaccinated, anterior to vaccination, with the deaths amongst the unvaccinated since vaccination has been enforced?—My difficulty would be that you select one single town, and I do not know anything about the circumstances that governed either the small-pox or any other fever or disease some 200 to 300 years ago.

976. Then if that were so, might not that tell unfairly against the user of any statistics in pre-vaccination times before this Commission, unless with those statistics we had very specific details of the places to which they applied?—I quoted them in so far as they support the general body of evidence, that in pre-vaccination days the main incidence of small-pox was upon the infantile population.

977. Do I understand that the value of any particular state of facts before this Commission is dependent upon whether or not they support some particular opinion?—I have not desired to convey that impression; if you infer it from what I have said, I must have expressed myself badly.

978. I am afraid I must again ask you; given an 80 per cent. of deaths from small-pox amongst the unvaccinated, in what you have very properly described as the pre-vaccination period, and 39 per cent. from 1881 to 1887 inclusive, should you not think that that reduction was attributable, and ought to be attributable, to causes other than vaccination?—I think it is probably largely to be attributed to the difference in amount of small-pox at the two periods, and I should be sorry to say that the absence of vaccinated people in the pre-vaccination days, and the presence of a large body of such people in the period between 1881 and 1887 did not control the virulence.

979. Do I understand you to mean that in the small-pox epidemic at that particular time, the presence of vaccinated people would make the attack less virulent to the unvaccinated?—I do not put it in that positive way, but I believe this, that you can, by the aggregation of specific disease, produce an intenser poison. I am not offering this as an explanation of what took place in Geneva in 1580, but I am making this statement quite generally.

980. Does the virulence of small-pox affect the percentage under the age of 15 of the total deaths?—I do not think I am quite prepared to answer that question.

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981. You mentioned the Sheffield report of Dr. Barry, who will probably himself come before the Commission. I wish to ask you whether you have noticed in that report, upon page 248, that only a very small per-centage of children born in Sheffield remain unvaccinated?—I know that is so with regard to the recent births.

982. I daresay you have also noticed, on page 218, a description of the general insanitary condition of the place where the attack specially prevailed?—I feel very confident that Dr. Barry could answer upon his own report better than I. I have never read the whole of his report. I am sure you will get more accurate information from Dr. Barry than from me.

983. (*Sir Charles Dalrymple.*) You have brought before the Commission the serious fact of the inferiority of vaccination in London and York Division and the mining districts, and amongst large populations generally, and you used the expression that the quality of infantile vaccination there was very inferior to that which obtains in other parts of the country. I would ask, if vaccination is compulsory, is not the responsibility for proper vaccination recognised by the Local Government Board?—It is, certainly; and, as the result of inquiries made by the Privy Council and continued by the Local Government Board there is much greater stringency exercised with regard to that point.

984. But does the responsibility of the authority which compels vaccination not extend to the defective operations of what was described as "the sixpenny doctor"?—There is absolutely no control over any vaccination which is not performed at the public stations.

985. Then the Local Government Board does not take security for the thoroughness of the process, except at the public stations?—It can only do so at the public stations, and there it does all it can to see that vaccination is thoroughly performed.

986. In St. Pancras you mentioned that 99 per cent. of the infants were vaccinated; this vaccination might, in many cases, be of the inferior kind you mentioned?—There were in St. Pancras during the year my statement referred to, namely, 1884, a considerable number of imperfectly vaccinated children.

987. Then the prevalence of vaccination would be no measure of protection in such a district?—In the report which I quoted, which, I might say, was prepared by a Mr. G. W. Collins, he distinctly differentiates between the amounts of the good and the imperfect vaccination, and the evidence as to the value of what he calls first class vaccination, as compared with imperfect vaccination is overwhelming.

988. But the poverty of vaccination would invalidate the protection to that extent, would it not?—To that extent, especially, as time elapses since the date of the vaccination.

989. And the Local Government Board would have no power to check that poverty of vaccination which might widely prevail in such a district?—Except at the public stations, they have absolutely no power whatever.

990. (*Mr. Picton.*) Might we ask what were the distinctions between perfect and imperfect vaccination, what was meant by imperfect vaccination?—"By first-"class vaccination is meant foveated (pitted and "depressed) vaccination marks, equal in total area to "half a square inch. Imperfect vaccination includes "(1) marks which are not foveated or pitted, (2) marks "less than half a square inch in total area, (3) marks of "doubtful origin, (4) no marks to be seen, but vaccina-"tion stated to have been performed." Out of 25,917 people under 10 there were 20,504 persons found (or 79·1 per cent. of those examined) with first-class vaccination: 5,127 (or 19·78 per cent. of those examined) with imperfect vaccination.

991. (*Mr. Hutchinson.*) I gather from a reference to the table that we discussed just now, that the annual number of registered vaccinations varies considerably?—It has varied.

992. Do you know at all what causes those variations outside the variations of the number of births?—A small-pox epidemic almost always increases the vaccinations enormously, that is one point. I have here a list of primary vaccinations performed at stations which

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supplied lymph to practitioners, and in the five years from 1865 to 1869 they varied between 13,000 and 14,000 and 15,000, roughly speaking. Then came the epidemic of 1871, when the number jumped up to 30,632.

993. That is to say, the number of vaccinations is the effect of previous small-pox existing?—It is the effect of the fear of small-pox.

994. (*Mr. Savory.*) I should like to ask you with regard to some questions which have been put concerning the relation of improved sanitary measures to the diminution of small-pox; is your answer to that as complete as you would wish it to be?—I have some more information I could give, since special attention appears to have been directed to this point. The Local Government Board in 1886, took some pains to get the figures as to the steamship "Preussen," bound for Australia, on board of which small-pox broke out. You have, of course, on a vessel, people living under the same sanitary circumstances, eating very much the same food, and in all respects practically alike, with the one solitary exception of vaccination. There were 312 persons on board this vessel. Of persons both vaccinated and re-vaccinated there were 55, four of those were attacked by small-pox, none died. Of persons vaccinated but not re-vaccinated there were 209; 45 of whom were attacked by small-pox and 3 died; 13 persons had previously had small-pox, of whom 3 were attacked by small-pox and none died. Of persons stated to be vaccinated but showing no scars, there were 16, two of whom were attacked by small-pox, and none died. Lastly there were 19 persons unvaccinated; 15 of these were attacked by small-pox, and 9 died. This evidence is in expansion of that I gave, showing that sanitary circumstances have little or no control over small-pox when compared with the condition of vaccination or no vaccination.

995. (*Sir Edwin Henry Galsworthy.*) What was the date of these observations?—The observations were made in January 1887, when the ship had arrived at Sydney. Then referring also upon the same question to Mr. G. W. Collins's report, I have another set of facts which, like the facts quoted from Dr. Cory, deal with persons actually pitted with small-pox. He examined 39,835 persons who had been re-vaccinated, and ·08 per cent. of these were marked with small-pox; 71,213 had been vaccinated once only, and of these 2·8 per cent. were marked with small-pox. He also examined 1,377 unvaccinated, and of these no less than 62·2 per cent. were marked with small-pox. I am diffident in quoting evidence about a town in which I know one honourable member of the Commission is interested, namely, Leicester, but many years ago Dr. Buchanan made a lengthened inquiry in the country in regard to the influence of sanitary measures upon health, and he divided the period which his inquiry covered into years before commencement of sanitary works, years during the construction of sanitary works, and years subsequent to the sanitary works. Now, taking small-pox under five years of age in the first instance; in the seven years before any sanitary works were carried out, namely, from 1845 to 1851, the death-rate per 10,000 at all ages was 5·5. Then during the construction of the main sewer works, the construction of 30 miles of sewers in the town, and supplying the town with water, the death-rate was 1·2 per 10,000.

996. (*Mr. Picton.*) What was the date of that construction?—From 1856 to 1861. And since the completion of the sanitary works, when the advantage might be expected to follow, the corresponding small-pox death-rate from 1862 to 1864 was 2·7, that is to say, higher than during the construction of the works. Over five years of age, in the first period before the sanitary works were constructed, the rate was 1·7; in the three years after the construction of the sanitary works it rose to 2. I do not attach the slightest value to this, but I only bring it forward to show that the mere carrying out of sanitary works does not necessarily lead to a reduction of small-pox. Dr. Buchanan, indeed, distinctly eliminates small-pox from his consideration at the commencement of his paper, upon the ground that he could find no evidence of the influence of sanitary works on small-pox in the towns he visited.

997. I should like to ask you a question or two upon that. Of course you remember the great epidemics of 1872 and 1873 in Leicester, when a large number died of small-pox. Are you aware that the spread of that epidemic was largely attributed by the inhabitants to the unsanitary condition of Leicester in those years, long after the dates you have referred to?—I cannot say that I ever heard that allegation.

998. Are you aware that the authorities immediately set to work to improve the sanitary condition of the town, which they considered grossly unsatisfactory?—I know that Leicester has done a large amount of good sanitary work since that date.

999. Are you aware that since they began those thorough improvements the rate of small-pox in Leicester has been exceedingly low?—I know it has been low in Leicester, and in a very large number of other towns since that date.

1,000. But more particularly in Leicester since that date?—I do not know that it has been more particularly so in Leicester. There were only nine deaths from small-pox within the whole of the Metropolis in each of the last two years.

1001. Are you aware that at the present time they are carrying out a main-drainage scheme in Leicester?—I know they are doing some works of drainage.

1002. But I say a main drainage scheme; that is to say, that the main drainage of the town is only now being carried out; were you aware of that?—I have evidence that 30 miles of sewers were laid down between 1856 and 1861.

1003. (*Mr. Meadows White.*) Is it known to medical science in what way an attack of small-pox operates in preventing or diminishing susceptibility to subsequent infection?—I think I can answer that nothing of any particular value is known upon that point.

1004. (*Dr. Collins.*) It seemed possibly that it was unfair to ask that a comparison should be instituted between per-centage of deaths from small-pox under the age of five to the total deaths in Geneva some time ago, and the same per-centage in England and Wales within recent years; but I see on page xi of the extracts from the Annual Report of the medical officer for the Local Government Board for 1884, this paragraph:—"In former centuries, out of a thousand persons "dying from small-pox, some 800 would have been "children under 5 years of age, and 150 of the remain-"ing 200 would have been between 5 and 10 years of "age. I do not know whether in any community these "proportions were ever materially smaller. I have not "been able to find an instance, though I can find "cases where infants suffered in still larger proportion." Apparently the medical officer would there be suggesting that in former centuries, before vaccination was introduced, the usual per-centage of deaths from small-pox under 5 years of age to the total small-pox deaths was about 80?—That is the contention, I believe.

1005. There is no evidence to point to the per-centage being less?—The medical officer says he has not met with any in former centuries.

1006. In your examination on the last day, in answer to Question 727, you said that you might give the Commission some further information as to vaccination in the mining districts; perhaps you would like to take this opportunity of adding that?—I would only add that I have made some inquiry as to the manner of performing vaccination, and as to the amount of infantile vaccination formerly performed in the mining districts; and those whom I have consulted, and who have had to do with those districts, have told me distinctly that in those districts there was, above all things, a very great neglect of vaccination, in so far as postponing vaccination was concerned, and also a default in the method of performing it. Of course that evidence related to a time that is past.

1007. But have you had any facts or figures before you to show that from 1871 to 1880, in the mining districts, there was a distinct improvement in the quantity and quality of vaccination?—I feel positive that we have information as to improvement in the quantity, and as to the earlier date at which it was done; but we have no detailed record that could be put before you statistically as to improvement in the quality. Our records, of course, are absolutely limited to vaccinations performed at public stations; in short, I am afraid that the information I could add would not be of any great value.

1008. Then what is the information that you were going to endeavour to supply?—I have told you that I have made some inquiry as to the past neglect in those two decennial periods of vaccination; and that in the earlier one there was certainly more neglect, especially as to deferring vaccination amongst infants than in the subsequent one, and than at the present time, but I am

not prepared to give the Commission statistics upon that point; I doubt very much whether they could be obtained.

1009. (*Sir Edwin Henry Galsworthy.*) You spoke of nine deaths only in London during each of the last two years from small-pox?—Yes, there were nine deaths during each of the last two years from small-pox in London.

1010. As a matter of fact there have been very few cases in the last two years?—Yes, and those two sets of nine cases each included those in hospitals belonging to the Metropolitan Asylums Board on ships down the river.

1011. Are you aware whether there was any opinion entertained by the Medical Department of the Local Government Board that before this, judging from the past, a fresh epidemic of small-pox would have shown itself?—Judging from previous experience, we rather did anticipate that small-pox might by now have become more rife; and we cannot help thinking that the action which has been taken under your directions of removing small-pox patients away from London, has probably tended to prevent that.

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1012. By isolation?—Yes, that has at least been one of the factors in lessening it.

1013. You are aware, I suppose, that there have been several isolated cases which have been instantly removed, and that no evil results have followed beyond those particular cases?—I do not happen to know the details, but I know the sum total is this, nine deaths only in each of two years. I believe that we never have had a period in which there have been so few small-pox deaths in London as during the last two years.

The witness withdrew.

Adjourned till Wednesday next at 1 o'clock.

Sixth Day.

Wednesday, 31st July 1889.

PRESENT:

THE RIGHT HON. THE LORD HERSCHELL IN THE CHAIR.

Sir JAMES PAGET.
Sir CHARLES DALRYMPLE, Bart., M.P.
Sir W. GUYER HUNTER, K.C.M.G., M.P.
Sir EDWIN HENRY GALSWORTHY.
Mr. WILLIAM SCOVELL SAVORY.
Mr. CHARLES BRADLAUGH, M.P.
Dr. JOHN SYER BRISTOWE.
Dr. WILLIAM JOB COLLINS.
Mr. JOHN STRATFORD DUGDALE, Q.C., M.P.
Professor MICHAEL FOSTER.
Mr. JONATHAN HUTCHINSON.
Mr. SAMUEL WHITBREAD, M.P.
Mr. F. MEADOWS WHITE, Q.C.

Mr. BRET INCE, *Secretary.*

[During the temporary absence of LORD HERSCHELL, Sir JAMES PAGET took the Chair.]

Mr. JOHN H. RAUCH, M.D., examined.

Mr. John H. Rauch, M.D.

1014. (*Chairman.*) What is your office?—I am the secretary and executive officer of the Illinois State Board of Health; I am also secretary and executive officer of the Sanitary Council of Mississippi Valley, an association composed of the States more particularly interested in looking after yellow fever.

1015. You have, I believe, large experience of small-pox in the State of Illinois, and especially in the city of Chicago?—Yes.

1016. Will you kindly give us any of the chief facts within your experience there?—I have practically been engaged in official sanitary work since 1861. My first sanitary work was done in the Army in 1861, in connexion with small-pox, when I was brigade surgeon. When we were stationed near Washington in the Fall of 1861, I learned one day that small-pox existed in some of the other brigades that were near us. I then issued an official order to the regimental surgeons to vaccinate and re-vaccinate the members of their different regiments. To my astonishment I learned one day that there was a case of small-pox in one of the regiments. On investigating the matter I found that the surgeon had neglected to re-vaccinate the men of his regiment. That was the only case that occurred; I took charge of the business myself, and there were no more cases. That was my first practical experience with regard to small-pox as an official. I was afterwards division surgeon and medical director of a corps, and I was medical director in the Department of the Gulf, with head-quarters at New Orleans. After the war closed I was instrumental in securing at Chicago legislation with regard to the Health Department there. I was sanitary superintendent of the city of Chicago from 1867 until 1874. After the Illinois State Board of Health was established in 1877 I was its first President; and for ten years since that time I was the secretary and the executive officer. I was also one of the founders of the American Public Health Association, and the fourth president of that body. I will ask the permission of the Commission to occasionally call attention to a report that I made in 1884, to which my attention was called by the medical officer here who happened to have a copy.

1017. (*Mr. Bradlaugh.*) I know these reports are published by your State Department; would it be possible to have a copy of them sent over to the Commission, which will be sitting for some time?—I shall be pleased to send a copy as soon as I return to the States, which I shall do in a few days.

1018. (*Chairman.*) Will you be so good as to proceed with your statement?—The first experience that I had in connexion with small-pox and vaccination was in 1867 and 1868 at Chicago, while I was sanitary superintendent. Small-pox prevailed during those two years, though it diminished afterwards. Then, in 1871, 1872, and 1873, before the Chicago fire, we had no small-pox in Chicago. A Hamburg steamer landed passengers in the city of New York, and, as has frequently occurred since and before, the disease, not developing itself while the passengers were in quarantine, developed itself in Chicago. In the confusion incident to the calamity we knew nothing about these immigrants until about three weeks after their arrival. All the houses in Chicago at that time were crowded in consequence of so many houses having been destroyed by fire. The Relief and Aid Society erected barracks in which about 20,000 people were housed, and the barracks were under the immediate sanitary care of Dr. H. A. Johnson and myself. One Sunday my attention was called to a suspicious case in one of the barracks, and I found it to be a case of small-pox. I had allowed all the employés of the office to leave, and the small-pox hospital had been burnt, and there was only one place where I could remove the patient, and that was a place called the Cholera Hospital, which had been used as a cholera hospital in 1866. I took the patient in my own conveyance although this place was not prepared for the reception of patients, and spent the afternoon there, leaving a note for some of my assistants to come to where I was. I had had this patient made pretty comfortable at that hospital, and the next thing that I decided to do was to issue an order to vaccinate and

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re-vaccinate everybody in the barracks. There were about 4,000 people in it. I spent the evening in collecting all available virus, and the next morning I issued it to the medical officers. The inmates of the barracks all willingly submitted, with the exception of the father of one family, an Englishman, who said that he would kill any man who vaccinated his children. The medical officers did not like to attempt it, but I decided to do it myself, seeing that I had a sufficient number of policemen with me to protect me. The man was opposed to vaccination, and he thought, because of his calamity, and of the condition that he was placed in, that it was an imposition upon him, and he was afraid that we would ruin his children. I vaccinated the children; fortunately he was not about. No untoward circumstances occurred. The result of the vaccination was typical. Not another case occurred in the barracks; and about four weeks afterwards a man came into my office and said that he owed me an apology. I wanted to know why; and it happened to be the father of these children. That was the only practical opposition that we found to vaccination that year. You can easily imagine the conditions that obtain when 112,000 people are burnt out; and, moreover, it was on the eve of winter, because the Chicago fire occurred on the 9th of October. We became satisfied that, having regard to the crowded condition of the buildings that were left, and the other conditions incident to the destruction of so large a portion of the city, unless we were very careful and took extraordinary precautions, and made extraordinary efforts, we should have a great deal of trouble. We had about 20,000 people in barracks. There was no trouble at all in getting them vaccinated and re-vaccinated; we commenced that immediately. Then there were about 80,000 people who were obtaining their food from the Relief and Aid Society. It occurred to me that we would make a certificate of vaccination necessary before they would get their rations. That was the manner in which we enforced vaccination. This recommendation was adopted by the Relief and Aid Society. All these vaccinations were performed under my immediate supervision, and I saw the results of nearly every one of them. During the winter we had reports of 87,000 vaccinations; but there must have been at least from 110,000 to 120,000 persons vaccinated and re-vaccinated in that way. During that time small-pox was increasing, but the case that I alluded to was the only one that occurred in the barracks. Thousands of mechanics with their families began to flock into the city from the neighbourhood and surrounding country to assist in re-building the city, and immigration also began to tend that way. That epidemic, as it may be called, continued to decrease, and disappeared entirely about the middle of 1874. Among those vaccinated and re-vaccinated by the Relief and Aid Society, or through their assistance, practically no cases of small-pox occurred; but the mechanics who came from the neighbourhood who had not been protected by vaccination, and whose children had not been protected by vaccination, and also the immigrants that came from abroad, kept up and fed the disease. During this time, among all the vaccinations that were then performed, my attention was only called to three cases where other than ordinary results were produced. Of course, we were in a position to re-inspect. Some 80,000 people were for three or four months constantly under our supervision, and we knew all about them. In one instance, where the arm was more than ordinarily sore, I found that the same material that had been made use of had been made use of in another case without any what might be termed injurious or unpleasant results. It left an ulcer, but the arm soon healed. Small-pox has re-appeared in the city of Chicago between 1851 and 1883 at 19 different times, after periods of entire freedom; and in the case of 14 of those re-appearances, it is positively known to have been introduced by immigrants. It was quite marked in 1872, and, in proportion to their numbers, we had less small-pox brought into the State of Illinois by immigrants from Prussia and Great Britain and Ireland than from any other portions of Europe. Whenever those cases occurred, I always made it my business to follow up the source and origin of the case.

1019. (*Chairman.*) You said that there were practically no cases of small-pox among those who had been vaccinated by the Relief Aid Society; were there any cases at all?—That I cannot recollect; there may have been one or two, but it practically did not amount to anything. The small-pox was fed by the new-comers from the country—from the interior of the State of Illinois and the immediate neighbourhood, where vaccination had not been practised, and also by the immigrants.

1020. And you vaccinated several thousands every day?—Yes.

1021. We have had questions asked as to what number can be safely vaccinated in the hour. Does your experience enable you to give us any information upon that point?—There were a great many vaccinating. The number that could be vaccinated in an hour would depend entirely upon circumstances. I do not suppose that one man could vaccinate more than 25 in the hour.

1022. Were there any accidents from the vaccination more than the one that you have mentioned?—There were no accidents outside of what I have mentioned.

1023. Do you know where the lymph was obtained?—It was humanised virus; in the crust at that time.

1024. You do not know what was its original source?—No, I do not.

1025. Will you proceed to state what your further experience has been?—The next introduction of small-pox of any importance in the State of Illinois was in 1880. That was brought by an immigrant, after passing the quarantine at New York; and during the interval since 1873 the Illinois State Board of Health had been organised, and railway building was much increased throughout the State. I had in my office a map of the State upon which I indicated the location of outbreaks of small-pox, and I found that those outbreaks followed the lines of communication just as they radiated from the city of Chicago or from the city of St. Louis—one in the southern part of the State and the other in the northern portion of the State. This became so threatening that I became satisfied that the small-pox would increase; and, as immigrants were constantly arriving, the disease was constantly being introduced into the State of Illinois. In November 1881 the Board became satisfied that small-pox would increase, and we then issued what we call the Vaccination Order with regard to the children of the public schools. It was to the effect that no pupil should be admitted to the public schools without being vaccinated. That was done at a meeting in November. We did not get the machinery of the State at work until about the middle of January. We could not get the blanks and everything necessary until that time. There were 12,000 school districts in the State of Illinois, and the disease was spreading in Illinois until we began to get all this machinery at work. In October there were five points of infection, in November 12, in December 28, and in January 1882 there were 58 new points of infection in the State. The new points infected were nearly all of them infected in the first two weeks of the month. We did not get this machinery, covering the entire State, at work until a little after the 1st of January, but two weeks after that the number of cases and of newly infected localities began to decrease, so that in place of 58 newly infected points, in February we had only 24, in March 21, in April 14, in May 8, in June 7, and in July 2. While the pupils of the public schools were being vaccinated other parties were also being vaccinated. We also had all the railway employés throughout the State vaccinated or re-vaccinated. We had, also, the pupils of the parochial and private schools vaccinated or re-vaccinated, and we had them all inspected to see whether the cicatrices were typical or not. We also secured the vaccination and re-vaccination of the employés of all the manufacturing and mercantile establishments and of many miners. We pushed vaccination and re-vaccination in every possible way we could, and we succeeded in having about 600,000 of the public school children vaccinated in those two years, and about 50,000 of those in parochial schools; and the total vaccinations and re-vaccinations were about a million and a half.

[LORD HERSCHELL took the Chair.]

1026. What had been the condition as to vaccination before that date?—I may say that in the State of Illinois there was no law or order with regard to vaccination in the public schools up to this time; although about one-half of the parents without any force or suggestion had their children vaccinated.

1027. And the remainder would be unvaccinated?—The remainder were unvaccinated.

1028. A great many children were vaccinated during that epidemic who had not been vaccinated before?—Yes, we always took advantage of that.

1029. Have you any statistics with regard to that last epidemic that you can give us as to the effect of vaccination on the deaths from small-pox?—The total number of cases of small-pox reported in the State of Illinois during that time was 2,040. I wish you to understand that we had no authority to compel these returns to be made, and that in this report that I have made upon that subject I have thrown out everything that I could not positively rely upon. It was, to some extent, a voluntary return. We prepared blanks. Of course the vaccination was done in a great many instances as a matter of duty. The total number of cases reported during this time was 2,040. The epidemic commenced in 1880, continued through 1881 and 1882, and ended in 1883. I am taking it from the first introduction by the immigrants in the city of Chicago.

1030. (*Professor Michael Foster.*) What is the date of the commencement of these cases?—October and November 1880.

1031. Lasting up till when?—To about June 1883. 460 died. The mortality per-centage of attacks amongst vaccinated was 6·1, and amongst those vaccinated before exposure only 6·9. By "exposure" I mean the having been in houses that had been invaded by small-pox. In that connexion I wish to state that the course which we pursued in the city of Chicago and throughout the State afterwards was to vaccinate everybody who had been exposed. The mortality per-centage after exposure was only 5·6. The mortality per-centage of those vaccinated twice, both before and during exposure, was none; not a death occurred amongst those who had been vaccinated before, for instance, in infancy, and then when they were exposed, vaccinated again. On the other hand, the mortality per-centage amongst the non-vaccinated was 48·6 of the attacks. That is the difference between the two.

1032. (*Chairman.*) Is that all you have to communicate to the Commission with reference to that epidemic?—No; not quite.

1033. Will you be good enough to favour us with any further observations?—With regard to infantile vaccination here are some very striking points: The school age in Illinois is from 6 to 21; from 6 to 17 is the usual time. The effect of our enforcement of the school vaccination order will be perceptible. The number of cases that occurred during the first six years of life was as 19 to 100 of the total cases that occurred at all ages. During the next 11 years of life, viz.: from 6 to 17 years, which is practically the school age, it was as 17 is to 100 cases at all ages. You observe the difference. Here comes in the effect of infantile vaccination. The children that went to public schools have to be six years old. It is more striking still in the mortality. Under six years of age the mortality from small-pox was 21·5 per cent. of the mortality at all ages; and from 6 to 17 years, that is the school age, it was 18·7 per cent., or as 13 is to 100 deaths at all ages.

1034. (*Dr. Collins.*) Is that the mortality of the cases attacked?—Yes, that is the relation by ages.

1035. Of both vaccinated and unvaccinated?—Yes, that includes all the cases. It simply shows the effect that vaccination has had in the case of the pupils in the public schools.

1036. (*Chairman.*) That makes no distinction between vaccinated and unvaccinated?—No, it simply shows the effect of the more thorough vaccination of the pupils of the public schools.

1037. (*Mr. Meadows White.*) Those pupils in the public schools came into these statistics, although these statistics comprise the whole population?—Yes. This is estimated according to the whole population at the time. My experience practically has been that it is never too early and never too late to vaccinate.

1038. (*Chairman.*) Are there any other statistics in connexion with that epidemic that you would wish to present to the Commission?—Yes, with regard to immigration.

1039. Are you able to state what was the action of the State of Illinois and the city of Chicago as to isolation and immigration?—Yes; in Chicago and throughout the State, the moment a case was discovered it was removed to the small-pox hospital if it was possible. The small-pox hospital there is in an isolated locality. We never had the same experience with regard to the hospital that you have had in this country, that is to say in the spread of small-pox from it. If the patient is not removed to hospital the house is practically quarantined, placarded up, and everybody vaccinated and re-vaccinated in it, and communication, as far as possible, cut off. That was the course pursued.

1040. Was the vaccination or re-vaccination there compulsory, or was it optional?—It was compulsory, so far as the public schools were concerned, and so far as those who were in the infected houses were concerned.

1041. As regarded those in the infected houses it was compulsory?—To some extent it was; it was indirectly made so. For instance, they were allowed certain privileges if they would become vaccinated; or if they happened to be exposed in any way, if they were vaccinated they would be permitted to go out. The vaccination was made compulsory in an indirect way. I have, for instance, the little town of Cable, a mining town, in my mind now. They had small-pox there and were completely panic-stricken. I found that nothing could be done, but by vaccinating and re-vaccinating everybody in the place. I issued an order to that effect, and it was enforced in an indirect way. Those who were vaccinated and re-vaccinated were permitted to leave their houses, but those who would not be vaccinated or re-vaccinated were compelled to remain inside of their houses. That is the way that I have acted in a number of instances, and the result has been that of immediately stopping the epidemic.

1042. (*Sir Guyer Hunter.*) There is no law, is there, to compel an unvaccinated person to remain in his house?—No; but that comes within the police jurisdiction of the State.

1043. (*Chairman.*) You mean that it was absolutely compulsory that they should stay in the house unless they were vaccinated?—Yes, that position has been maintained by the courts. If the local health authorities think it is necessary that persons should remain in their houses so as not to endanger the lives of others, they compel them to remain.

1044. And that applied to all the persons in a house where a case of small-pox had occurred?—Yes. The result is simply this, that a person would rather be vaccinated than be compelled to remain in the house.

1045. Practically speaking, it operates as a compulsion sufficient to lead to the people being vaccinated?—Yes.

1046. You are now dealing with the isolation; is that all that you have to tell us with reference to isolation?—The patient is removed to the hospital if possible, or as little communication is held with the patient as possible if he remains in his own house. In many cases, for instance, in the interior of the State, they station a policeman in front of the house and allow no communication whatever; the food supplies and everything are placed inside so that they can get them, but there is no communication with the outside. This course is frequently taken.

1047. (*Sir James Paget.*) When a person is not vaccinated?—Yes, or from fear of anyone else communicating the disease.

1048. (*Chairman.*) Will you proceed with your statement?—I explained that when we got the machinery of the entire State at work vaccinating the 12,000 school districts that we have in the State, small-pox began to decrease, but still it was fed by the immigrants. In 1882 the influx of immigration was very large indeed, and scarcely a steamer landed at New York that did not have small-pox on board, or persons who became infected during the passage, the small-pox not developing itself until they arrived at Chicago or other points in our State. We called a meeting of the health authorities of the different States, and we decided that we would ask the National Board of Health to require the vaccination and re-vaccination of all immigrants. I interested myself and others in the matter, and we secured an appropriation by Congress for this purpose. I superintended the inspection in the western district, and applied the police powers of the State of Illinois to enforce the vaccination. The health officers at some of the ports would to some extent be controlled by the steamship companies, but we threatened to cut off communication with them if they did not take this precaution. We brought the pressure to bear first upon the transporting companies, then upon the health officers of the ports, and they upon the steamship companies. We wanted all immigrants to be vaccinated and re-vaccinated before they started. We to some extent found that impracticable, but we insisted upon their being vaccinated while in transit and on their being inspected. I superintended this inspection for

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six months, and during that time we inspected 115,000 immigrants and vaccinated 21,000. The surgeons of the steamship companies were required to give a certificate of vaccination to each passenger. We re-inspected those, examined the work they did two or three weeks afterwards, and if we found that it was not satisfactory, we re-vaccinated; and it was not until we did that that we stopped small-pox in Illinois.

1049. (*Sir Guyer Hunter.*) Supposing that a person on board these immigrant ships declined being vaccinated, what should you have recourse to?—Of course, we would not let them come into our State. I will illustrate that. In the year 1882 I was going from Detroit to Chicago on one of the emigrant trains. I did not allow the inspector to know that I was on the train. But at any rate, I saw the result of his work. Those that were under my control would go out from Chicago to meet the immigrant train; and they would, perhaps, be six hours on the train, so that they would have plenty of time to thoroughly inspect every individual. The inspector in the course of the day discovered that I was on the train. I had some conversation with him, and I told him to go on and finish his work, and I would like to talk to him. He came back after a time, and reported to me that there were three Englishmen on the train who objected to being vaccinated. I had a conversation with them, and I told them that the only alternative was that when we came to the Illinois State line they would have to leave the train; that they could not enter the State of Illinois without being vaccinated. They finally consented to be re-vaccinated, and that was the end. But we could not control small-pox at that time until we drew the reins tight on the steamship companies. For instance, here is a report on the condition in which we found some of the ships:—No inspections of any value appear to have been made by the surgeons of the "Pollux," "Plantyn," or "Leipsig." The inspections by the surgeons of the steamers "Alaska," "City of Rome," and "Cimbria," "Edan," "Egyptian Monarch," "St. Laurent," "Nemesis," "Parthia," and "Britannic," appear to have been very superficial. We were following the work two or three weeks afterwards.

1050. (*Chairman.*) Since these stringent measures have been taken have you been comparatively free from small-pox?—Comparatively free. The port of New York was afraid to act until we brought pressure to bear upon them. When the "Alesia" brought cholera to the port of New York, I immediately telegraphed to the health officer of the port that unless certain precautions were taken we would not allow the "Alesia" passengers to land in or pass through the State of Illinois. We also notified the trunk lines that they would have to comply with certain conditions. We were simply exercising the police or quarantine powers of the State in this matter.

1051. Have you anything that you would desire to say with reference to sanitary arrangements in relation to the action of your State, for the purpose of diminishing the effects of small-pox?—Of course it is a matter of the utmost importance that the sanitary conditions that obtain should be good in all small-pox hospitals or where cases of small-pox occur. But sanitation has practically nothing to do with causing small-pox.

1052. Can you give us the number of cases of small-pox since the epidemic of 1880–83?—We had only one case last year in the State of Illinois. I think we have not had a score of deaths in the entire State since the epidemic. We have been looking after everything very closely. Ever since then the State has been more thoroughly organised, and if cases of small-pox occur prompt action is taken. Then, in the smallest towns of the State they enforce the vaccination order. About half of our people voluntarily see that their children are vaccinated. There is practically very little opposition to vaccination in the State of Illinois.

1053. (*Sir James Paget.*) Have you the numbers?—I can give them to you, but I have not them here. You must understand that my appearing here was something totally unexpected by me, and I have been just furnished with this report, which I made in 1883, so as to refresh my memory.

1054. Taking the last five years, can you say what has been the largest number of cases of small-pox in the State in any one year?—Not more than 20 in the year.

1055. (*Mr. Meadows White.*) What is the population of the State?—The population of the State now is about 3,700,000. There has been a longer interval, owing to various causes. For instance, more care being exercised at the maritime ports with regard to immigrants; more care being exercised with regard to the public schools, and prompt attention when cases do occur, and a more thorough understanding how to manage the cases. We have printed instructions covering every possible circumstance that may occur in the management and treatment of cases—not the professional treatment, but the sanitary treatment—so that we have had less small-pox and at longer intervals since 1883 than at any time before since the existence of Chicago as a centre, and, as I have already stated, it makes a great deal of difference whether the immigrants come to us or not. At the time that we took this action about a thousand immigrants arrived every day in Chicago, and were distributed from there throughout the north-west.

1056. (*Sir James Paget.*) Have you any knowledge of any other State where less care has been taken, and where opposite results would be shown?—Yes, there are such States. For example, Missouri, where they have not taken the same care as we have, they have had more small-pox. They are not organised as we are, although from the geographical position of Chicago, so far as immigration is concerned, we bear the brunt of it. In the city of St. Louis they do very well, but not outside it. Their health organisation has been crippled. It makes a great deal of difference whether the organisation is effective or not.

1057. (*Mr. Bradlaugh.*) St. Louis, in Missouri, would bear as much of the brunt of it as Chicago, would it not?—No. Here is the difference, for instance. I will explain that immediately. I can tell you how many immigrants at St. Louis were inspected; that was under my supervision. Out of 78,000 immigrants passing through Chicago and inspected there, only 6,165 were bound for St. Louis between the 1st June and the 30th September 1882. Chicago is the great distributing point. At St. Louis the number of immigrants does not amount to much.

1058. (*Chairman.*) Have you given us all the statistics that you are able to give with reference to the relative incidence of small-pox attacks, and small-pox mortality amongst children, and at other ages?—I think I have already done so.

1059. What is the public law as to vaccination?—In Illinois we have no vaccination law, other than that we require the pupils of public schools to be satisfactorily vaccinated before admission.

1060. So that they are not admitted unless they are vaccinated?—No; that is by an order of our board. The local authorities since have passed ordinances to that effect. In Massachusetts there is a compulsory law, and vaccination is compulsory in some cities too.

1061. Are the regulations which you say are made by the health authorities for isolation with privileges in case the persons isolated are vaccinated or re-vaccinated, the work of the State Legislature, or are they made under the authority of State Legislature?—It is under an authority giving them power to do what is absolutely necessary to prevent the spread of disease.

1062. And that power is given to the health authorities?—That power is given to the health authorities.

1063. So that the State Legislature delegates to the health authorities power to deal in this way with the residents in cases of small-pox epidemics?—Yes.

1064. Would that apply in any case of small-pox in a house, or only when there was an epidemic prevalent?—It would apply in any case, because practically any one case if it is neglected is the first case of an epidemic; if you do not take care you will have more cases.

1065. And the effect, as I understand, of these regulations, and the enforcement of them, is indirectly to compel vaccination?—Yes, that is the effect. As I remarked before you entered the room, with regard to the people who are dependent upon charity, when I found a case of small-pox in the barracks at Chicago I suggested that they be required to furnish vaccination certificates before they got rations, and that was carried out afterwards.

1066. I think you have told us that the ordinary vaccination in the case of about half the children would be within three months of birth?—Yes; and in the presence of small-pox, not half, but nearly the whole, of the children would be vaccinated, no matter how young.

1067. Would there be, then, an increase in the number vaccinated about the commencement of the school age?—Yes.

1068. That is at six years of age?—Yes; and if the vaccination is not satisfactory they have to be re-vaccinated. They are all examined.

1069. Then in the coming generation, apart from those who have come into the State, or who are above the school age, or who were born before these regulations were in force, would that compel practically the vaccination of all children?—Not entirely.

1070. Do they not all attend some school?—Yes, they do.

1071. Then how comes it that that would not compel the vaccination of all children?—Because in some instances it is not enforced, where you get into the interior for instance. Another reason why we had so much trouble in 1880–83, was the fact that railway communication in Illinois is so very easy. We have about 10,000 miles of railway in that State. During both those epidemics that I allude to particularly, there were certain factors that had to do with the spread of the disease. There are some districts where they never have small-pox. I saw in November 1881, that unless we took active steps small-pox would be in every township in the State of Illinois. I had before me the map of the State of Illinois, on which was marked every case that occurred, and I saw what influence the lines of transportation had, and how the disease was spreading out on those lines, and I became satisfied that unless we took extraordinary steps we should have small-pox in every county in the State. As it was it got into 79 counties.

1072. But practically speaking although there may be cases in which it is not enforced there is compulsory vaccination of all children who had arrived at the age of six years and upwards?—Yes.

1073. Is there any other point to which you would particularly wish to call attention?—I believe I said that Massachusetts had a compulsory vaccination law. There is another point, with regard to the effect of vaccination. I have personally vaccinated and had under my immediate supervision, about 250,000 people, and during that time I have never seen a case of syphilis as a result of vaccination; I have never seen any extraordinary result produced; I have never seen anybody die because they were vaccinated, but I have seen a great many die because they were not vaccinated. That has been my personal experience; of course I do not say anything outside of that.

1074. Over what length of time does your experience extend?—Since the year 1861.

1075. (*Sir James Paget.*) You have not seen any syphilis resulting from vaccination?—No, I have not seen a case of syphilis from vaccination.

1076. Nor any untoward event?—No; I have seen some pretty bad ulcers; but as a rule I can say that the statement is literally true so far as my personal experience goes. Of course I have heard of bad results, but I am speaking now about my personal experience. I have never had any trouble from the vaccinations that I have myself performed.

1077. (*Mr. Savory.*) What do you consider a satisfactory vaccination with regard to the number of punctures?—That depends upon circumstances. Sometimes you can get the desired result from one puncture, sometimes you cannot, but have to make two or three or even four.

1078. Do you attach any importance to the number of punctures?—It is important in some cases; it does not always follow as a necessary consequence, but I think it is very important that you should have at least more than one. Of course it depends entirely upon the lymph that is used, and the conditions that obtain. I believe that in some instances one puncture is enough.

1079. Have you any evidence to show the proportion between the amount of protection and the number of punctures?—No, I have not.

1080. (*Professor Michael Foster.*) I think I understood you to say that above half the population were voluntarily vaccinated?—Yes.

1081. By that you mean that they were vaccinated when under the age of three months?—Only in the face of small-pox; otherwise within 12 months of birth:—there is a general feeling upon the part of nearly every parent in Illinois that they must have their children vaccinated.

1082. Nevertheless, there is about half the population which is believed to be compulsorily vaccinated in this indirect manner?—Yes.

1083. Have you any views yourself as to the advantage of that indirect compulsion over direct compulsion?—I think that direct compulsion would be better.

1084. But the authorities of the State are of a different opinion?—The question never came up. We have had practically to do with all these things, and whenever we have found it necessary to do anything, and we have not direct authority for it, I have found some other way to accomplish it. That is about the truth of the matter. We have never asked for authority to make vaccination compulsory.

1085. Do you think that the method pursued at present is as good as if vaccination were compulsory?—No; I think that the method pursued in England is better. I think that the results of your vaccination are very good indeed. I remarked a short time ago that from Prussia, Great Britain, and Ireland we had not many cases of small-pox in immigrants. I have been watching these cases carefully, and I attribute it to your method of vaccination.

1086. Do you think that there are cases of small-pox in your State occurring under your present system of having, so to speak, spurts of vaccination when cases occur which might not have occurred, if there had been a regular system of vaccination and re-vaccination?—I do. The fact is that I have not the least doubt that small-pox could be exterminated if vaccination and re-vaccination were universally carried on. In one of the tables I find that none of the persons vaccinated in infancy and again vaccinated after exposure to small-pox died.

1087. Is Massachusetts, so far as you know, the only state where there is compulsory vaccination?—Yes.

1088. In all the other States is vaccination voluntary?—Yes, or procured by indirect methods.

1089. Is it voluntary in New York?—In New York it is, but they have the same requirement with regard to the public schools that we have in Illinois.

1090. (*Chairman.*) Do you think that the public school requirement touches substantially the whole of the classes who would not have their children vaccinated voluntarily?—No, it does not.

1091. Are there some who would not send their children to the public schools?—Yes; there are a great many who send their children to private schools, church schools, and parochial schools. These others in the last epidemic came forward voluntarily and had their pupils vaccinated. They sent to me for the blank certificates. We have a special form of certificate prepared. We have very little trouble. We secured the vaccinating and re-vaccinating of about a million and a half of people.

1092. But those who were of a class not going to the public schools and who had not been voluntarily vaccinated would not come under any compulsion?—No, not unless they were exposed to the infection of small-pox in a house. We took every opportunity to push vaccination and re-vaccination in every way we possibly could under existing conditions.

1093. (*Professor Michael Foster.*) What per-centage of the population in your State remains unvaccinated, say at six years of age, which is the public school age?—It may perhaps be 50 per cent. now, but it was brought down to about 10 per cent. at the time we were engaged in this work.

1094. (*Mr. Hutchinson.*) Would it be possible by any sanitary arrangements, such as attention to drainage and water supply, to diminish the prevalence of small-pox?—I have no doubt that good sanitary arrangements would have an effect in regard to mortality, and perhaps make the disease not quite so contagious; but sanitation practically has nothing whatever to do with the spread of small pox.

1095. You believe in isolation and vaccination?—Yes.

1096. Those are the two important things?—Those are the two important things.

1097. So that if you were told that fever had diminished under improved sanitary arrangements and that small-pox had also diminished, should you be inclined to think that the same influences which had diminished the prevalence of typhoid had had anything to do with

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diminishing the prevalence of small-pox?—The conditions are entirely different.

1098. Have you had any difficulty in inducing parents to have their children vaccinated?—No.

1099. Have you met with any instances of great obstinacy?—A few. I related one case where the father threatened to kill me for vaccinating his children, and afterwards came and thanked me.

1100. Have you in your State any indirect means of inducing persons to be re-vaccinated?—I have mentioned the influence of employers, companies, and others. When small-pox was about there was no trouble in inducing people to be re-vaccinated.

1101. The first vaccination I understand is induced indirectly?—Yes, upon the part of some; but we have educated our people with regard to this matter, and we had nearly everyone re-vaccinated that had been vaccinated before. We secured the vaccination and re-vaccination of at least a million and a half of people in 1882-3.

1102. You entertain a strong opinion as to the advisability of re-vaccination?—I entertain a very strong opinion indeed.

1103. At what age should you advise re-vaccination?—At about the age of puberty or after puberty.

1104. Would you have it done a third time?—Yes; it does no harm.

1105. You have given us a very clear testimony to your not having found personally any ill results from vaccination; have you any experience of serious results from the vaccination of others?—I have heard of it, but I have seen nothing of the kind.

1106. You have never yourself seen syphilis resulting from vaccination?—Never. I alluded to the vaccinations that were performed after the Chicago fire; we had those people under our control for months, and I was present when a great many of them were vaccinated; although I did not vaccinate many myself, I saw to their inspection; and I myself was visiting the barracks every day and thoroughly inspecting them week after week. This went on for about six months, and if anything more than ordinary had occurred, they would have called my attention to it, because they knew that I was responsible.

1107. And you have never in your own practice, or in that of others with whom you are acquainted, known a death from vaccination?—No, never.

1108. What lymph have you used?—We have used the bovine lymph lately. At first, before that was introduced, we used the humanized virus.

1109. Do you usually use that from the calf?—Yes.

1110. Do you know the origin of the bovine lymph?—The Beaugency stock, I believe.

1111. (*Mr. Meadows White.*) You named the man who threatened to shoot you, and the three persons in the train; have you known, within your personal observation, any other decided opposition than that of those four persons?—No.

1112. As to the indirect compulsion of vaccination, do you inquire whether persons have been re-vaccinated as well as whether they have vaccinated?—We do.

1113. And you vaccinate every person, or indirectly try to secure the re-vaccination of every person at or above the age of puberty?—We do. Where they are exposed to small-pox we re-vaccinate at whatever age; it does not make any difference what the age is.

1114. With regard to the vaccination of immigrants, in your opinion it would not be enough to inspect the immigrants with a view to detect symptoms of small-pox?—You could not tell the earlier symptoms from any other febrile symptoms.

1115. The period of incubation of small-pox is considerable, is it not?—At the ports for instance, they find small-pox on board, and the cases are removed and they vaccinate. But, in many cases, the small-pox is contracted on board the ship. The steerage is the fruitful source. For instance, even if the immigrants were all right, when they left some of them may have baggage that may not have been thoroughly disinfected or purified, that they have brought from the various parts of Europe. You find on the same steamer persons from different countries of Europe, and for some infected persons the period of incubation is not over when they have passed the quarantine. The result is that Chicago is the next distributing point, and we have them there. The moment a case of small-pox occurred, while we were inspecting these trains, the inspector telegraphed to Chicago, and we would have the persons removed from the train, and taken to the small-pox hospital, where no one else could be exposed. Promptness in everything of that kind is one of the most important factors in preventing the spread of this disease.

1116. Do you take any measures to disinfect the clothing of immigrants if they have been exposed to small-pox infection on board the ship in which they have come?—That we do now; and that is one of the reasons why we do not have so much small-pox. The period of quarantine in the United States is changed entirely; it does not mean the 40 days. I fully appreciate and understand the position which England takes with regard to quarantine. It is practical quarantine with us, but it is a quarantine of inspection and of care. That is what we really have in the United States, inspection and care. The quarantines are controlled either by local authorities or by State authorities. The national Government has nothing whatever to do with the quarantine. The only way that we can protect ourselves, for instance, at Chicago, in Illinois, against lapses at New York, or Baltimore, or Philadelphia, or any of the other ports, is to bring pressure to bear upon the transporting companies, the railway companies. We can say to them: "Unless you take "such precautions we shall not let you enter our State." When they had an epidemic of small-pox at Montreal I was making an inspection of the maritime quarantines in view of the possibility of our having cholera in the United States, because whenever cholera has come into the United States it has been introduced by the immigrants. Some reporter was interviewing me, and I remarked that unless the system was changed at Grosse Isle, in case cholera should occur, we would not permit the Grand Trunk Railroad to enter the city of Chicago. The Dominion Cabinet Minister of Agriculture, who had charge of quarantine, wrote me a letter with regard to it. The result has been that the whole system has been changed there. The only way that we can protect ourselves in the interior is to bring indirect pressure to bear. I have been urging that the National Government should have control over the quarantines, which it has not. The jealousy of the States has interfered with and interrupted it. In 1879 specially, and 1880 I represented the National Board of Health on Yellow Fever, and I practically controlled everything from St. Louis to New Orleans. I spent four months during the hot season between Memphis and Cairo on the Mississippi. I represented the National Board of Health, also the Sanitary Council of the Mississippi Valley and the Illinois State Board of Health, and by the application of the powers vested in these authorities we had very little trouble.

1117. You said that you had never, in your experience of vaccinating, seen any case of syphilis supervening; have you ever seen a case of erysipelas supervening?—I have.

1118. Have you seen many such cases?—Not many.

1119. How many?—I have probably seen a dozen.

1120. Have you anything to remark upon those cases?—That may be an accident; you cannot tell. It is impossible to tell the origin of erysipelas in every case, and when you make so many operations some cases of erysipelas are to be expected. You may have erysipelas without vaccination.

1121. You did not investigate those cases specially?—The cases that I saw were trifling. Of course, if it had been anything serious, I should have followed it up closely. In this last experience, the public knew that I was very active in pushing vaccination. I did everything I possibly could, and my attention would have been called to other cases if they had occurred.

1122. (*Dr. Collins.*) I think I understood you to say that you were attached to the army in the year 1861?—Yes.

1123. Did you occupy that position during the time of the American civil war, 1861-65?—Yes, from 1861 to 1865.

1124. Do you happen to be acquainted with a work by Dr. Joseph Jones, Professor of Physiology in the University of Nashville?—I am.

1125. Are you aware that he published numerous instances of spurious vaccination or abnormal phenomena accompanying the vaccination in the Confederate army?—I am.

1126. Have you formed any opinion as to the nature of those cases?—I have not.

1127. Are you aware that there were 227 cases in the 44th Georgia regiment, which developed ulceration resembling the Hunterian chancre, followed by constitutional symptoms?—I recollect some statements to that effect.

1128. And are you aware that there were many similar reports by surgeons of other divisions of the same nature?—No such experiences ever came under my observation; I never heard of anything of that kind in the Federal Army. We had no Georgia regiment. There was a difference between the rebel army and the Union army.

1129. Still, you are aware that a large number of such cases is reported by Dr. Jones?—Yes, I know Dr. Jones's reports.

1130. And you could not give the Commission any information with regard to those cases?—No.

1131. (*Sir James Paget.*) Was it true that in a great number of those cases the vaccine was taken from the arm of one soldier and transferred to the arm of another?—Yes, that was true; at least I have been told so.

1132. At the time it was stated that the soldiers vaccinated one another, and that not unfrequently a syphilitic soldier was the source of vaccine to another?—I have not the least doubt about that. Nothing of that kind occurred with us; we took better care of our army.

1133. (*Mr. Bradlaugh.*) I understand that you have no doubt as to the transmission of syphilis by means of vaccination, although it has not come within your own personal observation?—I have not seen anything of it.

1134. But from the answer which you have just given to Sir James Paget I understand that you have no doubt of the transmission of syphilis by vaccination?—I should not be at all surprised if it could be done. The vaccine disease is a disease *sui generis*. From what I have read I think there is a possibility of such a thing being done, but I have never seen anything of it.

1135. (*Dr. Collins.*) I think you told us that you personally vaccinated something like 250,000 persons or had supervised the vaccination; was it the rule to inspect the cases on the eighth day?—I spoke of some 80,000 as having been specially under my own supervision, and they were inspected on the eighth day, and afterwards also.

1136. How long afterwards?—We inspected them for two or three weeks afterwards when they were applying for their rations, in the case of that class that came under our observation.

1137. If by any possibility syphilis should have been communicated in any of these cases do you think you would have been likely to hear of it, or see it within three weeks?—It was a longer time; some of these 80,000 people were receiving the bounty of the organisation for months.

1138. So that they were kept under observation longer than three weeks?—Yes, some of them were in the barracks for six months.

1139. I think you said that there were no cases of small-pox in Chicago before the fire?—No, not for several months.

1140. Which fire are you referring to?—The fire of the 9th of October 1871.

1141. I think you also told us that after the fire there was a great deal of overcrowding in consequence of the destruction of the houses?—Yes.

1142. Could you give us any idea of the condition in which the persons lived at that time; was the sanitary condition of Chicago bad in consequence of the overcrowding?—Where the houses were much over-crowded I removed the people in a number of instances and put them in the barracks. We had about 20,000 in the barracks, and I superintended and controlled their sanitary condition.

1143. Do you happen to know Dr. Elder of the Indiana State Board of Health?—I do.

1144. I see in his report for 1883, page 195, that while urging the value of vaccination he adds, "Impress "upon the public the fact that small-pox is a loathsome "repulsive unnecessary disease, that owes its existence "and prevalence to filth, squalor, and wretched hygienic "surroundings, that as they predominate small-pox "flourishes." I gather that you do not agree with Dr. Elder?—Not with the passage you have read. There is no doubt that contagion may be increased by those conditions, but that is a different problem entirely.

1145. Have you derived any of your lymph from the inoculation of the calf or the cow with small-pox?—No.

1146. Are you aware whether that has been done in any of the States?—I am not.

1147. I think I understood you to say that your source was the Beaugency stock?—Yes.

1148. I think you told us that you used the humanised virus in crusts?—Yes, at that time; in 1871.

1149. Is that done now?—No.

1150. In what way is the lymph preserved at the present time?—We are now coming to use more bovine lymph.

1151. In what way is it preserved?—It is preserved on ivory points. There are some who use humanised virus and they commonly employ tubes or crusts, and also there are some who vaccinate from arm to arm.

1152. I presume a large number of the population of the State of Illinois, like that of other of the United States, is composed of persons who are foreign-born; is that so?—In the city of Chicago that is the case. I think that of the population we have in the city of Chicago over one-half is of foreign birth. It maybe probably one-fourth in the balance of the State.

1153. I think you told us that you observed considerable difference in the quality of the vaccination in persons born in different countries?—I did.

1154. Can you give us any information as to which of the States of Europe the best vaccinated proceeded from?—From Great Britain and Ireland, and Prussia proper. There are certain portions of Germany where the vaccination is not so good, but in Prussia proper it is good. My experience goes back to over 20 years. We have not had many cases for the last six years.

1155. Do the larger number of Germans that you receive come from Prussia or from other parts of the empire?—That I could not tell. I have not paid much attention to that subject because I did not find anything that made it necessary to investigate it. At the time of the Franco-Prussian war there was a great deal of small-pox in Germany, and immediately after its close a good many Germans went to the United States, and there was more small-pox brought from Germany in that year than in any year before.

1156. The reason why I ask the question is because I find in Buck's "Statistics of Public Health," page 337, a report of the prevalence of mortality from different diseases in the United States, according to nationality, he shows that the Germans suffer far more heavily than any other nationality from small-pox; furnishing of 441 out of every 1,000 deaths from small-pox?—That would come from the fact of more Germans being there: "Germans" in those statistics doubtless included all Austrians, Hungarians, and Bohemians, along with immigrants from Prussia.

1157. But it gives the proportion of Germans to the total population as 303 to the 1,000, while the proportion of deaths of Germans from small-pox was 441 to the 1,000?—That may very well be. You will observe that in my statement, when telling of my experiences of 1872, I did not speak of "Germany," but what I had to say referred simply to Prussia.

1158. Apparently the Scotch suffer the least, and the Germans most, and intermediately come the English and Welsh, Irish, Swedes Norwegians and Danes, and French. Could you not give any further information with regard to that?—Not as to nationalities.

1159. (*Sir James Paget.*) Would Germany include Austria?—No doubt it did.

1160. (*Chairman.*) Would all who came from any part of Germany be included as Germans?—I suppose that is what is meant in Buck's book. That is evidently based upon the national census, which made little or no distinction between Prussians and other Germans. About 1870 and 1871 there was a great deal of small-pox in Germany, after the Franco-Prussian war, and we felt the effects of that.

1161. (*Dr. Collins.*) I think I understood you to say that in the case of the immigrants proceeding from

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New York to Chicago, although vaccination had been done on board it was often found to be unsatisfactory?—Yes, in a great many instances owing to carelessness and inert virus.

1162. In what way?—By examination. Each man was required to have a certificate of the date of the vaccination, and then we saw the results. There was an inspection made of each immigrant.

1163. In what way were the results unsatisfactory?—By their not being typical. The inspectors were instructed to see that they were typical.

1164. What would you consider to be a typical result?—It is a pretty hard matter for me to describe it properly, but I mean one that goes through the typical stage of the vaccine disease or having the regular crust having, for instance, when the crust is removed, little indentations on the scar.

1165. Then I presume that these observations as to the success or non-success of the vaccination were derived from the appearances of the scar?—Yes, and in many cases also from the earliar results of the vaccination, as from the vesicle or from the crust. The inspectors made reports with regard to each steamer as they found the immigrants on the trains.

1166. I understood you to say that it was never too early and never too late to vaccinate. Does "never too late" apply to vaccination after exposure to small-pox?—Yes.

1167. How late do you think it is possible to vaccinate so as to prevent an attack of small-pox which is incubating?—You cannot always tell, because you cannot tell the exact time of exposure. I have found it safe always to vaccinate, however late it was. It is occasionally possible that you may save your case.

1168. (*Chairman.*) Do you think that if you vaccinate in a case when the small-pox incubation has begun, it might diminish the severity of the attack of small-pox?—You will find that vaccine and the variolous disease frequently run their course together. I have no doubt that at times it has had that effect. As I have already stated you cannot always tell when the effect of the variolous contagion began to manifest itself, or when it took effect upon the individual; and, therefore, it is proper to vaccinate.

1169. (*Dr. Collins.*) Could you tell us at what age the chief mortality from small-pox occurs in Illinois?—Yes, I think I can tell you. The greatest number, I think, are under six years of age. The proportion to the total population is 16·1 under six years.

1170. Is that mortality per cases?—No, I apeak of the per-centage of the total population who are under six years of age. This section of the population had 21·5 per cent. of the deaths by small-pox.

1171. Per cent. of what?—Of the deaths at all ages.

1172. That is not quite what I was asking?—I find the "relative susceptibility to fatal small-pox at given ages" to be such that 25 children under six die of small-pox out of every 100 small-pox deaths at all ages.

1173. That gives the mortality per cent. of cases. What I wanted to ascertain was the number of deaths from small-pox per million of the population living at certain ages. Could you give us that?—I cannot find it. It may be somewhere in this book, but I cannot find it at the moment.

1174. (*Mr. Bradlaugh.*) Have you any statistics of vaccination in Illinois?—None outside of those that are in the office, and those I have here.

1175. You were good enough to say that you would send a copy of that to the Commission; could you with it send the laws relating to quarantine and relating to school attendance, which you have referred to?—Yes.

1176. Without putting yourself to great inconvenience?—Yes. I will be pleased to do so.

1177. You have told the Commission that there is no vaccination law other than those I have referred to in your State, and that the only State in the United States of America in which there is a compulsory law is Massachusetts?—Yes.

1178. Can you remember whether there has been any attempt to pass a compulsory law in any other State?—I do not think there has. The principle of compelling vaccination has been discussed, but I know of no proposal for actual legislation. As a general rule, small-pox appears in the larger cities and towns, and they have authority to take care of themselves, and to do whatever is necessary. It is very seldom that small-pox appears in the country districts.

1179. I rather gathered from your answer to Dr. Collins that except in Chicago you did not think the proportion of the population foreign born was large in your State?—It is about one-third, outside of Chicago.

1180. Shall I be right in thinking that there are some districts, mining districts and so on, in which the proportion of foreign-born subjects is comparatively large, a proportion which hardly exists in other portions of the State?—Yes.

1181. Shall I be right also in assuming that it would be the truth that in those parts referred to where the proportion is large there is hardly any enforcement amongst those who come in as adults of the practice of vaccination?—That is so to some extent, but not in other cases. I have had experience in three of the mining towns; one of them was Braidwood, where they were nearly all foreigners, where we secured their vaccination and re-vaccination without any trouble at all.

1182. You seem to be pretty persuasive when you take it in hand. I do not know whether in the case of the foreign population in your State you have had your attention directed, especially during the last seven years, to the cases such as are very marked in Pennsylvania, and I think some of them in your State, of Hungarians?—In that connexion I may say that we do not have so many Hungarians in Illinois as they have in Pennsylvania.

1183. But have there not been some special reports with reference to them. I do not know whether you happen to have looked over the labour reports for the State of Illinois?—I have not paid special attention to them.

1184. There was there some special reference to the sanitary habits of the Hungarians. I do not know whether you happen to know anything as to that?—I do not; my attention has never been called to it, nor has anything occurred to attract my attention in that direction.

1185. (*Chairman.*) Do your functions extend to the whole of the State or only to the city of Chicago?—To the whole of the State.

1186. (*Dr. Bristowe.*) I think I understood you to say that about half of the children under six years of age were vaccinated?—Yes, probably.

1187. Of course there are a small number who are compelled to be vaccinated owing to the presence of small-pox amongst them?—Yes.

1188. Those are the only cases in which, taking children under six, vaccination is enforced, in the presence of small-pox?—Yes.

1189. I suppose you attribute the heavy mortality of small-pox in children under six to the absence of vaccination?—Yes.

1190. (*Sir Charles Dalrymple.*) Were those stringent powers which you mentioned by which you prevented immigrants coming unvaccinated into the State of Illinois obtained from the State Legislature?—Yes; the State placed quarantine in the hands of our board; we control all matters of quarantine.

1191. (*Chairman.*) How is your board elected?—It is appointed.

1192. By whom?—By the Governor, and its appointment is confirmed by the Senate.

1193. (*Sir Charles Dalrymple.*) Was there any resistance to the enactment of those regulations in the Legislature?—No, not at that time. In fact on the question of quarantine, I may observe that the city of Cairo wished last Fall to quarantine against yellow fever. I was between Nashville and Chattanooga at the time when there was yellow fever at Decatur, and I told them we would not then permit quarantine against yellow fever, and they became very much incensed.

1194. Then there is sympathy of a public kind with the regulations?—Yes.

1195. They are not considered to invalidate the idea of personal freedom?—No.

1196. I understand you to say that the question of compulsory vaccination has not been raised in your State?—No.

1197. But if such a high value is set on vaccination, has it not struck people that the numerous exceptions which are possible under these school regulations may greatly impair its effect upon the population generally?—That is the fact, but when small-pox does not exist a great many people do not think anything at all about it. When there is no danger they lose sight of anything of that kind.

1198. Although you have no compulsory vaccinations and only have an order upon the subject relating to schools, have you any regulations in other circumstances, as where persons accept office for instance?—No.

1199. (*Mr. Bradlaugh.*) I forgot to ask you with respect to your classification of vaccinated and unvaccinated do you include in the unvaccinated those who have had small-pox?—No, we regard that as a protection.

1200. Where would you place a child who had been unsuccessfully vaccinated?—There is a class in which those who have been unsuccessfully vaccinated are included; they are taken in a separate table.

1201. How do you classify them. I do not know whether in your practice you have found a number who could not be vaccinated on account of poor health?—We count them as unvaccinated.

1202. (*Mr. Meadows White.*) You talk of your small-pox hospital being isolated; in what way is it isolated, is it far from the city?—Yes, it is fully half a mile from any dwelling and it is about five miles from the centre of population.

1203. Is it built like an ordinary hospital or has it any special appearance?—It was built for the purpose of a hospital.

1204. (*Chairman.*) Is the hospital for infectious diseases generally or only for small-pox?—For small-pox only.

1205. (*Sir Edwin Henry Galsworthy.*) What is the distance from the nearest dwelling?—About half a mile.

1206. Do you consider it possible that infection can travel from the hospital to the nearest dwelling?—It has never done so. The other hospital which was burnt down was where the Lincoln park is now. That was about the same distance from any dwelling. We never had any trouble. We always found that when we could take them to the hospital that would assist us in the first place in isolating, and that the death rate was not so great in the hospital as when they were treated in their houses.

1207. (*Chairman.*) You did not observe any increase of the disease in the streets along which the people passed to the hospital?—No, we never noticed anything of the kind, we took special precautions against it. I must confess that I was very much astonished when I saw the results of the Sheffield epidemic.

1208. (*Mr. Meadows White.*) There the hospital was in the middle of the town?—We never had any experience of that character.

1209. Having read that Sheffield Report, that was the reason I asked you the distance of your hospital from the town?—It is fully half a mile from any dwelling; there cannot be more than ten or a dozen houses within half a mile.

1210. How many patients does it accommodate?—100, but we never allow them to increase so far as that.

1211. (*Sir James Paget.*) What amount of personal traffic is there from the hospital to the town?—They go from the hospital every day to the Health Department in order to see whether there is any case to be taken up; but they communicate as much as possible by telephone. There is as little personal communication as possible with the hospital.

1212. Are the hospital attendants allowed free passage to go where they please?—They are not allowed; the Sisters of Charity are the attendants in the small-pox hospital.

1213. (*Mr. Meadows White.*) The friends of patients are not allowed to come there?—No.

1214. (*Chairman.*) If you have any statistics which would throw light upon or illustrate the answers which you have given to-day that you would like to forward to the Commission on your return to America, they would be glad to receive them?—I would be glad to do so, because this book was not prepared with a view to anything of this kind. There are certain data that will be more pertinent for you than those which I have here.

1215. (*Professor Foster.*) With regard to the indirect compulsory vaccination through the school regulations, is that common to all the States?—It is not; but it is the custom of some States.

1216. So that in all the States vaccination is about as common as it is in England?—I do not think it is quite so common.

1217. In any of the large cities are there any compulsory regulations apart from the school regulations?—Yes, in some of them.

1218. Do you know which?—I cannot exactly say. I can get the information. I have not charged my memory with anything of the kind. For some time I have not thought much about small-pox, except when my attention has been called to it. I have occupied myself in other sanitary matters.

1219. Did I understand you to say that there was no small-pox in Chicago before 1871?—For months before the fire the city was entirely exempt. For six months, I think we only had one case in the entire State.

1220. Immigration has very much increased since 1871, has it not?—It has.

1221. (*Mr. Bradlaugh.*) I think I understood you to say in answer to a question just put to you, that in the interior of Illinois, and also in other States where similar regulations prevail to your knowledge, the indirect enforcement of vaccination is very slight indeed?—Very slight indeed; there are portions of the State of Illinois where they have never seen nor had small-pox.

1222. (*Chairman.*) Supposing a child is refused admission to a school on account of not having been vaccinated, and the parent refuses to have the child vaccinated, what happens? Is it simply that the child is not admitted to the school?—It is not admitted to the school.

1223. There is no penalty on the parent for not sending the child, is there?—Yes, there is now; there is a compulsory education law, but it has not yet been enforced.

1224. So that now there is a compulsory education law, the parent must find some school to which to send the child, and if he does not send it to a public school he would have to send it to a school for which, I suppose, he would have to make payment?—Yes.

1225. (*Mr. Meadows White.*) It would not be recognised as an excuse for not sending the child to school that it had not been vaccinated?—That is so.

The witness withdrew.

Adjourned till Wednesday, the 9th October, at 1 o'clock.

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APPENDIX I.

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(Paper handed in by Sir John Simon, K.C.B., F.R.S., 26th June 1889.)

EXTRACTS from Papers prepared in 1857 by Sir John Simon (then Mr. Simon, Medical Officer of the General Board of Health), and at that time laid before Parliament, with reference to the History and Practice of Vaccination.

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I.—Small-pox before the Discovery of Vaccination.

You will not, I trust, think it irrelevant that I begin by referring to the history of small-pox. To the civilised classes of society it has now almost ceased to be a fatal disease; and among them, accordingly, there is a temptation to forget how their fathers and grandfathers regarded it.* Hence, in the middle of the 19th century, the very success of vaccination may have blinded people to its importance. It is so easy to be bold against an absent danger, to despise the antidote while one has no painful experience of the bane.

Dangers of natural small-pox

Yet, indeed, apart from historical records, our present daily experience of the nature of the disease might almost enable us to construct a description of the course which it has run. To know of it, that it is *fatal to a very large proportion of those whom it attacks;* that it is *eminently infectious from person to person;* and that it *seizes, with very few exceptions, on all who for the first time come within its range;* this, if one reflects on it, is almost to have read the story of the ravages.

Different circumstances under which it has prevailed.

The details at least may be conjectured. To remote or insular populations, having infrequent and difficult intercourse with the busier masses of mankind, such an infection would come seldom; but, having come, it would find, perhaps, the entire generation prone to receive it. There might have been no previous visitation within living memory. None of the population would have earned exemption by having suffered in a former epidemic. The disease, under such circumstances, must have ravaged more fiercely than the most ruthless of human wars: its effects on mankind must have been comparable to that utter obliteration of vegetable life which ensues when the army of locusts, descending on pastures and vineyards, and sweeping onward with fatal procession, converts into the likeness of a desert what just before was all freshness and fertility.

Among remote populations.

In every country, probably, its first invasion has been of this kind; and its recurrences, when far apart, have been of equal malignity. Thus it was that in 1518, following European adventure to the Western world, it concurred with fire and sword and famine and blood-hounds to complete the depopulation of St. Domingo;† thus, that soon afterwards, in Mexico, it even surpassed the cruelties of conquest, suddenly smiting down 3½ millions of population and leaving none to bury them;‡ thus that in Brazil, in the year 1563, it extirpated whole races of men; thus, that about the same period, in the single province of Quito (according to De la Condamine) it destroyed upwards of 100,000 Indians. And thus, too, it has been in later days that Siberia and Kamschatka§ have been ravaged; thus, that again and again, till very recent times, the same dreadful pestilence has depopulated Greenland and Iceland.* Before the terror of its presence, communities literally dissolved themselves;† and the well-known description of the plague at Athens does not convey more dreadful images of human suffering than may be gathered from the writings of those travellers‡

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* There were two words which Prince Kaunitz would not allow to be uttered in his presence: "Death" was one, "Small-pox" was the other.

† "Variolarum morbilli eis ignoti hactenus . . . qua tan-"quam morbosas pecudes contagioso halitu eos invaserunt." (Pet. Mart. Angler. de Orbe Novo. decad. iv. c. 10.). Not six and twenty years had passed since the island (then containing a million of Indians) had been discovered by Columbus, who received from the inhabitants an amount of kindness and hospitality which touched him to the heart, and whose language, in describing them, gives singular pathos to the thought of their then impending misery and extinction.—Comp. Helps's "Spanish Conquest in America," I. 124.

‡ "No habia quien los enterrasse" are words which Mr. Prescott quotes from Sahagun's History. Mr. P. also ("Conquest of Mexico," v. 6) describes this terrible epidemic as "sweeping over "the land like fire over the prairies, smiting down prince and "peasant . . . leaving its path strewn with the dead bodies of "the natives, who (in the strong language of a contemporary) "perished in heaps like cattle stricken with the murrain." Dr. Stricker (Oppenheim's Zeitschr. vol. xxxiv.) gives information about several later epidemics in Mexico. He states that in 1779 its ravages were dreadful; that it then occasioned in the capital alone nearly 9,000 deaths out of nearly 39,000 attacks; and that in 1797 again it caused in the city 4,451 deaths out of 24,516 attacks. With these records he contrasts what has happened since the introduction of vaccination; that in 1829-30, when small-pox was most severely epidemic, vaccination was almost always protective; and that in 1830-31 there died in New Leon 1,740 persons, without a single vaccinated person contracting the infection.

§ Pallas (Reisen, St. Petersb. 1770) makes mention more than once of the small-pox in Siberia; and in reference especially to the Ostjaks (vol. iii. p. 50) describes it as the chief obstacle to an increase of their population.

Captain Cook (Voyage to the Pacific Ocean, Lond. 1785, p. 365) speaks of the small-pox at its first appearance (1767) in Kamschatka as "marking its progress with ravages not less dreadful "than the plague, and seeming to threaten their entire extir-"pation."

* A subjoined official communication from Denmark (p. 109) gives interesting particulars of various visitations which have befallen Iceland and Greenland. As late as 1734 Greenland suffered its first epidemic of small-pox, when nearly two-thirds of the inhabitants were swept away. In Iceland the disease had been known from much earlier times; but in its eighteenth visitation (1707) it is said to have destroyed 18,000 persons out of a population of about 50,000. In Crantz's History of Greenland (London, 1767, i. 335-7) may be read terrible details of the epidemic just adverted to: "Empty depopulated houses and unburied "corpses, some within and some without the houses," are described: and "in one island they found only one girl with the small-pox "upon her, and her three little brothers; the father, having first "buried all the people in the place, had laid himself and his "smallest sick child in a grave raised with stone, and ordered the "girl to cover him." Sir George Mackenzie (Travels in Iceland Edin. 1811, p. 409) referring to small-pox in Iceland, says, "its "ravages have been such as to render this disease important even "in the political history of the island."

† It is said (Ring, Treatise on Cow-pox, p. 994) that after such a dispersion the capital of Tibet once remained for three years without inhabitants. The same author (p. 604) describes that about the end of last century a tribe of Esquimaux on the Labrador coast was put to flight by the outbreaking of small-pox, and did not venture to return for three years; when their country had "become a desert without a living soul in it, but they found "the skeletons of 500 persons who had fallen victims to that "horrible disease." Incidents of this kind may be found abundantly mentioned by travellers to whom I have referred, and Dr. Mead (Works, p. 311) describes the Hottentots on a particular occasion as drawing lines of defence against any communication with the sick, and shooting all who attempted to pass.

‡ Striking accounts of its ravages among the North American Indians, in very recent times, may be gathered from Catlin's "Letters and Notes on the Manners, Customs, and Condition "of the North American Indians," (Lond. 1841) as especially at vol. i. pp. 6, 80, 99, 213; vol. ii. pp. 24-5, 43-4, 161, 238, 255; and App. A. At the first-mentioned of these passages, Mr. Catlin observes, "Thirty millions of white men are now "scuffling for the goods and luxuries of life over the bones and "ashes of twelve millions of red men, six millions of whom have "fallen victims to the small-pox, and the remainder to the sword, "the bayonet, or whiskey." And in another place (ii. 255) he adds, "I would venture the assertion, from books that I have "searched and from other evidence, that of the numerous tribes "which have already disappeared, and of those that have been "traded with, quite to the Rocky Mountains, each one has had "this exotic disease in their turn, and in a few months have lost "one half or more of their numbers." Washington Irving's "Astoria" also makes mention of recent dreadful outbreaks, in which "almost entire tribes" have been destroyed. It may not be superfluous to quote from a third source some details which both confirm and illustrate the above. Mr. Lloyd, the translator of Prince Maximilian's Travels in the interior of North America, quotes in the preface to his work the following description of an epidemic of small-pox which befel the Indians 20 years ago, adding that the general correctness of the details had been confirmed to him by several travellers who had subsequently visited those nations: "The disease first broke out about the 15th of June 1837, "in the village of Mandans, a few miles below the American fort "Leavenworth, from which it spread in all directions with un-"exampled fury. The character of the disease was as appalling "as the rapidity of the propagation. Among the remotest tribes "of the Assiniboins from 50 to 100 died daily. The patient, when "first seized, complains of dreadful pains in the head and back, "and in a few hours he is dead; the body immediately turns "black, and swells to thrice its natural size. In vain were "hospitals fitted up in Fort Union, and the whole stock of "medicines exhausted. For many weeks together our workmen "did nothing but collect the dead bodies and bury them in large "pits; but since the ground is frozen we are obliged to throw "them into the river. The ravages of the disorder were the most "frightful among the Mandans where it first broke out. That "once powerful tribe which, by accumulated disasters, had "already been reduced to 1,500 souls, was exterminated, with the "exception of 30 persons. Their neighbours, the Big-bellied "Indians and the Ricorees, were out on a hunting excursion at "the time of the breaking out of the disorder, so that it did not "reach them till a month later; yet half the tribe was already "destroyed on the 1st of October and the disease continued to "spread. Very few of those who were attacked recovered their "health; but when they saw all their relations buried, and the "pestilence still raging with unabated fury among the remainder "of their countrymen, life became a burden to them, and they "put an end to their wretched existence, either with their knives "and muskets, or by precipitating themselves from the summit "of the rock near their settlement. The prairie all around is a "vast field of death, covered with unburied corpses, and spreading "for miles pestilence and infection. The Big-bellied Indians and "the Ricarees, lately amounting to 4,000 souls, were reduced to "less than the half. The Assiniboins, 9,000 in number, roaming "over a hunting territory to the north of the Missouri as far as "the trading posts of the Hudson's Bay Company, are, in the "literal sense of the expression, nearly exterminated. They, as "well as the Crows and Blackfeet, endeavoured to fly in all "directions, but the disease everywhere pursued them. At last

App. No. 1.

who, even to the latest times, have witnessed the power of natural small-pox, against remote unprotected populations.

In civilised countries.

While such was small-pox in the less travelled parts of the world, it seems certain that in civilised Europe, with its constant intercourse of towns and countries, the disease was at least as deadly. Its strength, indeed, was differently distributed. Not as in Greenland, twice or thrice in a century, but incessantly, that fatal sickle was in motion, and the harvest counted from day to day. Instead of coming after long absence on masses of population entirely unprotected against the infection, it recurred in each place so frequently that, for the most part, at any given moment, a more or less considerable majority of the inhabitants would have faced the danger before. They would have obtained against its attacks that protective exemption which was generally the good fortune of survivors. But it is a moderate computation, that for every five persons thus, at the price of much past suffering, almost secured against the disease, one at least must have died. The annual ravages of small-pox in Europe* alone, have been estimated at half a million of lives. M. De la Condamine† reckoned that in France a tenth of the deaths were by small-pox; Rosen's estimate of Sweden was to the same effect. For our English experience, there exists only imperfect records; but it seems that, within the London bills of mortality, small-pox, when not at its worst, averaged a fourteenth* of the annual total of deaths; a fourteenth, too, at times when that total, as compared with the population, represented, perhaps, double our present death-rate.

Illustrated in royal families.

For a popular notion of the disease, it may be enough to cite what it did in royal families.† In the circle of William the Third, for instance: his father and mother died of it, and, not least, his wife; and his uncle, the Duke of Gloucester; and his cousins, the eldest son and the youngest daughter of James the Second; and he himself (like his friend Bentinck) had suffered from it most severely, barely surviving, with a constitution damaged for life.‡ Or again, in the Court of Austria: "Joseph the First (says Vehse) was carried off, when "not more than 33 years of age, by the small-pox; to "which in the course of the eighteenth century, be-"sides him, two empresses, six archdukes and arch-"duchesses, an elector of Saxony, and the last elector "of Bavaria, fell victims." To this list might have been added, do doubt, many other names; among them, for instance, a dauphin (1711) and a king (1774) of France, a queen (1741) of Sweden, and an emperor (1727) of Russia.

It would be thought an awful epidemic now-a-days, that should strike like this in high places.

Mutilation and subsequent ill-health of many who were not killed.

Yet the ravages of small-pox are not half enumerated in the list of the myriads whom it killed. From the earliest to the latest medical records of the disease, there is constant mention of the tax which it levied upon survivors.§ Among those who outlive it (says De la Condamine) many either totally or partly lose their sight or hearing; many are left consumptive, weakly, sickly, or maimed; many are disfigured for life by horrid scars, and become shocking objects to those who approach them. Another learned writer of the same period, after describing these frequent sequels of the disease, says that its very nature is one *quæ nullâ furcâ sese expelli, patitur, sed usque recurrit.*‖ Sir Gilbert Blane¶ at a later period quoted a report of the Hospital for the Indigent Blind, to the effect that two-thirds of those who applied there for relief had lost their sight by small-pox.

Worst of all were these ill-effects in persons already of feeble, especially of scrofulous, constitutions. Nothing (says Dr. Gregory) develops that tendency more certainly than protracted small-pox.**

"every feeling of mutual compassion and tenderness seems to "have disappeared. Every one avoided the others. Women and "children wandered about the prairie seeking for a scanty sub-"sistence. The accounts of the situation of the Blackfeet are "awful. The inmates of above 1,000 of their tents are already "swept away. They are the bravest and most crafty of all the "Indians, dangerous and implacable to their enemies, but faithful "and kind to their friends. But very lately we apprehended that "a terrible war with them was at hand, and that they would unite "the whole of their remaining strength against the whites. "Every day brought accounts of new armaments, and of a loudly "expressed spirit of vengeance towards the whites, but the small-"pox cast them down, the brave as well as the feeble, and those who "were once seized by this infection never recovered. It is affirmed "that several bands of warriors who were on their march to attack "the fort, all perished by the way, so that not one survived to "convey the intelligence to their tribe. Thus, in the course of a "few weeks, their strength and their courage were broken, and "nothing was to be heard but the frightful wailings of death in "their camp. Every thought of war was dispelled, and the few "that are left are as humble as famished dogs. No language can "picture the scene of desolation which the country presents. In "whatever direction we go, we see nothing but melancholy "wrecks of human life. The tents are still standing on every "hill, but no rising smoke announces the presence of human "beings, and no sounds but the croaking of the raven and the "howling of the wolf interrupt the fearful silence. The above "accounts do not complete the terrible intelligence we receive. "There is scarcely a doubt that the pestilence will spread to the "tribes in and beyond the Rocky Mountains, as well as to the "Indians in the direction of Santa Fé and Mexico. It seems to "be irrevocably written in the book of fate, that the race of red "men shall be wholly extirpated in the land in which they ruled, "the undisputed masters, till the rapacity of the whites brought "to their shores the murderous firearms, the enervating ardent "spirits, and the all-destructive pestilence of the small-pox. "According to the most recent accounts, the number of Indians "who have been swept away by the small-pox, on the western "frontier of the United States amounts to more than 60,000."

* Dimsdale, who went to St. Petersburg to inoculate the Empress Catherine, talks (Tracts, St. Petersb., p. 119) loosely, and probably with exaggeration, of two millions as the annual mortality of the Russian Empire from small-pox; and he mentions that on one occasion, going in search of virus to a village where small-pox had been prevailing, he found that of 37 patients all but two had died. Clarke (Travels) speaks of the small-pox mortality of China as "incalculable." Maitland, the first English inoculator, says of natural small-pox in the Levant that in some years it is "a kind of plague that sweeps away at least a third "of those who are seized with it." And Holwell (Account of Manner of Inoculating for the Small-pox in the East Indies, London, 1767, p. 4) gave the following description of its ravages in Bengal: "Every seventh year, with scarcely any exception, the "small-pox rages epidemically in these provinces during the "months of March, April, and May, and sometimes until the an-"nual returning rains about the middle of June put a stop to its "fury. On these periodical returns (to four of which I have been "a witness) the disease proves universally of the most malignant "confluent kind, from which few, either of the natives or Euro-"peans, escaped that took the distemper in the natural way, com-"monly dying on the first, second, or third day of the eruption. ". . . . . The usual resource of the Europeans is to fly from "the settlements before the return of the small-pox season."

† Mémoire sur l'Inoculation de la Petite Vérole, 1754; or English edition (with additions from the author) by Dr. Maty, 1755. De la Condamine estimated that small-pox "destroys, maims, or "disfigures the fourth part of mankind." Williams (Elements of Medicine, i., p. 202) quotes the French Minister of the Interior as estimating (Report on Vacc., 1811) the former annual mortality by small-pox to have been 150,000 persons. Others (comp. Ring, op. cit. 700) state it at a very much smaller though still enormous amount.

* See Dr. Jurin's "Letter containing a Comparison between the "Mortality of the natural Small-pox and that given by Inocula-"tion," Lond. 1723. His estimate is formed on the bills of mortality of the 42 years, 1667–86 and 1701–22; the intermediate years 1687–1700 being left out, because in them measles and small-pox were not distinguished.

† Extensive fatality of any particular disease in single families can, of course, rarely be known, except where the house is of historical importance; but the same sort of thing must have been frequent in all classes of society. In one of Horace Walpole's letters (2nd April 1750) we read: "Lord Dalkeith is dead of the "small-pox in three days. It is so dreadfully fatal in his family, "that, besides several uncles and aunts, his eldest boy died of it "last year, and his only brother, who was ill but two days, putre-"fied so fast that his limbs fell off as they lifted the body into the "coffin."

‡ Burnet (Hist. William and Mary, p. 304) says of him: "He "was always asthmatical, and the dregs of the small-pox falling "on his lungs, he had a constant deep cough."

§ De la Condamine, op. cit. p. 57. "As sequelæ of small-pox, "Dr. Willan enumerates glandular swellings, ulcers (often gan-"grenous) about the thighs, scrotum, and knees, puffy tumours "of the soft parts, enlargement of the bones, stiffness of the joints, "ophthalmia, deafness, cough, dyspnœa, diarrhœa, anasarca, hydro-"thorax."—Williams, loc. cit.

‖ Tralles, de Insitione Variolarum, 1765, p. 159, who begins his account by saying: "Ab illo ævo quo innotuêre variolæ ad hunc "diem myriades exemplorum prostitere, tristium vestigiorumque "in corpore humano omnibusque ejus partibus illæ post se reli-"querunt."

¶ Medico-Chirurg. Transact., vol. x., p. 326. Dr. Gregory also writes, that a large proportion of the blind have been found to owe their misfortune to the secondary fever of small-pox.

** "Accordingly, in scrofulous constitutions we see secondary "fever complicated with strumous ophthalmia, characterised "by obstinate resistence to every kind of remedial "treatment. Irritable ulcers form under the lower eyelid, and "around the knee, ankle, and elbow joints, and are found very "difficult to heal. Glandular enlargements of the neck take place "which sometimes suppurate, but oftener continue indolent and "of stony hardness. Children frequently suffer from otitis." Gregory, op. cit. p. 741. "On parle de quelques individus scrofuleux "dont l'état s'est amélioré sensiblement à la suite de la variole; "mais nous avons rarement eu l'occasian de vérifer ce fait à "l'Hôpital des Enfans. Une circonstance qui nous a, au con-"traire, frappé, c'est que les affections scrofuleuses graves et la "phthisie pulmonaire reçoivent ordinairement de la variole une "impression défavourable: presque tojours alors leur marche est "accelerce, et leur terminaison funeste suit de pres."—Guersant et Blache, Dict. de Méd., art. *Variole*. See also to the same effect, Rayer, Maladies de la Peau, tome i., p. 522; and Lugol, sur les Causes des Maladies Scrofuleuses, p. 220. It deserves notice that Jenner, in his first publications, laid great stress on these, then notorious, after-effects of small-pox.

Habitual fears of the disease.

It is scarcely needful to say of the disease I have described that it was among all civilised nations a constant source of terror. Each time that the contagion was re-introduced to a place, all who had not been touched in previous visitations (including especially such children as had been born in the interval) might expect to become subjects of attack. Accident in individual cases might delay this dangerous moment, but for nearly all it was only delay.* Of persons not prematurely cut off by other diseases, in the long run very few escaped this infection.† Seventy years of age were no security; and for such as were disposed to triumph at the end of an epidemic which had spared them, there was often quoted the old saw, *Nemo ante obitum beatus*. Thus, at every rumour of the disease, men might tremble for the valuable lives of others‡ or for their own; and that horror of the living patient, which so loathsome an infliction occasioned, became, when death had ended his sufferings, a very panic towards his corpse.§

Commencement of 18th century.

Perhaps at no previous moment of English history had the horror of small-pox been greater or more fully justified than at the beginning of the last century.

Inoculation for small-pox.

And now for the first time there came to us a story that we could, so to speak, make terms with this loathsome and murderous enemy; that, by receiving it of our own accord, we could disarm it; that we could (as it was expressed) "buy the small-pox" cheap; that the susceptibility to contract its fatal infection could be exhausted by artificial means, giving indeed the disease, but giving it so mildly, that life was almost unendangered in the process.

This indeed was substantially the fact; and to the present time it remains one of the most interesting and least explained facts in pathology, that the specific contagion or ferment of small-pox, so uncontrollable in its operations, when it enters a man in the ordinary way of his breathing an infected atmosphere, becomes for the most part disarmed of its virulence, when it is artificially introduced to the system through a puncture of the skin; so that a person exposed to this artificial infection very generally contracts the disease in its mildest and most tractable form.‖

Introduction of the practice in England.

This practice, subsequently known in England as inoculation for the small-pox, seems to have been followed for ages in the East. Not only, it is said, had the Chinese since the sixth century been accustomed to procure, by special means of their own, an artificial infection of the disease; but the Brahmins from remote antiquity had practised the very operation which was now to be discussed in England. In Persia, Armenia, and Georgia, it is stated also to have been in vogue, and to have spread as a popular custom, not only about the shores of the Mediterranean, but even to those of the Baltic, to Scotland, and still less accountably to Wales. It was not thus, however, that the discovery first became notorious in England, but in the years 1714–16 communications on the subject were published in London by members of the medical profession who had witnessed in Constantinople and Smyrna the great success of the practice; and in 1717 Lady Mary Wortley Montagu's well-known letter (xxxi.) from Adrianople effectually awakened the public curiosity. Yet by her example, even more convincingly than by her pen, did Lady Mary introduce the knowledge of inoculation; for while still resident in Turkey she showed her faith in it by submitting her son to the operation; and four years afterwards, having meanwhile returned to London, she had the first demonstration of the Eastern practice made here, almost publicly, on her daughter. The result being most satisfactory, others were soon encouraged to repeat the experiment; and in 1722 (after a preliminary experiment on s ven condemned criminals) the critical course was taken of inoculating two children of the Royal family.

From this time the inoculation of small-pox possessed a recognised though not an uncontested place in medical practice.

Objections raised against its use.

Not uncontested, for innumerable absurd objections were raised, which much interfered with its general adoption. It was said to be wicked and irreligious, and to savour strongly of magic, to promote vice and immorality, and to be an inspiration of the devil.* It was said to instil a vicious humour without establishing an issue for its discharge; still worse, to be the means of introducing syphilitic and other infections into the body, and of exciting scrofula and consumption. Inoculating surgeons (it was urged) ought to be cut off, as poisoners, from the professional community.

Besides all this nonsense, there were objections, exaggerated but not unfounded, against a practice which sometimes occasioned death to the subject of the operation. It could not be denied that the worst possible forms of small-pox did sometimes, though rarely, ensue on this proceeding. Thus, in the first eight years there were inoculated in England only 845 persons, of whom 17 had died; and in Boston, United States, there had been an equal amount of failure among the earlier experiments. It might not unreasonably be urged that this was a large risk to incur in the pursuit of a somewhat uncertain good; for, said the objectors, there is no absolute security given by it against subsequent attacks of small-pox.† But as improvements were progressively made in the methods of managing inoculated persons, the dangers from the operation greatly diminished; and Mr. Moore probably over-estimates the deaths which would follow the operation under the most favourable circumstances when he says that "after "the last improvement in treatment had been established, probably not more than one in 200 were "lost."‡

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* Mr. Cross, in his account of the variolous epidemic in Norwich (p. 15), says: "In several instances I have met with severe small-"pox in adults who had at various times, both in Norwich and "in London, resisted the intimate and continued exposure to the "contagion of that disease, and who supposed, with some appear-"ance of reason, that they should for ever be free from it." And he subjoins the following anecdote, derived from one of the Suttons, who are mentioned in it: "A man who believed himself to have had "the small-pox lived for *twelve years* as nurse in the establish-"ment for the reception of inoculated patients which the Suttons "had near Norwich, continually waiting upon the patients who "were undergoing the disease; and at the end of that time he "caught the small-pox, of which he died."

† "All mankind, with few exceptions, are susceptible of the "variolous poison at some period of their lives . . . . A "few persons pass through a long life apparently insensible to or "insusceptible of the small-pox virus. It is a curious and im-"portant circumstance, that, so far as it yet known, such consti-"tutions exhibit a like inaptitude to receive and nourish the vaccine "disease."—Gregory, in Cyclop. Pract. Medicine, iii. 744.

‡ *E.g.*, "The small-pox raged this winter (1694–95) about Lon-"don, some thousands dying of them, which gave us great appre-"hensi on with regard to the Queen, *for she had never had them.* "In conclusion she was taken ill. . . . ." Burnet's Hist. William and Mary, p. 136.

§ Witness Saint Simon's account of the Grand Dauphin's death: "La Vallière fut le seul des courtisans qui, ne l'ayant point aban-"donné pendant sa vie, ne l'abandonna point après sa mort. Il "eut peine à trouver quelq'un pour aller chercher des Capucins "pour venir prier Dieu auprés du corps." Or Besenval's description how, on a different occasion, when Louis XV. had been huddled into his coffin, "quelques prêtres, dans la chapelle ar-"dente, furent les seules victimes condamnées à ne pas aban-"donner les restes d'un roi qui. . . . ." &c.

‖ Moore's Hist. of Small-pox, p. 218 et seq.; also communications by Tymoni and Pylarini in the Philosoph. Transactions, Nos. 339 and 347; also Kennedy's Essay on External Remedies, 1715; and Maitland's Account of Inoculating the Small-pox, 1722. In Kennedy's work, p. 157, mention is made of "some parts of the "Highlands of Scotland, where they infect their children by "rubbing them with a kindly pock, as they term it;" and the attractive estimate given of such inoculated small-pox is, that "it "need be no more minded than as in giving or taking the itch."

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* *See* Massey's Sermon against the dangerous and sinful Practice of Inoculation, Lond. 1722, where, *inter alia*, it is written: "Let the atheist and the scoffer, the heathen and the unbeliever ". . . . inoculate and be inoculated." This author regards natural small-pox as an useful check on "the increase of vice and immorality," and thinks men have good reason to be grateful for it as among "the wholesome severities ordained for offenders." Among the numerous objections subsequently raised against inoculation in France, especially by Monsieur Hecquet, it was urged that it came from Turkey, and had been well received in a Protestant country.

† It is remarkable that at the moment of introducing inoculation to England this objection was mentioned as one which had currency in the East. Kennedy (op. cit. p. 155) says: "The "greatest objection commonly proposed is, whether or not it "hinders the patient from being infected a second time." He adds, that in such cases of re-infection the second attack is "rarely "or never in the same manner, or the same fulness of malignity ". . . it generally proves to be that commonly called the "bastard or hog-pox, which is empty or skinny, and very little "matter or malignity contained in it."

‡ History of Small-pox, p. 302. De la Condamine says (p. 20) that "out of 6,398 persons inoculated in England, but 17 are sus-"pected to have died of the consequences of the operation, which "is only one in 376." Dr. Maty, the learned friend and translator of Condamine, remarks on this passage: "I can't help thinking "M. la Condamine's proportion full large, and I am inclined, "after a mature examination of all the facts that are come to my "knowledge, to reduce it to that of one in a hundred." Among 5,964 individuals inoculated at the Small-pox Hospital in the years 1797-99, there were only nine deaths (Watson, ii. 773). Gregory, loc. cit., p. 749, says: "The average number of deaths at the "Inoculation Hospital was only three in a thousand." The National Vaccine Board (*see* Reports 1825 and 1837) speaks decidedly of "one in 300" as the proportion of the inoculated that "will surely die" from the operation.

App. No. 1.

Its advantages.

The advantages of this alternative, as compared with that of encountering the risks of natural small-pox, were well set before the public by Dr. Jurin and Dr. Mead in England, by M. De la Condamine in France, and by others. The superstitions and prejudices respecting the practice were contended against by many able impartial persons. In 1746 an hospital was established for inoculating the poor, and for receiving them when affected with small-pox; and in 1754 the Royal College of Physicians of London pronounced its authoritative sanction of what was now no longer a speculative novelty.*

Its disadvantages.

Many difficulties remained. "Inoculation," says Mr. Moore, "had become a very serious affair; for the "preparatory treatment lasted commonly a month, "and medical attendance was requisite for five or six "weeks longer; and, though occasional disasters were "palliated, they could not be wholly concealed. Fa- "milies in moderate circumstance and timid mothers "were not therefore very easily induced to incur the "expense and risk of such a process. Consequently, "the practice of inoculation, though widely diffused, "was in a great measure confined to the opulent. ". . . . . It appeared from a calculation made by "Professor Monro in 1765, that between five and six "thousand persons had been inoculated in the whole "of Scotland in thirty-one years. . . . . and the "fatal cases amounted to one in seventy-eight. No- "thing, therefore, could be more vain than the ex- "pectations of those who imagined that such a system "could be universally adopted."

Yet, subsequently, as improvements were made, under which its adoption implied far less cost of time, convenience, money, and life; and as the public became aware of these improvements, great impulse was given to the progress of inoculation; and this progress, as regards the masses of society, was made at least more rapid, if not more sure, by the competition of quacks, who promised for it a hundredfold what it could perform.

Its tendency to diffuse the infection of small-pox, and to cause an increased mortality.

But now, at length, it was that people began to see, in its full force, the one real and almost insuperable objection to variolous inoculation. For the inoculated themselves it was indeed an immense gain. By passing through the artificial disorder, they apparently became as safe against any recurrence of the infection as if they had suffered from it in the natural way; and they attained this result at a fiftieth part of the risk which would have attended the natural disease. They had no reason to complain.

But, meanwhile, what was the state of the remaining millions of the population of England? A principal point of improvement in the treatment of the inoculated was, wherever their strength allowed, to send them abroad into the open air; and, as small-pox in its inoculated variety was not less infectious than in its natural form, the result may be imagined. Especially in the metropolis it could be observed; for here, under the influence of those doctrines which (so far as concerned the primary patients alone) made the chief improvements in treatment, inoculated persons were allowed to become incessant sources of general contagion. Even the Governors of the Small-pox Hospital (says Mr. Moore) broke through their original prudent regulations;† whoever applied at their gates were inoculated, and suffered to wander through the city of London covered with pustules and exhaling infectious vapour. The consequences of this system were, at the end of the century, admirably reviewed by Dr. Heberden in a section of his well-known work;‡ and as this book is one of simple medical research, written with no controversial object, it will be well to consider his estimate of the case.

Dr. Heberden's estimate of this evil.

"The inoculation of the small-pox having been first "used in England since the beginning of the eighteenth "century, and having been now for many years gene- "rally adopted by all the middle and higher orders "of society, it becomes an interesting inquiry to ob- "serve, from a review of the last hundred years, what "have been the effects of so great an innovation upon "the mortality occasioned by that disease. But how- "ever beneficial inoculation prove to individuals, or "indeed to the nation at large, the bills of mortality "incontestably show that in London more persons "have died of the small-pox since the introduction of "that practice. The poor, who have little care of pre- "serving their lives beyond the getting their daily "bread, make a very large part of mankind. Their "prejudices are strong, and not easily overcome by "reason. Hence, while the inoculation of the wealthy "keeps up a perpetual source of infection, many others, "who either cannot afford or do not choose to adopt "the same method, are continually exposed to the dis- "temper. And the danger is still increased by the "inconsiderate manner in which it has lately been the "custom to send into the open air persons in every "stage of the disease, without any regard to the safety "of their neighbours. It is by these means that, "while inoculation may justly be esteemed one of the "greatest improvements ever introduced into the medi- "cal art, it occasions many to fall a sacrifice to what "has obtained the distinction of the natural disease. "This must always be an objection against making "any great city the place for inoculation until the "practice is become universal amongst all ranks of "people. Out of every thousand deaths in the bills "of mortality, the number attributed to the small-pox "during the first 30 years of the eighteenth century, "before inoculation could yet have had any effect upon "them, amounted to 74. During an equal number of "years at the end of the century, they amounted to "95. So that, as far as we are enabled to judge from "hence, they would appear to have increased in a "proportion of above five to four."

This ob tion als insuper

Of the objections thus suggested to variolous inoculation (of the objections to it, at least, as a system for general adoption) I have ventured to say that they were almost insuperable. In theory, at first sight, it might seem otherwise. *If* all persons would but adopt that method, no one could suffer from another: the inoculated might then wander freely in fields and streets, or sit in theatres and omnibuses, finding no uninoculated whom they could poison. But that *if* covers unattainable contingencies.

Putting aside for the moment all question of the strong and stupid prejudices against inoculation which still operated on multitudes of people; putting aside, also, the immovable apathy and indifference of still larger numbers whom nothing will ever incite to precautions which look three days forward; putting aside, further, the reasonable fears entertained of an expedient under which two, or three, or four, or five, or ten in every 1,000 subjects were sure to die; and starting with an imaginary population neither prejudiced, nor apathetic, nor timorous, the inoculators themselves demurred against universal inoculation.* There were conditions of age and conditions of health, under which, even by them, it was thought unsafe to operate. Thus, even assuming an unanimous willingness of the world to adopt inoculation, there must inevitably remain against it this two-fold objection: (1) that it would destroy a certain, though small, proportion of those submitted to its performance; and (2) that to the very considerable number of persons, temporarily or permanently incligible for the operation, it would occasion a greatly increased danger of contracting the natural disease.

State c case o years

And in practice (as may be inferred from Dr. Heberden's remarks) this objection was more fatal than in theory. Inoculation, despite its advantages to individual life, was becoming a serious evil to society. An admirable, and till then unrivalled, invention, it could only be worked at an intolerable cost of life.†

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The historian of small-pox, looking back from this point of view on the labours which during 12 centuries had been made to mitigate its ravages, comes to a mournful conclusion on their value:—"The confession "that must be made is mortifying to a professional "man, for, according to such records as we possess, it "appears that, in spite of all medical exertion, the

* "Argumenta quæ contra hanc variolas inserendi consuetu- "dinem in principio afferebantur, experientiam repellisse . . . "camque humano generi valde salutarem esse se exis- "timare."—Taylor, Orat. Harv., 1855.

† The Small-pox Hospital (says Dr. Williams, p. 199) was much too small to effect its object, since it could only receive 15 persons at a time.

‡ On the Increase and Decrease of different Diseases, and particularly of the Plague. By Wm. Heberden, junr. 1801.

* See Dimsdale's Present Method of Inoculating for the Small-pox, 1779, pp. 9, 12, 13, 21; also De la Condamine, op. cit., pp. 17, 18, 45; also Mead, who implies the same sort of thing when he argues (op. cit. p. 344) that "the venom is communicated to a "young, healthy, and, for the age, strong body."

† From the commencement of inoculation this objection had been made to it on theoretical grounds, but had confused itself with the less reasonable arguments of that period. In France its validity had been recognised; and after a severe epidemic of small-pox which prevailed in Paris in 1763, and was ascribed to an increased infection from the practice of inoculation, this practice was prohibited in the capital, so that (says Mr. Moore) "those "who wished to be inoculated were under the necessity of retiring "to the country, where they might reap the advantage of this "operation, without destroying their neighbours." See also De la Condamine, op. cit.

" mortality of small-pox has progressively augmented. " It has been made evident, by calculations from the " bills of mortality of the city of London, renowned " for medical science, that at the beginning of the " eighteenth century about one-fourteenth of the in- " habitants died of the small-pox, and during the last " 30 years of that century when the practice in small- " pox was highly improved, the mortality of this disease " had augmented to one-tenth. . . . . But this " immense and increasing consumption of human lives " was not the sole evil produced by this distemper; " for a considerable portion of the survivors were pitted " and disfigured; some lost one of their eyes, a few " became totally blind, and others had their constitu- " tion impaired, and predisposed to a variety of com- " plaints, which were productive of future distress, " and sometimes death. These additional calamities " cannot be reduced to calculation; but as the mor- " tality from small-pox was continually on the in- " crease, these concomitant evils must have been so " likewise."*

Against the substantial justice of this painful criticism, so far as I am aware, no objection can be raised. Medicine baffled and helpless! For after times—for millions of our race—the continued raging of that pitiless plague! A drearier picture could scarcely have saddened mankind.

That this despair was not lasting is due to the genius of an English surgeon; and the close of the eighteenth century, which had much to darken it, will be remembered till the end of human history for the greatest physical good ever yet given by science to the world.

* Moore's History of Small-pox, p. 299.

II.—The Early History of Vaccination.

opular adition on e efficacy accidental cow-pox.

Among the dairy-folks of Gloucestershire there was a curious tradition, that a certain pustular eruption occasionally observed on the teats of cows, and supposed to be engendered in them by contagion from the grease of horses, might extend its infection to the human subject; and that persons who had suffered from this *cow-pox*, as it was called, were by it rendered insusceptible of small-pox.

ENNER.

Words to this effect were once spoken in the hearing of Edward Jenner, then a village doctor's apprentice in the neighbourhood of Bristol. They were never afterwards absent from his mind. Thirty years elapsed before their fruit was borne to the public; but incessantly he thought, and watched, and experimented on the subject; and the work in which at length he recorded the incomparable results of his labour may well have commanded the confidence of reflecting persons.

is first ublication.

Little would ever be heard of objections to vaccination if all who undertake the responsibility of its performance, and all who feel disposed to resist its adoption, would but thoroughly study that masterpiece of medical induction, and imitate the patience and caution and modesty with which Jenner laid the foundations of every statement he advanced.

he protective influence of ow-pox stablished;

In the first *Inquiry into the Causes and Effects of the Variolæ Vaccinæ* (1798) Jenner set on a scientific basis the popular belief to which I have referred. He cited in detail many instances of persons who, having at earlier periods of life accidentally contracted an infection from cows or horses, had afterwards shown themselves insusceptible of human small-pox;—instances where the protective contagion had reached the hands of milk-women, stable-boys, and the like; where, for 20, 30, even 50 years afterwards, its consequences had survived; where the system, even at these distances of time, remained absolutely proof against all attempts to infect it with small-pox, either by inoculation or by the breathing of an infected atmosphere. He further showed by experiment (Case 19) that persons desirous of acquiring this protective influence needed not to wait for some accidental infection; they could imitate the manœuvre of small-pox inoculation, and on any occasion when the cattle of the neighbourhood might be suffering, could let the vaccine infection be surgically transferred to themselves from the cow.

nd its inoculability rom the ow.

Necessity or it is demonstration.

If this had been the limit of Jenner's discovery he would, indeed, have made an interesting contribution to pathological science. For the popular belief which first excited his mind was by no means generally or firmly established, even in the counties where it originated. There were plenty of alleged instances, where cow-pox had failed to afford the imputed protection. The subject was obscured by many sources of fallacy; and nothing less than elaborate and skilful inquiry could have effected the important demonstration.

Partial anticipations of Jenner's practice.

Up to this limit, however, his merits—though very great and original—were not exclusive. No one else, indeed, had come to the subject with the insight of genius; no one else had surmised what immense human interests were involved in that gossip of cow-houses; no one else had seen through the fallacies which made it contradictory and incredible. Still the tradition which had so moved him was not special to his own neighbourhood. Common (as afterwards appeared) to sundry cow-keeping districts, it had floated past many other ears than Jenner's, and as early as 1769 had been paragraphed in a Göttingen newspaper. In parts of Holstein, too, the protective influence of cow-pox had been so thoroughly recognised that, on more than one occasion, its infection had been artificially conveyed to the human subject; and especially Plett, a village schoolmaster, near Kiel, had thus in 1791 inoculated from the cow three children who, three years afterwards, when small-pox prevailed severely in their family, were found to be proof against infection.*

Propagability of cow-pox from person to person.

But this was not the limit of Jenner's achievement. Happily for mankind, his thoughts had from the first stretched further forward in the subject; and it was his transcendent merit to show how that apparently local privilege of the Gloucestershire cowherds might be diffused for the blessing of nations.

For when (in March 1780) he first disclosed to an intimate friend the magnitude of what was in his mind, and communicated the theory he had formed on the protective influence of vaccine lymph, he "declared " his full and perfect confidence that it might be con- " tinued in perpetuity by inoculation from one human " being to another in the same way that the small-pox " was."

And now, in his first publication, he announced what, for practical purposes, may be regarded as the fulfilment of that prediction. In a succession of cases he had conducted the lymph to a fifth generation from its source; and the child vaccinated last in the series had been proved, by the test of variolous inoculation, to be no less safe against small-pox than another to whom had been given a first infection from the cow.

Setting aside for the present the question whether this transmission of the vaccine influence from person to person can really and practically be "continued in perpetuity," it may be sufficient to observe, that (1) its transmissibility through at least many successive human bodies, and (2) that large multiplication of lymph which, by the production of new vesicles, occurs at each stage of such transmission, were established fully and solely by Jenner's researches. These are the all-important conditions, under which alone the discovered virtues of cow-pox could be useful for public protection.

Sources of fallacy to be guarded against.

Jenner had now detailed 23 cases in which, by vaccination, accidental or experimental, the human system had been rendered, for periods ranging up to 53 years, insusceptible of small-pox inoculation. He had reasonably accounted to himself for the so-called exceptions in the great pathological law which his cases illustrate; exceptions only in appearance; but which had precluded that law from early and general recognition. He had learned that not every eruption on the cow is the specific cow-pox; and that—even from cow-pox—not all inoculation is protective. The disease might be mistaken, or the lymph be spoilt. He had cautioned persons who would repeat his experiments against these sources of fallacy, "lest the want of discrimina- " tion should occasion an idea of security which might " prove delusive."

Barring such sources of fallacy, he asserted "that the " cow-pox protects the human constitution from the " infection of small-pox;" and that, by an appropriate procedure—henceforth to be named VACCINATION—this protective influence may be indefinitely communicated and multiplied among mankind.

Vaccination.

* I borrow this statement from an interesting lecture by Prof. Hasse, entitled "*Die Menschenblattern und die Kuhpockeninpfung*," Leipzic, 1852. He refers to Chouland's *Life of Jenner* as his authority, a work which at this moment I am unable to consult. In Mr. Cline's note-book referred to below (next foot-note) I find an entry, apparently made in 1780, that "some inquiries " and experiments ought to be made relative to the cow-pox."

App. No. 1.

Its first performance in London.*

These conclusions were at once accepted, as proven or probable by persons of judgment and authority in the medical profession. Mr. Cline, then the great teacher of surgery at St. Thomas's Hospital, was, at Jenner's request, the first to verify them by experiment; and early in 1799 Dr. Woodville, of the Small-pox Hospital, with the co-operation of Mr. Pearson, commenced a great series of public vaccinations in London.

Universal corroboration of Jenner's statements.

In these early days of the discovery, almost every case of vaccination was made a test of the alleged protection. Dr. Jenner, writing in 1801, says, "upwards "of 6,000 persons have now been inoculated with the "virus of cow-pox, and the far greater part of them "have since been inoculated with that of small-pox, "and exposed to its infection in every rational way "that could be devised, without effect;" and Dr. Woodville (giving public evidence in 1802) said that within two years (1799–1801) there were vaccinated at the Small-pox Hospital 7,500 persons, of whom about one half were subsequently inoculated with small-pox matter, and in none of them did small-pox produce any effect. Other observers, too, had contributed numerous instances of persons who, having accidentally contracted infection from the cow, were found, many years afterwards, capable of resisting all attempts to infect them by inoculation of small-pox.

Conclusiveness of these facts;

These facts told their own story, and they tell it still. They were in themselves sufficient argument; for Jenner's simple truthful style carried conviction. No one candidly studying them (in the first publication and in its supplements of the next two years) could, even at that time, reasonably doubt that, *subject to certain qualifications*, there was now given to society an almost absolute power to control the ravages of small-pox.

under certain qualifications.

Subject, I say, to certain qualifications; for it was not yet proved or tested that infants vaccinated by Jenner's process would permanently enjoy the same complete protection which he had shown to exist in persons who at riper age had contracted accidental cow-pox by their own manipulation of infected cattle; neither was it beyond question whether perhaps the vaccine influence might become progressively though slowly enfeebled by an indefinite length of human transmission. Time, and long time alone, would decide whether these would be over-fastidious doubts; but if, indeed, Jenner did undervalue their remote interest (almost invisible clouds, as they were, in the distance) it may, at least, be said that envy and malice have found no other weakness in his case.

Scientific meaning of cow-pox

It was not till 40 years afterwards that science supplied an authentic interpretation of Jenner's wonderful discovery. He, indeed, had suspected the solution, and had hinted his meaning when he called cow-pox by the name of variolæ vaccinæ:—for such, in fact, it is—*the small-pox of the cow*. It had been an old medical observation that cattle often suffered in the same epidemic with men; certain of their diseases had already (especially by Dr. Layard, in the Philosophical Transactions for 1780) been compared to the human small-pox; and Jenner (says his biographer) "always "considered small-pox and cow-pox as modifications "of the same distemper, so that in employing vaccine "lymph we only make use of means to impregnate "the constitution with the disease in its mildest, "instead of propagating it in its virulent and contagious form, as is done when small-pox is inoculated."†

Recent researches;

Researches subsequent to Jenner's, and extending to within the last 20 years, have settled this part of the question.‡ It has been made matter of almost familiar experiment that the infection of small-pox may, by inoculation, be communicated from man to the cow; that its result is an eruption of vesicles presenting the physical characters of cow-pox; that the lymph from these vesicles, if implanted in the skin of the human subject, produces the ordinary local phenomena of vaccination; that the person so vaccinated diffuses no atmospheric infection; that the lymph generated by him may be transferred, with reproductive powers, to other unprotected persons; and that, on the conclusion of this artificial disorder, neither renewed vaccination, nor inoculation with small-pox, nor the closest contract and cohabitation with small-pox patients, will occasion him to betray any remnant of susceptibility to infection.

their results,

The merit of first putting on record these important facts does not belong to England. As early as 1801, Dr. Gassner of Günzburg—after 10 unsuccessful trials of small-pox inoculation on cows—had at last succeeded in infecting one; and, with matter taken from the resulting vesicles of this animal had inoculated four children, who thereupon had developed the ordinary phenomena of vaccination, furnishing vesicles from the lymph of which 17 other children had been similarly infected. Dr. Gassner's discovery remained for 40 years almost entirely unknown or unbelieved; but at length Dr. Thiele, of Kasan, repeated the experiment with equal success, and rendered it still more complete by supplying a necessary test of the nature of the process. He showed, namely, that the lymph engendered in these experiments possessed, not only the local infectiousness, but likewise the protective powers of cow-pox; that persons recently inoculated with it might with impunity be let sleep in one bed with small-pox patients, or be inoculated with small-pox virus; that, in short, it was true, protective vaccination which they had undergone. The result of these investigations was not published before the beginning of 1839;* at which time other experiments of the same kind, independent and equally conclusive, were being conducted in this country by Mr. Ceely, of Aylesbury; of whom I am glad to repeat the praise expressed by a high authority, that he "has done more to advance the natural "history of vaccination than any other individual

and autho

* Both in Rose's Biographical Dictionary (art. Jenner) and in Gregory's Lectures on the Eruptive Fevers (p. 187), I read that the first verification of Jenner's discovery was made *in St. Thomas's Hospital*. Neither in Mr. Cline's private case-book, in which that first vaccination is described, nor in Jenner's notice of the experiment (op. cit. p. 128), can I find any mention of the *place* where it was performed; and the name of the patient (Richard Weller) is not to be found in the hospital books of the period.

† Much interesting historical information on these points is compiled by Dr. Baron in his fifth chapter, vol. i., p. 162.

‡ *See* Heim (who gives an account of Gassner's inquiry and of the local circumstances which nearly deprived him of credit in the matter) in Henke's Zeitschr., Ergänzungsheft xxx. p. 57; Thiele, loc. infra cit.; Ceely, in Transactions of the Provincial Medical and Surgical Association, vol. viii.; Badcock, Detail of Experiments proving the Identity of Cow-pox and Small-pox; Brighton, 1845; also Boston (U.S.) Daily Advertiser, 14th April 1852, where it is stated that Dr. Adams, of Waltham, and Dr. Putnam, of Boston, by a successful repetition of Mr. Ceely's experiments, have been able to "furnish the city and neighbourhood with all the vaccine "matter used there since that period;" further, with respect to a different and probably less successful method of variolating the cow, Sunderland, in Hufeland's Journal, 1830. In the above-quoted volume of the Trans. Provinc. Med.-Surg. Ass. (p. 24) Dr. McMichael is referred to as having in 1828 informed the College of Physicians that in Egypt, on occasion of a failure in the ordinary supply of vaccine lymph, the variolous inoculation of cows was successfully practised, and "fine active vaccine virus produced."

* Dr. Thiele's paper is published in the first part, for 1839, of Henke's Zeitschrift für die Staatsarzneikunde, with an editorial note, dated December 1838. At that time the vaccine contagion, which he had originated by small-pox inoculation of the cow, had passed through 75 successive human descents, and had been used for vaccinating more than 3,000 persons. I transcribe the paragraph in which Dr. Thiele states his conclusions; and I add to it a further remarkable passage in which he describes what he believed to be effectual means—independent of the cow—for artificially reducing small-pox virus to a state in which its inoculation would produce on the human subject only the ordinary effects of vaccination:—

"1. Die Sogennante Vaccine ist nicht eine den Kühen eigenthümliche, sondern durch Uebertragung der Menschenpocken bei ihnen hervorgebrachte Krankheit; und der Mensch und nicht die Kuh, wie man bisher geglaubt, ist die Quelle der Vaccine.

"2. Diese so gebildete Krankheit kann durch unmittelbare Uebertragung von Kühen auf Menschen übergehen, bringt in ihnen eine identische leichte, vor den natürlichen Blattern schützende, Krankheit hervor.

"3. Durch ein absichtliches methodisches Modificiren und Depotenziren, kann man auch ohne Daswischenkunft der Kuh, Schutzblattern hervorbringen.

"4. Diese Schutzblatter hat alle bekannte Eigenschaften der Vaccine, nur im einem zum Wohle der Menschheit höheren Grade.

"5. Die vorstehenden, bis jetzt erlangten Resultate berechtigen zu der Hoffnung, dass man zur Milderung der epidemisch-contagiösen Krankheiten ein den Schutzblattern ähnliches Mittel wird finden können.

". . . . . Die Reduction der Menschenpocke zur Vaccine anlangend, so muss die Lymphe aus Menschenpocken erst 10 Tage zwischen mit Wachs verklebten Gläsern liegen, und dann mit warmer Kuhmilch verdünnt, gleich der gewöhnlichen Vaccine geimpft werden; diese Impfung bildet an den geimpften Stellen grosse Pocken, das die gewöhnliche Impfung begleitende einmalige Fieber zeigt sich zweimal, zum erstenmale gegen den 8ten bis 4ten, das zweitemal, und zwar heftiger, zwischen dem 11ten und 14ten Tage, die peripherische Röthe ist stärker, und nicht blos an der geimpften Stelle, sondern auch neben derselben entstehen zuweilen, jedoch immer nur ganz kleine Pocken; die Narbe ist grösser und tiefer wie gewöhnlich, die Ränder derselben zuweilen scharf. Zehn Generationen hindurch muss diess Verfahren beobachtet werden, wodurch die Pocke nach und nach ganz der Vaccine gleichkömmt; wenn das consecutive Fieber ausleibt, dann kann man Impfungen von Arm zu Arm ohne Verdünnung der Lymphe mit Kuhmilch vernehmen."

"since the days of Jenner." Soon afterwards, and also by independent experiments, Mr. Badcock, a long-established druggist at Brighton, arrived at the same conclusion as to the origin of cow-pox; and from 1840 to the present time he has constantly been applying his knowledge to its important practical purpose; having within this period again and again derived fresh stocks of vaccine lymph from cows artificially infected by him; having vaccinated with such lymph more than 14,000 persons; and having furnished supplies of it to more than 400 medical practitioners.

heoretical terest of ese obser- tions.

These researches are mentioned out of their chronological order, because they set in so very clear a light the meaning of Jenner's practice. A host of theoretical objections to vaccination might have been met, or indeed anticipated, if it could have been affirmed 60 years ago as it can be affirmed now:—"This new pro-"cess of preventing small-pox is really only carrying "people through small-pox in a modified form. The "vaccinated are safe against small-pox, because they "in fact have had it. Their safety is of the same sort "as if they had been inoculated under the old process, "or had been infected by the natural disease. The "trifling disorder which they suffer—these few tender "vesicles on the arm, this slight feverishness that they "show—is small-pox of the most mitigated kind; "small-pox so modified by the intermediate animal "organisation through which it has passed, that, when "thus re-introduced to the human body, it excites but "insignificant disturbance, and no general exhalation "of infective material."

e subject vaccina- n first ought fore Par- ment.

Returning now to the early history of vaccination, we find that early in 1802 the subject was formally brought under cognisance of the Legislature. By this date Dr. Jenner's "correspondence had become so "extensive as to occupy almost all his time, and to "make him a most laborious servant of the public for "their great and exclusive benefit, whilst there was "nothing of advantage left to himself but the con-"sciousness that he was so employed; and, under "these circumstances, it was thought that the magni-"tude of his discovery and the very disinterested "manner in which he was sacrificing his time and his "property in diffusing its blessings, were fit subjects "for the consideration of the British Parliament."* On presentation of a petition to this effect, Mr. Addington, then Prime Minister, informed the House of Commons that he had taken the King's pleasure thereon, who strongly recommended it to the consideration of Parliament.

st Parlia- ntary mmittee.

The Committee to which the petition was referred, "after examining a number of witnesses of the highest "character and most extensive experience in the pro-"fession," reported in full corroboration of all that Jenner had alleged.

Subjoined to this letter is the evidence (p. 94, A.) which Jenner gave before that Committee, and likewise (p. 94, B.) the Committee's report.†

Reports.

Admiral Berkeley, the chairman of the Committee, in the speech with which he introduced the report, made a statement which greatly added to its significance. "In the investigation of a matter so important "to mankind in general, it was not thought right by "the committee to confine their examination to the "petitioner's evidence alone, as is usually the case, "but to sift out any case which could make against it. "This conduct, which certainly may appear to bear "hard on the petitioner, has proved a matter of fresh "triumph to him: for although we descended to sift "out information from every anonymous letter—though "we raked the very kennels for information against "this practice—all that we were enabled to get is "pointed out at full length in the report; and such "were the explanations on those very cases, such were "the testimonies against that evidence, that if Dr. "Jenner's discovery could receive additional lustre "from this sort of inquiry, it certainly has done so. "Upon the beneficial effects of this discovery, I hardly "wish to trouble the committee (of supply) as I am "certain, if the report which contains the scientific "opinion of the first medical men in this country, does "not satisfy the House, the united opinion of all the "world, the homage of Europe which has been paid "to the discoverer of this blessing, will have its due "weight on the minds of his countrymen."

* Baron's Life of Jenner, p. 480.

† The Evidence at large, as laid before the House of Commons, respecting Dr. Jenner's Discovery of Vaccine Inoculation, together with the Debate which followed, and some Observations on the contravening Evidence, &c.; by the Rev. G. C. Jenner, 1805.

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First Jennerian Institution.

The verdict was not without its effect. At the close of this year steps were taken with unprecedented strength of public support, to found, by voluntary contributions, a society "for the extermination of small-pox"; and on the 3rd of February 1803 the great discoverer took his seat for the first time as President of the Royal Jennerian Institution. This society, "fostered by the most exalted patronage, and adorned "by all the learning and talent of the medical pro-"fession of the metropolis," took a very important part in diffusing the first advantages of vaccination. "Thirteen stations were opened in different parts of "the metropolis. In 18 months they were enabled to "announce that 12,288 inoculations had taken place, "and during the same space of time 19,352 charges of "vaccine virus were supplied from the central house "to most parts of the British Empire and to foreign "countries. . . . This society was also in corre-"spondence with other institutions, and its medical "council investigated with care and fidelity such cases "of small-pox as were alleged to have occurred after "vaccination."

Early prejudices against vaccination; compared with former prejudices against inoculation of small-pox.

It would have been claiming too much from reason, to expect that this progress could be made without opposition. Eighty years earlier the use of variolous inoculation, a thing of immemorial practice in Eastern countries, could not be imported here by those who had witnessed its operation on thousands, without its introduction exciting theoretical (as well as rightly founded practical) objections. How much less, then, could Jenner find an easy reception for his method! It appealed to no national experience. It based itself only on some rustic traditions, and on his few thoughtful observations.

Prognostics.

Great allowance must, indeed, be made for those who then hesitated to accept this wonderful novelty. The very magnitude of the promised boon almost justified mistrust. And, to persons ignorant of the Gloucestershire experience, that good should accrue from such a source was a strange supposition. Fears were more suggested than hopes.* What could be expected from "a bestial humour" but new and dreadful diseases? Who could see the limit of its "consequences," physical or moral? What security was there against "horns" growing on the vaccinated? What "ideas "might arise in the course of time from a brutal fever "having excited its incongruous impressions" on the brain? Who knew but that "the human character "might undergo strange mutations from quadrupedan "sympathy, and some modern Pasiphäe rival the fables "of old?"

and den nciations.

While these physiological conjectures were gravely pressed upon the public, religion and morality were not less misargued to the same effect.† Leviticus was quoted, with dark insinuations against "contamina-"ting the form of the Creator with the brute creation.' Small-pox being a "merciful provision on the part of "Providence to lessen the burden of a poor man's "family," was it not "impious and profane to wrest "out of the hands of the Almighty these divine dis-"pensations?" What could ensue, on so daring a measure of attempted prevention, but some unimagined punishment?

Reply to these various scruples (where they were sincere) was no difficult matter. Those who feared mysterious bodily changes were answered from the collection of observed facts and experiments; were assured that, in Berkeley, neither horns had grown nor Minotaurs been begotten. To the others, superstitious mistrusters of good, it seemed enough to say that, in this beneficent economy of the world, antidotes are ever scattered side by side with poisons; that not exclusively the latter are of divine gift; that man's duty concurs with his instinct and privilege, to struggle against physical as against moral evil.

* See especially "Treatise on Lues Bovilla, or Cow-pox," (3 editions); "Commentaries on Lues Bovilla, or Cow-pox," (3 editions); and "Cow-pox Epistle to Rowland Hill," (7 editions), all by B. Moseley, M.D., Member of the Royal College of Physicians of London, and of the University of Leyden; likewise other works mentioned below.

† "Cow-pox Inoculation no Security against the Small-pox Infection," by W. Rowley, M.D., Member of the University of Oxford, and of the Roy. Coll. Physicians; "Serious reasons for "uniformly objecting to the Practice of Vaccination," by John Birch, Surgeon to St. Thomas's Hospital. Over Mr. Birch's remains, within one of the city churches (Rood Lane), a monument erected by his sister commemorates, that "the Practice of Cow-"poxing, which first became general in his day, Undaunted by "the overwhelming influence of power and prejudice, And the "voice of Nations, He uniformly and until Death (1815) perse-"veringly opposed."

App. No. 1. and inventions.

Up to a certain point the weaker side in a controversy is apt to grow noisier with defeat. In proportion as Jenner's merit became recognised by Parliament and the public, those who had committed themselves to opposition became more and more vehement against his matchless discovery. All that had been predicted was now, they said, in fulfilment. The nation, unconsciously, was dying of vaccination. Terrible portents were described.* A child at Peckham had its former natural disposition absolutely changed to the brutal, so that it ran upon all fours like a beast, bellowing like a cow, and butting with its head like a bull! Sarah Burley's face was distorted, and began to resemble that of an ox. Master Joules, similarly degenerating, became the ox-faced boy, a proverb and a frontispiece! A lady's daughter coughed like a cow, and had grown hairy all over her body! William Ince, too, had grown patches of hair not resembling his own, but of the same colour, length, and quality as that of a cow! Many had suffered like him! Some also squinted as only oxen can squint! Others had lost their nails and the ends of their fingers! Eruptions, ulcers, mange, abscesses, scabs and blotches, glandular tumours and diseased joints and decaying bones, fevers and blindness, and gangrene and convulsions, were multiplying among the victims of Jenner! Deaths, of course, were plentiful. And on what but vaccination could they depend? It was the old story again:—

Post ignem æthereâ domo
Subductum, macies et nova febrium
Terris incubuit cohors;
Semotique prius tarda necessitas,
Lethi corripuit gradum.

Facts.

Such was the experience of the opposition. Divested of its more ludicrous imaginations, and some allowance being made for an occasional unskilfulness of those who pretended to vaccinate, all resolves itself into the one not uncommon error of confounding what is fact with what is opinion or inference. A child coughed: to the ears of the vaccinophobist, the sound was as of a cow; to his intellect, it was the effect of vaccination. A child was ugly or squinting, or it had those skin eruptions which have always been frequent incidents of infancy: at once, to the alarmist, there was *vultus taurinus* or *tinea bovilla*. In a word, the oldest and most familiar diseases were thus re-named, in conformity with a belief that vaccination was causing them; while, in reality, there was no more reason in this belief than if vaccination had been charged with occasioning infants to cut their teeth, or with leading boys to prefer cricket to Cornelius Nepos.

Last appeals.

As the chances of the opposition became less hopeful, so did their language grow worse and their arguments more wild.† Placards and caricatures were resorted to. Tender points were aimed at. Were persons about to marry, might not vaccination injure their fortune in life? Might there not be a disclosure of shocking facts? And was nothing due to patriotism? Evil and Buonaparte (1807) and vaccination are allowed to triumph for a time, perhaps as the scourge and punishment of our sins; but shall we submit because they have for a while been prosperous? No! Britons never, never, &c.!

Present interest this obs literatu

You will find it difficult to believe that the very oldest of this nonsense, which I have transcribed, was written in England within 60 years of the present time. By us, for half a century, it has been forgotten, or only recalled as an echo by occasional last words from the continent, where, far off, there is seen sometimes a feeble wave still rippling from that old flood of ours. It is wearisome work to read stuff so stupid or so dishonest. But I have ventured to trouble you with it, as with some other parts of this narrative, in order that it may plainly be seen how little of suddenness or surprise there was in the first social successes of vaccination; how everything possible and impossible was affirmed against it; how all weaknesses and prejudices were appealed to; how every inch of progress was contested; and how little it can be said that Jenner stole a march on the public mind. Further (because there is nothing new under the sun, and the wheel of time brings back the follies of the past oftener than its wisdom), it may become necessary, in case these doctrines should emerge again from obscurity, to refer to their right authors the praises of original invention, and to remember that 50 years ago such objections were examined, and refuted and condemned.

Public doubts.

For, when those outcries were raised, the public naturally hesitated, and asked for explanation. Moseley and Squirrell and Rowley and Birch and Lipscombe, and even Stuart were, no less than Jenner, members of the medical profession. To the uninitiated it was doctor against doctor.

Under these circumstances two inquiries were successively instituted.

Report of Roy Jenner Institu

First, in 1805, "the Medical Council of the (then) "Royal Jennerian Institution having been informed "that various cases had occurred which excited pre-"judices against vaccine inoculation, and tended to "check the progress of that important discovery in "the kingdom, appointed a committee of 25 of their "members to inquire into the nature and truth of such "cases." The report, in which the council recorded the result of this inquiry, contains much which is as applicable to the present occasion as to the circumstances of that time. I therefore subjoin it (p. 96, C.) for your consideration, begging merely to observe, that among the members of this council and committee were not only surgeons and physicians of the largest practice and highest character in London, but especially some whom the profession of that day would have selected as the most competent persons in England to pronounce on the questions at issue. You will observe that minute inquiry was made, not only into allegations then current against the protective powers of vaccination, but also into "opinions and assertions "which charged the cow-pox with rendering patients "liable to particular diseases"; and that the council, after having detailed the results of this inquiry, "can-"not conclude their report upon a subject so highly "important and interesting to all classes of the com-"munity, without making this *solemn declaration*:—

"*That in their opinion, founded on their own individual experience, and the information which they have "been able to collect from others mankind have already "derived great and incalculable benefit from the dis-"covery of vaccination; and it is their full belief, that "the sanguine expectations of advantage, and security, "which have been formed from the inoculation of the "cow-pox will be ultimately and completely fulfilled.*"

Discus in Par ment.

The second inquiry was even more critical. The then Chancellor of the Exchequer (now Lord Lansdowne) asked the attention of the House of Commons (2nd July 1806) "to a subject of general importance . . . "totally unconnected, indeed, with all party princi-"ples . . . but concerning the welfare, health, "and existence of a large portion of His Majesty's "subjects, and therefore well deserving of the con-"sideration and support of Parliament; . . . that "very remarkable discovery . . . a substitute for "the loathsome small-pox, an evil which has spread a "dreadful desolation throughout the whole world. He "stated to the House facts, derived from the experience "of vaccination in (alas!) other countries than England,

* "Dissertation on the Failure and Mischief of Cow-pox," and "Cow-pox exploded," both by G. Lipscomb, Surgeon; "Observa-"tions on the Pernicious Consequences of Cow-pox Inoculation," (3 editions), by R. Squirrell, M.D. The last-named author certainly did his utmost to produce the results which he predicted. Not content with being struck "with such horror and diversion "that he could not as a man of honour or feeling submit to or "coincide with vaccination," he recommended those who had already undergone the operation immediately to submit themselves to a course of treatment to "eradicate every particle of the cow-pox virus out of the blood." His treatment was mercury. The consequences may be imagined. See also (contra) "Letters to Dr. Rowley on his late Pamphlet" (with a frontispiece), by Aculeus; "The Vaccine Contest," by William Blair; and "Treatise on Cow-pox," by John Ring.

† Rowley, op. cit.; also F. Smyth Stuart's "Letter on the Subject of Coercive Vaccination," and "30,000*l.* for the Cow-pox." To this author's fancy, vaccination was "a mighty and horrible "monster with the horns of a bull, the hind hoofs of a horse, the "jaws of the kraken, the teeth and claws of a tyger, the tail of a "cow, all the evils of Pandora's box in his belly; plague, pesti-"lence, leprosy, purple blotches, fœtid ulcers, and filthy running "sores covering his body, and an atmosphere of accumulated "disease, pain and death around him, which had made his appear-"ance in the world and was devouring mankind—especially poor "helpless infants, not by scores only or hundreds or thousands, "but by hundreds of thousands." The author assists his description by an engraved caricature:—Dr. Jenner and other ministers of vaccination (distinguished from ordinary practitioners of medicine by the addition of cowtails and horns) are discharging large hampers of children into the mouth of the monster; while another (apparently Dr. Thornton) officiates behind with a spade, and shovels into a nightman's cart the undigested remains of this diet. From the distance are advancing to the rescue Drs. Moseley, Squirrel, and Rowley, with Messrs. Birch and Lipscombe, "the men, the heroes," to whom also an obelisk is erected in the right background. Perhaps it may have been in this unattractive guise that vaccination was first introduced to Philadelphia, where (see Baron's Life of Jenner, vol. i., p. 442) "the leading physician pro-"nounces it too beastly and indelicate for polished society."

" illustrative of those advantages to society which we " were neglecting to realise. He expressed a profound " regret, that in this country alone, in which the dis- " covery had originated, the salutary practice of vaccine " inoculation had been undergoing a retrograde move- " ment. He referred to the objections and to the " manner in which they had been promulgated; to " prejudices which had been excited, and to their fatal " effect in bringing back nearly that average degree of " depopulation which had been experienced previous " to the introduction of the vaccine discovery. He " had not the smallest inclination to propose any com- " pulsory measures, . . . but felt it a duty incum- " bent on him . . . to submit a plan by which the " House should become possessed of a mass of evidence " as to the real merits of this discovery; . . . a " procedure which would tend to enlighten the public, " by informing them in a formal and regular manner " of what appeared to be the truth, . . . and would " give this valuable discovery the advantage of having " all the weight of promulgation which the high " character and popularity of Parliament is capable of. " He concluded by moving that an humble address be " presented to His Majesty, praying that he will be " graciously pleased to direct his Royal College of " Physicians to inquire into the state of the vaccine " inoculation in the United Kingdom, and to report " their opinion as to the progress which it has made, " and the causes which have retarded its general " adoption." Mr. Wilberforce (from the other side of the House) and Mr. Windham (then Secretary of State), with others, spoke at length and with great earnestness, in the same general sense as Lord Henry Petty; so the motion passed *nem. con.*

Report of Royal College of Physicians.

Nine months passed before the College of Physicians (April 1807) made its report:—" *Deeply impressed with* " *the importance of an inquiry which equally involves* " *the lives of individuals and the public prosperity,* " *they had made every exertion to investigate the subject* " *fully and impartially. In aid of the knowledge and* " *experience of the members of their own body, they had* " *applied separately to each of the Licentiates of the* " *College; they had corresponded with the College of* " *Physicians of Dublin and Edinburgh; with the* " *College of Surgeons of London, Edinburgh, and Dub-* " *lin; they had called upon the societies established for* " *vaccination for an account of their practice, to what* " *extent it had been carried on, and what had been the* " *result of their experience; and they had, by public* " *notice, invited individuals to contribute whatever* " *information they had severally collected.*"

An inquiry of this nature and extent, conducted under a sufficient sense of responsibility by the first medical corporation of the kingdom, could not fail to deserve public confidence. Nearly every passage in the report applies to the present juncture, as well as to the purpose for which it was written; and I subjoin the whole of it (p. 97, D.) as recording by far the most important investigation to which Jenner's discovery has been submitted in the country of its birth. Having already quoted the words with which the report opens, I will here also repeat the remarkable paragraphs which close it:—

" *The College of Physicians feel it their duty strongly* " *to recommend the practice of vaccination. They have* " *been led to this conclusion by no preconceived opinion,* " *but by the most unbiassed judgment, formed from an* " *irresistible weight of evidence which has been laid* " *before them. For, when the number, the respecta-* " *bility, the disinterestedness, and the extensive expe-* " *rience of its advocates is compared with the feeble and* " *imperfect testimonies of its few opposers; and when it* " *is considered that many, who were once adverse to* " *vaccination, have been convinced by further trials, and* " *are now to be ranked among its warmest supporters,* " *the truth seems to be established as firmly as the nature* " *of such a question admits; so that the College of* " *Physicians conceive that the public may reasonably* " *look forward with some degree of hope to the time* " *when all opposition shall cease, and the general con-* " *currence of mankind shall at length be able to put an* " *end to the ravages at least, if not to the existence, of* " *the small-pox*"

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With this report terminates, for all practical purposes, the early history of vaccination in England. The result was of course brought (29 July 1807) under notice of the House of Commons; and again, in such a debate as is seldom given to matters of concord, the foremost Members of the House honoured themselves by honouring the great benefactor of mankind. Henceforth the public mind was apparently quite satisfied on the subject;* and from this period, I repeat, begins to date the almost universal vaccination of children of the educated classes in this country.

The discussion exhausted.

The general assent of the medical profession dated from an earlier period, and soon became all but unanimous. An infinitely small amount of *bonâ fide* dissent probably continued; in reference to which I will only observe, that allowance must be made for two sorts of personal influence which tended, and perhaps still tend, to occasion it.

General assent of the medical profession.

Even now, among the living contemporaries of Jenner's discovery, there must be men whose fathers and friends and teachers of 50 years back denounced the new practice. Among such as remember the warmth of that contest, perhaps not all discriminate the error. The old allegiance of studentship binds, possibly, here and there a surviving follower of Birch. An hereditary admirer of small-pox inoculation, he may remember only its advantages as compared with the evils of natural small-pox; may forget the fatal objections to its general employment, and may still hesitate to replace that practice of his youth by the " speculative novelty " of vaccination.

Individual exceptions.

Also to a very small extent allowance must be made for personal eccentricities, which, in respect of vaccination, as of every other subject, have ever caused solitary voices to be raised against the common convictions of mankind. This influence can scarcely cease to operate. Occasionally, no doubt, till the end of time, there will be found some lover of paradox, ready, in mere wantonness of authorship, to choose his text from Squirrel or Rowley, and to write dispraise of Jenner, as Cardan wrote encomiums on Nero.

Subject only to these qualifications, it may be said, as regards England, that the convictions of the medical profession on this important matter were fixed 50 years ago. Even then, probably, they would have been expressed with the same sort of unanimity as prevails among the professors of any other department of knowledge, in respect of their most familiar and elementary teaching.

Whether my present inquiry has brought to light any subsequent divergence of opinion, is a question on which the evidence is before you, and to which I shall presently return.

* There always has been, and there always must be a kind of opposition to which my text does not refer, and against which it would be ridiculous to argue. What has sounded like a voice of dissent has sometimes been only the jingle of an advertising cart. What has looked like a conflict of opinion has sometimes been the mere hustling of pickpockets in a crowd. For quacks with their touters have often found it convenient to hitch themselves on to the skirts of a discussion in which the public has been interested; ready for any chance of reviling the science which condemns their wretched arts; but above all, eager to assure their dupes that while vaccination is so worthless a precaution, life may be prolonged and youth made perpetual by one incomparable pill or elixir.

III.—Small-pox since the Use of Vaccination.

Evidence on the protectiveness of vaccination must now be statistical.

In the earlier days of Jenner's discovery the evidence which led men to adopt vaccination depended on a somewhat minute inquiry into individual cases. In thousands of instances (as I have already mentioned) the patient, after being vaccinated, was deliberately tested by inoculation with small-pox matter; in other instances, chance supplied equivalent means of trial; and the results of these very numerous experiments were sufficiently uniform to convince the public judgment.

At present it may be reasonably claimed that the evidence shall be of a more comprehensive kind. From individual cases the appeal is to masses of national experience. Tested by half a century's trial on the millions of civilised Europe, what has vaccination achieved? Comparing the small-pox mortality of the last 40 or 50 years with that of as many years in the last century, do we find a sensible difference? Has progress been made towards that final result which (p. 94, A.) Jenner anticipated, the annihilation of the most dreadful scourge of the human species?

Foreign information obtained by the Epidemiological Society.

In respect of certain countries, these questions are admirably answered in papers already before Parliament. Four or five years ago the Epidemiological

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Society of London appointed a committee of its members to conduct inquiries connected with small-pox and vaccination. The committee, having obtained from foreign governments the communication of most important statistical facts as to the decline of small-pox, reported (*inter alia*) these results to the Society; and soon afterwards this valuable report (specially the work, I believe, of Dr. Seaton, honorary secretary to the committee) was ordered to be printed for presentation to both Houses of Parliament.

For reasons with which I need not trouble you, I neither quote at length the statistical tables of that report, nor exactly follow their form; but, extracting from the foreign communications of its appendix such particulars only as relate to *Population* and *Small-pox*, and distinguishing these into two periods, I obtain all requisite means for comparing the past and present ravages of the disease. On this plan the following table has been constructed; and in observing the last columns (calculated by Mr. Haile from the materials referred to) you will notice, side by side, two series of facts:—1st, how many persons in each million of population annually died of small-pox *before* the use of vaccination; and 2ndly, how many persons in each million of population have annually died of small-pox *since* the use of vaccination. And lest these facts should appear a whit stronger or less strong than they really are, I have set in the other side of the table, opposite the name of each territory, a statement of what periods of time are referred to in the particular comparison.

Its results in a tabular form.

Terms of Years respecting which Particulars are given.	Territory.	Approximate Average Annual Death-rate by Small-pox per Million of Living Population.	
		Before Introduction of Vaccination.	After Introduction of Vaccination.
1777-1806 and 1807-1850	Austria, Lower	2,484	340
1777-1806 and 1817-1850	„ Upper and Salzburg.	1,421	501
1777-1806 and 1807-1850	Styria	1,052	446
1777-1806 and 1807-1850	Illyria	518	244
1777-1806 and 1838-1850	Trieste	14,046	182
1777-1806 and 1807-1850	Tyrol and Vorarlberg	911	170
1777-1806 and 1807-1850	Bohemia	2,174	215
1777-1806 and 1807-1850	Moravia	5,402	255
1777-1806 and 1807-1850	Silesia (Austrian)	5,812	198
1777-1806 and 1807-1850	Gallicia	1,194	676
1787-1806 and 1807-1850	Bukowina	3,527	516
1817-1850	Dalmatia	—	86
1817-1850	Lombardy	—	87
1817-1850	Venice	—	70
1831-1850	Military Frontier	—	288
1776-1780 and 1810-1850	Prussia (Eastern Provinces).	321	56
1780 and 1810-1850	Prussia (Western Provinces).	2,272	356
1780 and 1816-1850	Posen	1,911	743
1776-1780 and 1810-1850	Brandenburg	2,181	181
1776-1780 and 1816-1850	Westphalia	2,643	114
1776-1780 and 1816-1850	Rhenish Provinces	906	90
1781-1805 and 1810-1850	Berlin	3,422	176
1776-1780 and 1816-1850	Saxony (Prussian)	719	170
1780 and 1810-1850	Pomerania	1,774	150
1810-1850	Silesia (Prussian)	—	310
1774-1801 and 1810-1850	Sweden	2,050	158
1751-1800 and 1801-1850	Copenhagen	3,128	286

The results are truly conclusive.

Contrast of periods before and after vaccination in Austria, Prussia, Sweden, and Copenhagen.

Compare, for instance, in the case of Sweden, the 28 years before vaccination* with 40 years soon afterwards:—during the earlier period there used to die of small-pox, out of each million of the Swedish population, 2,050 victims annually;—during the later period, out of each million of population, the small-pox deaths have annually averaged 158.

Or compare two periods in Westphalia; during the years 1776–80, the small-pox death-rate was 2,643; during the 35 years 1816–50, it was only 114.

Or taking together the three lines which belong to Bohemia, Moravia, and Austrian Silesia, you find that where formerly (1777–1806) there died 4,000, there now die 200.

Or taking two metropolitan cities; you find that in Copenhagen, for the half century 1751–1800, the small-pox death-rate was 3,128, but for the next half century only 286; and still better in Berlin, where for 24 years preceding the general use of vaccination, the small-pox death-rate had been 3,422; for 40 years subsequently it had been only 176.

In other words, the fatality of small-pox in Copenhagen is but an eleventh of what it was; in Sweden little over a thirteenth; in Berlin and in large parts of Austria, but a twentieth; in Westphalia but a twenty-fifth. In the last-named instance, there now die of small-pox but four persons, where formerly there died a hundred.

Other national statistics are not sufficiently accurate for the purposes of an equally exact comparison.

From such information as exists, it seems probable that the small-pox death-rate of London within the bills of mortality, during the 18th century, ranged from 3,000 to 5,000. During the 10 years, 1846–55, it was under 340.

Dr. Lettsom, in his evidence before the Parliamentary Committee of 1802, stated reasons for estimating the small-pox death-rate of England at about 3,000; and Dr. Blane's evidence was nearly to the same effect. Reference to the adjoining Tables (where the death-rates of other countries are given) and to subsequent Tables (where the death-rate of London at different periods is minutely examined), leads me to believe that such an estimate by no means exaggerates our average losses before the discovery of vaccination. In contrast therewith I shall hereafter have occasion to show that for the years 1841–53, the average small-pox death-rate of England and Wales was only 304; in 1854, only 149; in 1855, only 132.

Further exclusion of small-pox in proportion as vaccination is general.

But even the later rates, reduced as they are, belong to a population of which some considerable section is unprotected; and it is easy to observe that, in proportion as vaccination becomes more general among the given number of persons, so is the small-pox death-rate further lessened. Sufficient proofs are given by those public establishments, army, navy, and schools, in which it is the rule to vaccinate on admission all unvaccinated subjects who do not show marks of previous small-pox. Thus, in an important paper (reprinted from the *Transactions of the Medical and Chirurgical Society of London*) Dr. Balfour shows that the small-pox mortality of the British navy has not reached a third, nor that of the British army a fourth, of the London rate; and that in the experience of the Royal Military Asylum for 48 years (within which time 5,774 boys have been received for training), only four deaths by small-pox have occurred, and *these all in non-vaccinated boys* who were believed already to have suffered small-pox once before becoming inmates of the school. In two severe epidemics of small-pox which prevailed in Malta in the years 1830–1 and 1838–9, the death-rate of the general population was just 20 times the death-rate of the military population.* Other evidence of the same nature may be collected from materials in the Appendix, to which I shall hereafter more particularly refer.

A check.

It is a vast improvement which the above figures demonstrate. Yet, unequalled as have been already the benefits to mankind conferred by the discovery of vaccination, the gain would have been greater but for a disappointment which I have now to mention.

See Diagram appended.

* The small-pox death rate for this earlier period has been calculated from the numbers given in an important paper (p. 112) which we owe to the Swedish Board of Health. It is on the same paper that the annexed diagram is founded, which represents the annual fluctuations of small-pox mortality in Sweden for the last 82 years, and less perfectly for the 25 years previous.

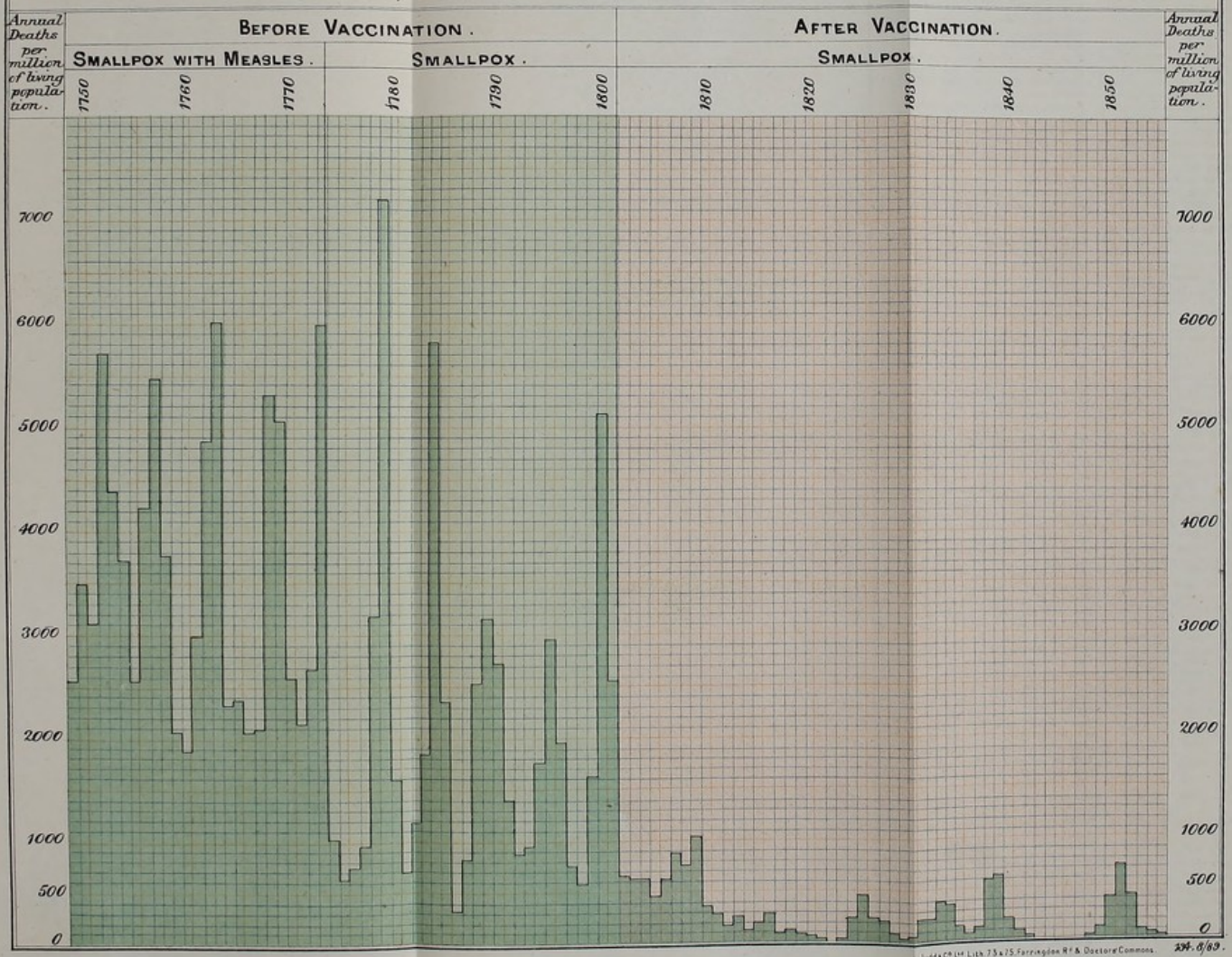
Before 1774, measles and small-pox were unfortunately not distinguished in the mortuary registers of the kingdom; so that the first section of the table must be read with allowance for this combination. During the period referred to in the text, small-pox deaths were separately enumerated, and of course are alone counted in the estimate there given of the small-pox death-rates for 1774–1801, and 1810–50. The first successful vaccinations in Sweden were performed at the end of 1801, namely (in Malmö) November 23, and (in Stockholm) December 17. About 1810, the vaccinations were amounting to nearly a quarter of the number of births.

* Wunderlich's Handbuch der Pathologie u. Therapie, vol. iv. p. 207.

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SMALLPOX DEATH RATES FOR THE KINGDOM OF SWEDEN, FOR THE 107 YEARS 1749 1855.

Calculated by Mr. Haile from returns communicated by the Swedish Government.



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In the early days of vaccination it was noticed that every now and then small-pox would attack a person said to have been vaccinated. Enemies used this fact with so much exaggeration and spiteful triumph, that sober persons at first hardly gave it the attention it deserved. But though often vaunted in mere malice, it was in substance true, that vaccinated persons did not, even then, invariably resist small-pox. In the two reports (1806 and 1807) to which I have already referred, these exceptional failures were admitted in the following terms:—

First (Rept. R. Jenn. Institution, *seq.* page 96):—

"That most of the cases which have been brought forward as instances of the failure of vaccination to prevent the small-pox, and which have been the subjects of public attention and conversation, are either wholly unfounded or grossly misrepresented; that many persons have been declared duly vaccinated, when the operation was performed in a very negligent and unskilful manner, and when the inoculator did not afterwards see the patients, and therefore could not ascertain whether infection had taken place or not; and that to this cause are certainly to be attributed many of the cases adduced in proof of the inefficacy of the cow-pox; that some cases have been brought before the Committee on which they could form no decisive opinion, from the want of necessary information as to the regularity of the preceding vaccination, or the reality of the subsequent appearance of the small-pox; that it is admitted by the Committee that a few cases have been brought before them of persons having the small-pox, who had apparently passed through the cow-pox in a regular way; that cases, supported by evidence equally strong, have been also brought before them of persons who, after having once regularly passed through the small-pox, either by inoculation or natural infection, have had that disease a second time; that in many cases in which the small-pox has occurred a second time after inoculation or the natural disease, such recurrence has been particularly severe and often fatal; whereas, when it has appeared to occur after vaccination, the disease has generally been so mild as to lose some of its characteristic marks, and even sometimes to render its existence doubtful."

And, secondly (Rept. Coll. Physicians, *seq.* page 97):—

"The security derived from vaccination against the small-pox, if not absolutely perfect, is as nearly so as can perhaps be expected from any human discovery; for, among several hundred thousand cases with the results of which the College have been made acquainted, the number of alleged failures has been surprisingly small, so much so as to form certainly no reasonable objection to the general adoption of vaccination; for it appears that there are not nearly so many failures in a given number of vaccinated persons as there are deaths in an equal number of persons inoculated for the small-pox; nothing can more clearly demonstrate the superiority of vaccination over the inoculation of the small-pox than this consideration; and it is a most important fact, which has been confirmed in the course of this inquiry, that in almost every case where the small-pox has succeeded vaccination, whether by inoculation or by casual infection, the disease has varied much from its ordinary course; it has neither been the same in violence nor in the duration of its symptoms, but has, with very few exceptions, been remarkably mild, as if the small-pox had been deprived, by the previous vaccine disease, of all its usual malignity."

During the next 20 or 30 years the proportion of these puzzling cases was constantly on the increase, and in some epidemic seasons they presented a very alarming total.

Allowance might be made for many instances in which vaccination had evidently been performed without care or knowledge; for some, in which spurious lymph had been used; for others, in which the immediate success of the operation had not been verified, and so forth; but, with all reasonable deduction from the aggregate, there still remained much to perplex and disappoint every honest observer. Injudicious friends of vaccination strove to disguise these facts; but there were still living some of their old antagonists who were not sorry to have another chance of victory; and happily there were also competent inquirers willing to look only for truth in the matter. And at no moment in the progress of Jenner's discovery had impartial investigation been more needed than now; for, partly by the facts themselves, and partly by hostile overstatement of them, public confidence began to be disquieted. There seemed a breach in the contract under which vaccination had been accepted. In what had promised so much, failures were all the more conspicuous; men looked to them, even where most exceptional, rather than to the successes of vaccination; and there were (1820–35) not a few persons whose minds began to misgive them, whether the old plan of small-pox inoculation had not perhaps been too easily abandoned.*

Which further observations relieved.

To us, in the present day, this doubt cannot occur. The statistics I have quoted show beyond question that, whatever partial unexpected weakness may have been discovered in the protectiveness of the vaccination, still—even with that weakness—its adoption has been followed by a reduction of small-pox mortality to a tenth and a twentieth of its former magnitude. But, in fact, long before these statistics could be compiled, popular observation, with rough and ready induction, had come to the same result. Everyone could see that a vast majority of vaccinated persons escaped small-pox; everyone could also see that if a vaccinated person caught small-pox he suffered from it comparatively little. And on those very occasions when the large number of persons suffering small-pox after vaccination was most calculated to weaken confidence in its absolute powers of prevention, there were the best opportunities to learn that if it sometimes failed to prevent, at least it might be relied on to mitigate.

Habitual mildness of post-vaccinal small-pox.

Norwich.

Thus, for instance, in a very severe epidemic of small-pox which prevailed at Norwich in 1819, Mr. Cross minutely observed 112 families, in all of which there were cases of the disease; and the annexed Table shows the result. Among 215 persons unprotected by vaccination there were 200 cases of small-pox, and of these 46 proved fatal; while among 91 vaccinated persons the only effects of this terrible infection were, (1) that one girl, who had been vaccinated nine years, "had a mild disease, limited to 20 pocks, and lasted "only six days before it began to decline," and (2) that another, who had been vaccinated five years, "went through the disease in half the time (of her "unvaccinated sister) without danger or detriment; a "few very minute pits upon the tip of the nose being "the only permanent traces."

——	Number.	Cases of Small-pox.	Deaths by Small-pox.
Total number of persons in the 112 infected households.	603	202	46
1. Protected by previous small-pox.‡	297	—	—
2. Protected by vaccination -	91	2	—
3. Unprotected - - -	215	200	46

‡ Mr. Cross mentions that he met with several who were supposed to have had small-pox formerly, yet (p. 15) notwithstanding took it on this occasion; but he does not state whether such cases are included in the above summary.

Edinburgh.

Similarly, Dr. Thomson, of Edinburgh, recounting, some years afterwards, his experience at about the same period, says,† "My observation of the very "severe small-pox epidemic which prevailed in Scotland from 1818 to 1823, was carried on until I had "an opportunity of seeing not fewer than 1,500 individuals affected with small-pox after vaccination,

* Persons entertaining this doubt overlooked a possibly which happily for mankind has never been fully tested—a possibility that small-pox inoculation, *if it had been generally adopted at a sufficiently early period of life to prevent infantine deaths by natural small-pox*, might itself have proved in many instances an impermanent protection. The following passage from the French Academical Report on the vaccinations of 1850 (p. 25) points in the direction here suggested, but is not sufficiently definite for a proof:—"L'inoculation elle-même n'était par plus efficace. De "tous temps on a cité des faits contre son infallibité. Elle n'a pu "se soutenir en Chine au delà de cinquante ans; après qui des "épidémies sont venues qui en ont montré les faiblesses; et, sans "chercher si loin, Mr. Debourge de Rollot nous apprend que sous "le règne d'une épidémie a Edimbourg et dans le Devonshire les "inoculés ont eu plus à se plaindre que les vaccinés." In the French Report there are no references which might enable the reader to verify these important assertions, and study in detail the experience which they represent.

† Seventh Report of Poor Law Commissioners, p. 148. In explanation of the very large number of cases of post-vaccinal small-pox witnessed by Dr. Thomson, it must be observed that chicken-pox was epidemic in Scotland at the same time as small-pox; and Dr. Thomson, considering these diseases to be of identical nature, counted them both together in his total. Also see his "Account of the Varioloid Epidemic, 1820," and "Historical "Sketch of Opinions respecting the Secondary Occurrence of "Small-pox." 1822.

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" and of this number only three died, but none of " them with the disease in that form which is termed " malignant. I saw also about 85 cases of small-pox " in persons who had previously passed through either " natural or inoculated small-pox, and of this number " three also died. In addition to these, I saw also 400 " cases of primary small-pox, out of which 100 died. " The results gave me a confidence in the conservatory " effects of vaccination, which nothing has since " occurred to shake. Small-pox has twice prevailed " epidemically in Scotland since 1823, and from all I " have seen and heard I am satisfied that the propor- " tion of deaths in the several classes of patients I " have mentioned did not materially differ from that " above specified. In the first of these epidemics the " deaths that occurred in the vaccinated were of adult " males, and in the second chiefly, I believe, of adult " females."

Marseilles.

Similarly again at Marseilles*:—The number of cases and of deaths in the severe epidemic of 1828, and their relation to the vaccinated, non-vaccinated, and variolated masses of exposed population, were stated as follows; the first column of figures representing an estimate (which of course can only be approximative) made for the purpose by the Société Roy. de Medecine:—

	Number.	Cases of Small-pox.	Deaths by Small-pox.
Total number of persons at the ages (0–30) which were almost exclusively susceptible.	40,000	6,020	1,024
1. Protected by previous small-pox.	2,000	20	4
2. Protected by vaccination -	30,000	2,000	20
3. Unprotected - - -	8,000	4,000	1,000

Copenhagen.

So also (as quoted by Steinbrenner) in Copenhagen:—of 659 vaccinated persons who suffered in the variolous epidemics 1823–7, only five died, being at the rate of 1 in 132; while of 176 unvaccinated persons who caught the disease, more than a fourth seem to have died; and of 153 others, who professed previously to have had small-pox, there died 31. And similarly in the epidemic of 1828–30, and part of that of 1832–7, it seems that out of 228 unprotected patients 63 had died; but of 1,373 cases of post-vaccinal small-pox only 14 were fatal.

Numerous other illustrations.

Observations, more or less to the same effect, have been made, I believe, in every country to which vaccination has extended, and at every time when epidemic small-pox has prevailed. Sometimes the difference has seemed less, sometimes more; but difference, and very great difference, in favour of vaccinated persons, as regards the severity of small-pox, if it should happen to befall them, is made certain by the general and strong testimony of innumerable observers. The adjoining illustrations† are selected from various sources, and it would be easy to multiply their number to any desired extent. The largest illustrations are generally least likely to be deceptive; I would therefore point especially to the case of Bohemia, where (according to observations made for 21 years on 4,000,000 of people) the risk of death to vaccinated persons, if they happen to contract small-pox, is at the rate of 5½ per 100 patients; but to non-vaccinated persons, when they contract small-pox, at the rate of 29½ per 100 patients; or to the concurrent testimony of London, Milan, and Vienna, as showing, on an experience of nearly 26,000 cases, that post-vaccinal small-pox, if it occurs, is but a fifth or a sixth as dangerous as natural small-pox.

Places and Times of Observation.	Total Number of Cases observed.	Death-rate per 100 Cases	
		Among the Unprotected.	Among the Vaccinated.
France,[1] 1816–41 - - -	16,337	16½	1
Quebec,[1] 1819–20 - - -	?	27	1½
Philadelphia,[2] 1825 - -	110	60	0
Canton Vaud,[2] 1825–9 - -	5,838	24	2½
Darkehmen,[2] 1828–9 - -	134	18½	0
Verona,[2] 1828–30 - - -	999	46½	5½
Milan,[2] 1830–51 - - -	10,240	38½	7½
Breslau,[2] 1831–3 - - -	220	13½	2½
Wirtemberg,[3] 1831½–5½ - -	1,442	27½	7 1/10
Carniola,[4] 1834–5 - -	442	16¼	4½
Vienna Hospital,[2] 1834 - -	360	51½	12½
Carinthia,[4] 1834–5 - - -	1,626	14½	½
Adriatic,[2] 1835 - - -	1,062	15½	2½
Lower Austria,[2] 1835 - -	2,247	25½	11½
Bohemia,[5] 1835–55 - - -	15,640	29½	5½
Gallicia,[2] 1836 - - -	1,030	23½	5½
Dalmatia,[2] 1836 - - -	723	19½	8½
London Small-pox Hospital,[6] 1836–56.	9,600	35	7
Vienna Hospital,[6] 1837–56 -	6,213	30	5
Kiel,[6] 1852–3 - - -	218	32	6
Wirtemberg,[3] no date - -	6,258	38 1/10	5½
Malta,[8] no date - - -	7,570	21·07	4·2
Epidemiolog. Soc. Returns,[9] no date.	4,624	23	2·9

[1] Thomson, Small-pox, p. 376. The Quebec epidemic is described to "have spread rapidly among the unvaccinated, and carried off many "adults as well as children. The proportion of deaths in the unvaccinated was from 1 to 3½ to 1 in 4."

[2] Steinbrenner, op. cit. pp. 105, 110, 231, 232, 280, 281, 283, 285. In the Breslau epidemic, one patient is stated to have suffered small-pox for a third time.

[3] Rigoni-Stern, as quoted (p. 50) by Prof. Hasser; die Vaccination und ihre neuesten Gegner, 1854. It is mentioned that of 24 persons who during this period suffered second attacks of small-pox, no fewer than eight died.

[4] Med. Jahrb. d. Oesterr. Staates. 1838.

[5] Wunderlich's Handbuch d. Path. u. Therap. 1855, iv. 201.

[6] The 20 years' experience of the Vienna Hospital is detailed in the Report of the College of Surgeons, and in the statement of Professor Hebra.

[7] Canstatt's Jahresbericht, 1852.

[8] Hebra, op. infra citat. In these epidemics there were reported 57 cases of persons suffering small-pox for a second time; and of the 57, there were 16 fatal. In the Wirtemberg epidemics afterwards referred to, there were reported 86 cases of secondary small-pox, among which 12 were fatal.

[9] Seaton, on the Protective Value of Vaccination. Dr. Seaton quotes 203 cases of secondary small-pox, as reported to the Epidemiological Society. Of these 17 were fatal. In Mr. Marson's paper relating to the London Small-pox Hospital there are mentioned 47 cases of secondary small-pox. Of these eight died from the disease, and one from an accidental complication.

This, however, is only a part of the case; and I venture especially to beg your attention to what remains, as it is of much administrative importance. When the above and similar statistics are seen in mass, it is merely noticed that, among a number of persons suffering small-pox, those who have previously been vaccinated incur much less risk than others. But when

* Bousquet Traité de la Vaccine; Paris, 1833; p. 195.

† It will be observed in the Table that the fatality of small-pox, as it occurred in unprotected persons ranged from under 15 (Carinthia) to 60 (Philadelphia) per cent.: while in persons who contracted the disease after previous vaccination its fatality ranged from an inappreciable smallness to 11 (Lower Austria), and even 13½ (Vienna Hospital) per cent. This extensive range in each column depends on various circumstances. Sometimes, no doubt, material differences of classification have been made, one observer having included, while another has excluded, cases of *true chicken-pox*; sometimes (where the observation is that of hospital practice) only the graver cases of small-pox have been admitted for treatment; sometimes a particular epidemic has been in its form milder or more severe; sometimes (as the reporter mentions of 15 out of the 25 deaths in the Vienna Hospital in 1834) cases are included in which the fatal issue was not due to small-pox. But, generally speaking, such circumstances would effect equally both enumerations (vaccinated and unvaccinated) in any one epidemic, and would certainly give no fallacious result in favour of the former. And in comparing together the enumerations of *any one epidemic*, it will be noticed that always there is a marked difference in favour of the vaccinated class; so that they, if infected with small-pox, have not, even in extreme cases (Lower Austria or Dalmatia) incurred half the risk of non-vaccinated patients. In many lines of the above statistical table true chicken-pox is no doubt often reckoned as small-pox. In the returns of the London Small-pox Hospital a distinction is drawn between it and the *varicelloid modification of small-pox*; the former is excluded, and the latter (almost entirely occurring in vaccinated persons) is retained. This plan probably gives the most correct means of comparison. From the line which relates to the Vienna Hospital in 1834, there are excluded 533 cases of so-called chicken-pox; and judging by the high death-rate which results for the vaccinated persons, I should suppose that "varicella" had there been allowed to include many cases which in England would have been grouped as "varicelloid modifications"—*i.e.*, vaccinal mitigations of small-pox. For the reverse reason, the Vienna experience of 1837—56 gives rates lower than they would have reckoned here; for the total number of cases (6,213) includes 3,415 of so-called varicella; and of these, no doubt, a certain proportion would in England have been excluded as cases—not of vaccinal modification, but—of true chicken-pox.

such a mass is dissected there comes out as a second fact, that this lesser risk of the vaccinated has a graduated scale of its own; and that, *among vaccinated persons infected with small-pox, the danger of the disease is chiefly determined by the badness and insufficiency of their vaccination.*

Mr. Marson's observations.

The establishment of this truth is the work of Mr. Marson, who for more than 20 years has been Resident Surgeon of the London Small-pox Hospital, and who founds his conclusion on many thousands of cases which during this time he has attended, and of which he has kept accurate notes.* Conceiving it to be, for practical purposes, a discovery of high importance, I† annex a copy of the original paper, in which Mr. Marson, four years ago, communicated it to the Royal Medical and Chirurgical Society of London; and likewise a copy of the petition, last year addressed by Mr. Marson to the House of Commons, in which he briefly states the result of his large and laborious experience in small-pox and vaccination.

His conclusions, so far as they relate to my present point, are as follows:—That the fatality of small-pox, when it attacks the unvaccinated, is 350 per thousand; that its fatality to such vaccinated persons as it infects is, taking them indiscriminately, 70 per thousand; but, distinguishing vaccinated persons into two classes, —those (1) who have been vaccinated in the best known manner, and those (2) who have been badly vaccinated, —the fatality of small-pox, if it infects the former, will be 5 per thousand; if it infects the latter, 150 per thousand: that the risk of the one will be 30 times the risk of the other.

Almost perfect security given by good vaccination.

Such being the *almost perfect security* which well-performed infantine vaccination confers against death by small-pox, it remains to be considered whether here is the necessary limit of Jenner's benefaction to mankind. The remnant of danger is not great. But, such as it is, can it be prevented?

Further inquiry into post-vaccinal small-pox.

Thirty years ago, when first it became notorious that small-pox might affect a certain proportion of persons previously and properly vaccinated, this partial failure of protection was explained on one or other of two suppositions:—Either (it was said) the vaccine contagion‡ in its transmission through so many human subjects, must have lost by degeneration some of that specific protective influence which, in its former condition, it exerted on the human economy; or else there must be essentially something of uncertain constancy, something impermanent or liable to be impermanent, in the privileges which vaccination confers.

Two supposed causes of its occurrence.

To the former of these possibilities I shall presently revert, and will now only remark, that, viewed as an alternative to the other, it was judged to be an insufficient explanation.

Lapse of time as a cause.

For what chiefly attracted attention was this: not that persons vaccinated by the surgeons of 1820–30 with the lymph of 1820–30 were less protected against small-pox than persons who had been vaccinated in 1798; but, generally, that persons who had been vaccinated 10 or 15 or 20 years, and who, during this interval, had perhaps repeatedly resisted small-pox, would at length, in a certain proportion of their number, yield to the infection. This had most frequently happened during times when small-pox was severely epidemic among the unvaccinated; and the first notice of the fact on a large scale in Scotland in 1818–20 merely meant that then, for the first time, *large masses of persons with vaccination of many years standing* were exposed to the test of a strong epidemic influence. Under this ordeal it had become evident that, for some vaccinated persons, the insusceptibility conferred by cow-pox was not of life-long duration. And from careful analysis of cases it was shown, that this lesser protectedness of certain vaccinated persons bore at least *some* proportion to the number of years which in each case had elapsed since vaccination. Some proportion, I say:—for (1st) there were not materials to prove any uniform rate of increase from year to year; and, (2nd) the increase, such as it was, apparently continued up to about 30 years of age; after which period it seemed that, in the class of persons now under consideration, the liability to contract small-pox underwent a continuous decline. Thus (to select an illustration from a work to which I shall presently make more particular reference) Professor Heim, taking 1,055 cases of modified or unmodified small-pox in vaccinated persons, distinguishing them under 35 heads corresponding severally to the number of years—from 1 to 35—which had elapsed since vaccination.* The 35 numbers corresponding to the 35 successive years are severally as follows:—15, 4, 4, 7, 10, 9, 12, 16, 17, 14, 14, 21;—44, 45, 62, 48, 59, 43, 57, 68, 44, 40, 50, 53, 52, 46, 41, 27, 41;—17, 16, 13, 6, 32, 8. It is true that, taken year by year, this series is irregular, as might be expected in so limited an experience; but when it is divided into three successive parts, one for *the first* 12 years after vaccination, one for *the next* 17, and one for *the following six* years,—it appears that the average number of cases for each year is, in the first division 12, in the second division 48, in the third division 15. Or if the series be divided into seven successive parts—one for each quinquenniad comprised in it—the seven quin-

* Dr. Kinnis, formerly Superintendent of Vaccination at Colombo, in his "Report on Small pox as it appeared at Ceylon in 1833-4," and in an appendix relating to observations made by Dr. Forbes in the epidemic of 1830, gives enumerations from which the annexed table is compiled. It will be observed that the gradation of death-rates marked in the last column, though far less detailed than in Mr. Marson's statement, is to the same general effect. And in the cases noticed by Dr. Kinnis himself the difference is further developed; for he distinguished persons pretending to have been vaccinated into such as had *no marks*, and such as had *unsatisfactory marks*, of vaccination, and found that the death-rate of the latter was 26½, that of the former 32½. Cases of chicken-pox are not included in the annexed Table; and Dr. Kinnis gives at length (pp. 10-14) his reasons for concluding "that the febrile "eruptive disease known in Ceylon by the name of chicken-pox "arises from an infectious matter essentially different from that "which produces small and modified small-pox."—Op. cit. Colombo Govt. Press, 1835.

Occurrence and Fatality of Small-Pox.

—	Number of Cases.	Number of Deaths.	Per-centage of Deaths.
(1.) In persons decidedly not vaccinated.	351	146	41½
(2.) In persons having no marks or but unsatisfactory marks of vaccination.	199	52	26½
(3.) In persons having satisfactory marks of vaccination.	187	3	1½
(4.) In persons having marks of small-pox.	4	2	—

[† Mr. Marson having personally laid before the Committee his complete experience down to the present time, I think it unnecessary to subjoin the above-mentioned records of his earlier experience.—J.S. 1871.]

‡ I avoid speaking of the vaccine *lymph* as being weakened by transmission through many human subjects, because this expression often represents a misunderstanding of what really occurs in the propagation of disease by morbid poisons. Lively arguments for the *necessary degeneration of the vaccine contagion* have proceeded on a belief that the original cow-pox at each vaccination *simply dilutes itself with certain passive juices* of the vaccinated body, that it thus of course gets weaker and weaker at every stage, till at its thirty-fifth succession it is reduced, according to Dr. Nicolai, to at least the 8,809,458,688th fraction of its original power. This argument founds itself on a radical misapprehension of the infective process in question. What essentially marks the infective action of cow-pox, small-pox, and similar morbid poisons, is, that under their *fermentative influence* some ingredient of the infected body converts itself into their likeness. The material contained within certain vaccine vesicles is not a something which has been transfused into the body, but a something which has been generated within it by a specific decomposition of its own proper substance; and the original lymph, which acted as a ferment to this process, has very probably completed its decay, and altogether passed from the scene before those new vesicles begin to show themselves. Successive dynamical infections do not imply a perpetuation (with corresponding infinitesimal subdivision) of the original efficient; or Nicolai's argument might equally have been used to prove that the power of human procreation could not but cease soon after the days of Adam.

* In a medical pamphlet of 25 years ago (Address to Parents and Guardians on the Present State of Vaccination by a Candid Observer; London, 1822; p. 47) I read, "There are strong grounds "for believing that this peculiarity of constitution, which disposes "to attacks of modified or vaccine small-pox, is hereditary." A medical friend writes to me, that he and his two brothers were vaccinated in infancy to the satisfaction of their then doctor, that some years subsequently, when they were severally aged 12, 11, and 7, the second of them contracted small-pox in a very severe form, and the other two caught the disease from him; that my correspondent himself, when 20 years of age, having occasion to attend the post-mortem examination of a patient who had died of small-pox, again contracted the disease, and in his turn communicated a second infection to both his brothers, who, like himself, had suffered it before. Dr. Arnott tells me, that he attended in Spain a case of post-vaccinal confluent small-pox, where the patient's father had had small-pox twice and her uncle three times, another uncle having died with a first attack of the disease. I have notes of an instance, published, I believe by Dr. Webster, where three brothers and sisters had had post-vaccinal small-pox; one of them once; another twice; and the other three times, including a last and fatal attack.

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quennial sums read thus :—40, 68, 186, 275, 239, 172, 75 ; and a corresponding subdivision of 653 cases which occurred at Copenhagen (according to Möhl, as quoted by Gregory) gives the series 14, 102, 173, 187, 156, 19, 2. A calculation of similar materials made by Professor Retzius (Gaz. Méd. de Paris, 1843) with respect to 961 cases in the Stockholm Hospital, gave the following series to express the average allotment of small-pox to each year of life in 11 successive quinquenniads up to the age of 55 :—3½, 4½, 13½, 45½, 51½, 40, 20, 17½, 3½, 2½, 1. Mr. Marson's copious information tends to show the same thing.

Post-vaccinal small-pox made manifest by signs of artificial interference in the present distribution of small-pox deaths, as contrasted with their natural distribution before the discovery of vaccination.

This re-development of susceptibility to small-pox, as affecting a certain proportion of the vaccinated population, is a fact which becomes most evident when one compares the present ages of small-pox death with the ages of small-pox death before the discovery of vaccination. Formerly the entire number of such deaths, distributed among the ages of life, constituted, from first to last, a declining series. Duvillard gives an analysis of the 6,792 small-pox deaths which happened during nearly two centuries (1580–1760) in the city of Geneva ; and the numbers belonging to the six successive quinquenniads of life up to the age of 30 were 5,467, 1,058, 126, 54, 39, and 31 ; only 17 cases having fallen to all ages above 30. In the adjoining table the difference between that former distribution and the distribution which now prevails in partially vaccinated populations is shown. The 6,792 small-pox deaths of Geneva during the period 1580–1760, and 12,941 registered small-pox deaths of England during the years 1839 and 1847, and 3,699 registered small-pox deaths of London during the years 1848–51, and 3,323 deaths reported by the Epidemiological Society to have occurred in Paris during the years 1842–51, are severally analysed according to the ages at which they took place. For convenience of comparison they are all reduced to the scale of 1,000, and are reckoned for each age in reference to this total.

See Diagram appended.

PROPORTIONATE DISTRIBUTION by AGE of 1,000 SMALL-POX DEATHS in GENEVA before the discovery of Vaccination, and of the same Number in England, London, and Paris respectively, at Periods subsequent to its general practice.

Ages.	Geneva, 1580–1760.	England, 1839 and 1847.	London, 1848–51.	Paris, 1842–51.
0–5	805	730½	684	338
5–10	155½	127½	131	59
10–15	18½	24½	29½	132½
15–20	8	25½	30	
20–25	5½	30½	48	329½
25–30	4½	18½	35	
30–35	2½	11½	19½	169½
35–40		7½	12	
Over 40		15½	10½	31½
Total	1,000	990½	999½	1,060½

In the column which relates to Geneva, the declining series from 805 to 2½ expresses what may probably be considered to have been the natural distribution of small-pox deaths among different ages in cities where it was frequently or constantly present. In its general signification, this declining series closely resembles the present distribution of those infectious infantile diseases (measles, hooping cough, and scarlet-fever) for which hitherto no prevention has been found, and which therefore in their distribution express unmodified natural affinities.* In those columns of the table which relate to London and Paris the declining series is interrupted ; in the latter case most remarkably.* This interruption is certainly artificial ; and no doubt chiefly denotes the mortality of post-vaccinal

* The adjoining table expresses in four series of figures, arranged side by side, what may be considered, approximately at least, as the expression of those natural affinities of disease. The population under five years of age is of course always a minority of the entire population ; in England, at the last census, somewhere about 13 per cent. ; but that minority furnishes the large majority of the deaths here referred to. Two-thirds of all deaths by scarlet fever, four-fifths of all deaths by natural small-pox, a still larger proportion of all deaths by measles, and 942 of every 1,000 deaths by hooping cough belong to that fraction of the population. In a word, those are distinctively infantile diseases. And the obviousness of this fact represents three conditions :— First, that the susceptibility to those diseases develops itself very early in life ; secondly, that the susceptibility, when once acted on by its corresponding exterior cause, becomes exhausted more or less absolutely for the remainder of life ; thirdly, that the exterior cause or infection has been of sufficiently frequent recurrence among the population for those relations of susceptibility to show themselves. For the meaning of the diseases being infantile is, not that any insusceptibility to contract them is acquired in the mere act of growing up ; but that, because the susceptibility develops itself at the commencement of life, and because the exterior influence which acts upon that susceptibility is seldom absent ; therefore all who have outlived the first years of childhood have commonly had each susceptibility exhausted by suffering the disease to which it relates. Hence, if all occurring cases of any such disease be classified according to the ages at which they happen, the resulting series of figures must necessarily have its maximum at that age where the special susceptibility is first fully developed. From this point it must undergo a more or less rapid and uninterrupted decline ; the *uninterruptedness* being determined by the fact that at each succeeding age there will be fewer and fewer susceptible persons, the *rapidity* being graduated by the frequency or constancy with which the exterior cause is in operation. The infection of measles was carried to the Faroe islands in the year 1846, after an absence of 65 years ; it was then observed that (with the exception of persons who had been touched in the former epidemic) nearly the whole population suffered. According to the very interesting history published by Dr. Panum (Virchow's Archiv. I. 492) there were, among 7,782 inhabitants of the islands, more than 6,000 attacks of measles. If these had been classified in the manner in which I speak, the maximum number corresponding to the age when the susceptibility is first fully developed, would probably have stood, as in the adjoining death-table, at the second year of life ; but as all subsequent ages of that population up to 65 years represented a still susceptible class, the series of figures for these periods of life would have declined very slowly ; probably, indeed, only at the same rate as the mass of living population declines from age to age.

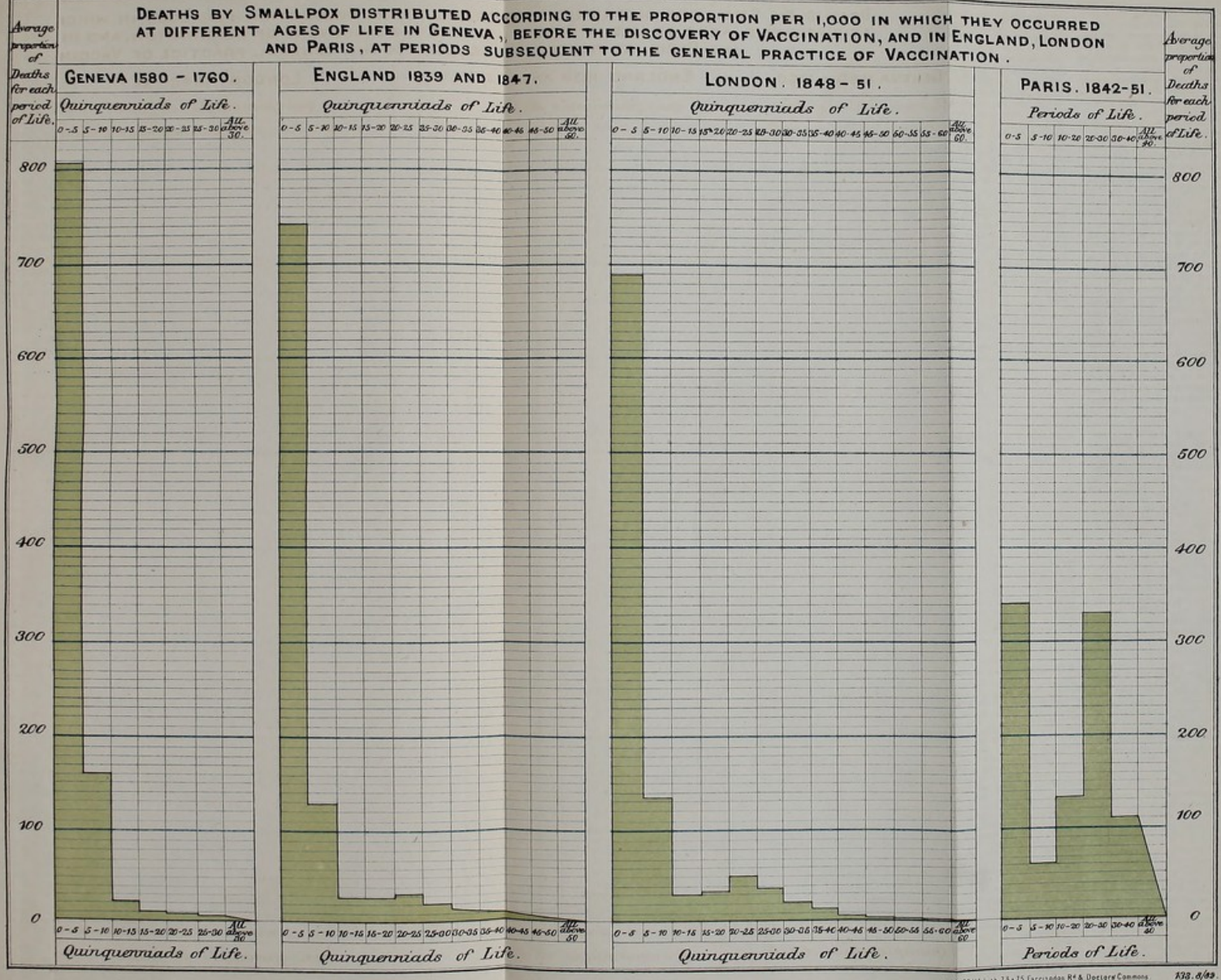
Proportionate distribution by age of 1,000 deaths in Geneva by Small-pox before the discovery of Vaccination ; and of the same number of deaths in England by hooping cough, measles, and scarlet fever respectively, in the year 1847.

Ages.	Small-pox.	Hooping-cough.	Measles.	Scarlet Fever.
0–1	202½	404½	155½	63½
1–2	191½	275	346½	145
2–3	190	138½	201½	171½
3–4	102½	77½	117	155
4–5	88½	47½	68	123½
0–5	805	943	883½	656
5–10	155½	52½	91½	254½
10–15	18½	2½	15½	54½
15–25	13½	½	4	19½
Above 25	7	1½	7	22½
At all ages	1,000	1,000	1,000	1,000

In the adjoining table, it deserves notice, that deaths from hooping-cough, and (in a trifling degree) those from small-pox, are proportionally most abundant in the first year of life ; deaths from measles in the second ; and deaths from scarlet fever in the third. I have no reason to believe that a similar classification of *attacks* of those diseases respectively would (if one could obtain it) differ so materially from that classification of *deaths* as to reverse any important conclusion which may be drawn from the latter ; and, if not, there would seem to be evidence that the several specific susceptibilities to those respective diseases develop themselves, not simultaneously, but in succession. I would not insist much on the trifling difference between 202½, 191½, and 190 in the small-pox column ; for although they show that the susceptibility to small-pox is largely developed in the first year of life, yet they leave it quite possible that the full susceptibility, if it could be tested by *attacks* instead of *deaths*, might be found rather in the second and third years of life than in the first. But the very early development of full susceptibility to hooping-cough, and the later development of susceptibility to scarlet fever, are strikingly illustrated in the table. It deserves notice, however, that an analysis of deaths from the same diseases in *London* during the seven years 1848–54, though showing generally the same distribution among different ages, presents a remarkable exception in the case of hooping-cough ; the deaths from this disease in the first biennium of life being divided nearly equally between the two years ; not, as above, in the proportion of 404½ to 275, but (with a slight preponderance for the second year) in the proportion of 319½ to 323½.

* That nearly one-third of the whole number of small-pox deaths in Paris happens between the ages of 20 and 30 is one of the most startling facts I have learnt in my study of the subject. I can conceive for it no other explanation than that given in the text, and, if this be the true one, there must prevail in Paris an appalling amount of post-vaccinal small-pox. I cannot say

Deaths by Smallpox distributed according to the proportion per 1,000 in which they occurred at different ages of life in Geneva, before the discovery of Vaccination, and in England, London and Paris, at periods subsequent to the general practice of Vaccination.



Judd & Co. Lith. 75 & 75, Farringdon Rd. & Doctors' Commons. 138. 6/93.

small-pox. In other words, vaccination has established an interference with the natural series: at a certain period this artificial interference is to some extent withdrawn, and the death-list begins to contain cases which formerly would have belonged to earlier periods of life: cases, where vaccination has only sufficed to postpone the fatal infection.

I refrain from inserting in the text of this letter any discussion of the very interesting pathological considerations by which those new facts in the science of vaccination may to some extent be interpreted.

You will chiefly care to notice their practical result; namely, that men soon began to inquire, and by experiment to test, whether that absolute immunity against small-pox, which a vaccinated person in the lapse of years had partially lost, could by a second vaccination be renewed to him. And again, without dwelling on an immense detail of literature which records the tentative re-vaccinations of private practitioners (among whom Dr. Harder, of St. Petersburg, deserves especial credit), it is enough to study what has been observed in the re-vaccination of great masses of men in various military establishments, especially of Germany.

The earliest large experience of this kind came from Wirtemberg. In 1829 the practice of re-vaccinating the troops of that kingdom was commenced; and its collective results for the next few years are recorded in an elaborate form* by Professor Heim, of the Wirtemberg military service.

The adjoining Table presents an abstract of these results in relation to five years terminating with June 1836. There are parts of it from which (because of the complicatedness of the conditions) I will not venture on attempting to draw conclusions. But there are other parts of which the meaning is obvious.

—	Total.	Ratio of Success per 1,000 cases Vaccinated.		
		Perfect Success.	Modified Success.	No Success.
Vaccination of the Wirtemburg army in the five years 1831½-5½ - -	14,384	340·2	248·3	411·5

13,681 of the above-mentioned 14,384 Military Vaccinations being classified according to the Marks of previous Vaccination or Small-pox, the Results were as under:—

Degree of Success of Re-vaccination.	Of Cases with Normal Cicatrices of Vaccination there were 7,845, and among these the Results per 1,000 were,	Of Cases with Defective Cicatrices of Vaccination there were 3,545, and among these the Results per 1,000 were,	Of Cases with no Cicatrices of Vaccination or Small-pox there were 2,025, and among these the Results per 1,000 were,	Of Cases bearing Marks of previous Small-pox there were 266, and among these the Results per 1,000 were,
Perfect -	310·4	289·7	337·3	319·5
Modified	280·5	259·	191·1	248·1
None -	409·2	469·4	471·6	432·3

11,565 of the same Number being distributed according to Age, the Results were as under:— App. No. 1.

Degree of Success of Re-vaccination.	Under 20 Years of Age there were Re-vaccinated 124 Persons, and the Results as per 1,000 were,	Between 20 and 30 there were Re-vaccinated 11,157 Persons, and the Results per 1,000 were,	Above 30 years of Age there were Re-vaccinated 284 Persons, and the Results as per 1,000 were.
Perfect - -	338·7	285·6	436·1
Modified -	322·6	259·2	207·7
None - -	338·7	455·2	366·2

First, let me observe, that one line of the figures corroborates, in an indirect manner, the conclusions recently quoted from Mr. Marson. Besides 5,919 of the vaccinated on whom the operation produced no vacciniform result, there were 3,571 (or about 248 per 1,000) in whom it produced results approaching, but not quite attaining, what was strictly enforced as the criterion* of perfect success. These "modified successes" form for comparison a group, less subject to accidental sources of fallacy than some other combinations in the table; and such *modification* is in its way (like an attack of small-pox) a measure of how far the influence of previous protection survives in those persons in whom it has begun to decline. Now, in tracing the degrees of this influence as present in the four different categories of vaccinated persons, and as expressed in proportions of those classes, it is seen that the proportion is highest (280½) in those who showed normal marks of previous efficient vaccination; next (259) in those whose previous vaccination marks, though visible, were imperfect; next (248) in those who had had small-pox; and least (191) in those who, whether they had previously had small-pox, or been vaccinated or not, showed no scars of either infection.

But the Table shows, even more unquestionably, another great fact. It shows that on the average of more than 14,000 experiments (an immense majority performed at between 20 and 30 years of age) 34 out of every 100 re-vaccinated persons developed the same sort of vesicle as would arise from a first insertion of vaccine lymph. And it is important to observe that this renewed susceptibility to cow-pox did evidently not depend, so far as could be traced, on any original ineffectiveness of the former vaccination; for (as is expressly set forth in the second part of the table) among the 14,384 subjects of vaccination there were 7,845 who presented strictly normal scars of previous vaccination; yet nearly a third of this large number gave again exactly such local phenomena as arise in children when vaccinated for the first time.

What inference may be drawn from this?

Is it then a legitimate inference from these figures, that, if the same 14,384 soldiers had been exposed to an atmosphere of small-pox infection, every third man would have caught the disease? Certainly not. Inoculation of lymph (whether vaccine or variolous) is, so to speak, a finer and more delicate test of susceptibility to the small-pox poison than is the breathing of an infected atmosphere; so that many persons, when the lymph of cow-pox or small-pox is inserted in their skin, will give—locally at least—evidences of susceptibility which no atmospheric infection would have elicited from them. And of this, perhaps, there can be no more ready illustration than by noticing (either in another part of the annexed Table, or on a still larger scale in a subsequent Table, which represents the re-vaccinations at Kasan) that persons who bore marks

whether difference of race may make any difference to that re-development of susceptibility to small-pox; still less can I venture to surmise whether so extreme an instability in the results of French vaccination may depend on anything peculiar to the French administration of this important agency. But if those indications be sound, which in a later part of this section I deduce from the history of re-vaccination in the Prussian army, there would apparently be cogent reasons for inquiring very critically into the *quality of lymph* which is current for the vaccinations of France.

* Historisch-Kritische Darstellung der Pocken Seuchen, &c., im Königreiche Würtemberg, innerhalb der fünf Jahre Juli 1831 bis Juni 1836. Professor Heim also reports (through with less exactness) the results of 29,684 re-vaccinations performed by civil practitioners in different parts of Wirtemberg, and the general results were as in the annexed form.

Ratio of Success per 1,000 Cases Re-vaccinated.

Perfect Success.	Modified Success.	No Success.
517·7	176·9	306·1

Heim, op. citat, p. 594. Beim K. Militär wurde jede nicht mit dem reinsten Bilde einer vollkommenen Kuhpocke, oder mit zu grosser Randröthe und dem Anschwellen des Oberarmes verbundene Impfung unter den modificirten Erfolg locirt; wohin alle übrigen pustulosen Abnormitäten des Exanthemes gerechnet wurden, die manchen Impfchirurgen verleitet haben könnten, sein "guter Erfolg" auszusprechen. Als erfolglos wurde jeder nicht bis zur Blasenbildung gesteigerte Lokalprozess, und das was man falsche Kuhpocken zu nennen pflegt, aufgerechnet. Nur das ungetrübte Abbild der bei erstmals geimpften Kindern für gut erklärten Schutzpocke wurde auch an den Revaccinirten "gut" prädicirt.

App. No. 1.

of previous small-pox were, in at least equal proportion with previously vaccinated persons, capable of producing perfect vaccine vesicles; and probably they too, if tested with variolous matter, would have shown at the inoculated part similar signs of susceptibility; whereas, notoriously, of persons who have once had small-pox, not nearly one-third becomes afterwards capable of contracting small-pox by frequenting the neighbourhood of the sick.

For this reason (greatly corroborated by what had already in every-day practice been observed of the immunity of once-vaccinated persons) it was evidently impossible to argue that *all* who on re-vaccination yielded perfect vaccine vesicles would, on ordinary exposure to small-pox infection, have become infected with small-pox. On the other hand there could be little reason to doubt that they would have been distinctively *the endangered class*; not that all or nearly all of them would have suffered; but that from among them, more than from among other vaccinated persons, the occasional sufferers from small-pox would have come.

The experience of other countries did not fail, so far as it went, to confirm the general accuracy of the Wirtemberg observations.

Prussian re-vaccinations.

Especially in the Prussian army in 1833, at the commencement of a system to which I shall presently revert as having given other remarkable results, there were re-vaccinated between 40,000 and 50,000 adults, and in about 33 per cent. of the entire number this re-vaccination took with perfect success.

Russia.

In a re-vaccination of Russian soldiers at Kasan,* Dr. Thiele observed that in 28 of each 100 cases the operation succeeded perfectly or imperfectly; that the rate of perfect success was 18¾ per cent.; and (as there happened to be vaccinated at the same time 1,436 persons presenting marks of previous small-pox) that perfect vaccine vesicles would arise just as often on persons who had once had small-pox as on persons who had once been vaccinated.

Results of 1,795 Adult Vaccinations at Kasan.

In Subjects as follows:—		Perfect Success per 100 cases.	Imperfect Success per 100 cases.
Presenting marks of previous small-pox.	1,436	18¾	5¼
Presenting marks of previous vaccination.	247	18¾	9¾
Presenting neither - -	112	29⅛	10⅛

Of nearly 24,000 re-vaccinations practised in the Danish army† in the four years 1843–45 and 1847, more than half were attended with perfect success, and more than a quarter with modified success. There remained between a fifth and sixth on whom (though most were submitted to a second trial) no impression could be produced.

Results of Danish Re-vaccinations.

Perfect success - - - - -	12,041
Modified success - - - - -	6,131
Perfect or modified success obtained at a second trial - - - - - - -	1,532
Complete failures - - - - -	4,241
Total - - -	23,945

Brunswick.

Of 1,050 re-vaccinations practised in the Brunswick army‡ in 1844, 502 gave the perfect and 130 the modified result.

Baden.

In 1844 there were practised, in the army of Baden,§ 20,483 vaccinations, and the results stated in per-centages were as follows: Perfect success, 38·6; modified success, 26·6; failure, 34·7. In a less extensive re-vaccination (3,170 cases), which had taken place four years earlier, the perfect successes had been at the rate of 26½ per cent., and the modified successes at the rate of 38½. The proportion of perfect successes was also 27 per cent. in 2,355 re-vaccinations which took place in Baden in 1842.

Effects of re-vaccination against post-vaccinal small-pox.

By the earliest of these various independent observations it was put beyond question that the same lapse of time which renders some vaccinated persons again susceptible of small-pox renders them also again susceptible of cow-pox. But it remained to be seen whether that second dose of the latter infection, which it was the object of re-vaccination to introduce, would restore such persons either permanently or for a long while, to the state of security from which they had declined; whether, by successful re-vaccination, their revived susceptibility to small-pox would once more be extinguished.

Nearly 30 years have elapsed since the commencement of this practice on a large scale, and it may now fairly be judged by its fruits.

In Wirtemberg.

As early as 1838 Professor Heim reported its results in Wirtemberg to the following effect: That during the five years, 1833–37, though small-pox infection had been 16 times imported into different regiments of the army, there had ensued among the 14,384 re-vaccinated soldiers only (in the person of one whose re-vaccination two years before had been followed by "modified" success) a single instance of varioloid. And, similarly, in the civil practice of the kingdom during the same time, among nearly 30,000 re-vaccinated persons, there had occurred only (1) a mild case of varioloid in a woman who four years before had been re-vaccinated apparently with "modified" success, and (2) a case so trifling that it was called chicken-pox, in a man who, 15 years before, at the age of 13, had been, if not re-vaccinated, at least successfully vaccinated. Yet, within these five years, the infection had been present in 344 localities of Wirtemberg, producing 1,674 cases of true or modified small-pox among the not re-vaccinated and in part not vaccinated population of 363,298 persons in those places where it had prevailed.*

In Prussia.

Better, because longer and larger, experience of the same kind is that of the Prussian army, as recorded year after year, by Dr. Lohmeyer, in the successive volumes of the "Berliner Medizinische Zeitung," from 1833 to the present time. In Prussia (just as in Wirtemberg) the practice of re-vaccination grew out of the knowledge that small-pox would ultimately attack a certain proportion of those who had been vaccinated only in infancy. This knowledge, too, had been dearly purchased in the Prussian army; for, during the ten years preceding 1831, cases of post-vaccinal small-pox were increasing in number and fatality; attacks were counted annually by many hundreds, and, within the three years, 1831–33, there had occurred no fewer than 312 deaths by small-pox. For the last 20 years the Prussian army has represented an almost entirely re-vaccinated population. And what has been the contrast? 104 annual deaths by small-pox was the last experience of the former system; two annual deaths by small-pox has been the average for the re-vaccinated army. Analysing, moreover, the 40 fatal cases of small-pox which, during the last 20 years, have occurred in the Prussian army, we find that only four of the number were of persons who (it is said) had been successfully re-vaccinated.

In Bavaria, Denmark and Sweden.

Other illustrations of the same conclusive kind may be gathered from the experience of other countries. From 1843 re-vaccination has been compulsory in the Bavarian army; and from that date to the present time (we are told) neither a single death by small-pox nor even a single case of unmodified small-pox, has occurred in that population. For the last 21 years re-vaccination has been general in the Danish army, and for the last

* Henke's Zeitschr., 1839.
† Oppenheim's Zeitschrift, vol. 27.
‡ Oppenh. Zeitschr., vol. 27.
§ Henke's Zeitschr., 1842.

* In these epidemics (as was in all where small pox has attacked a certain proportion of the vaccinated population) the mildness of the disease in such vaccinated persons, as compared with the unvaccinated, and even with those who had previously suffered small-pox, was constantly observed. The annexed Table, compiled from Heim's material, illustrates the fact. Its chief results are inserted in the table at page 74.

Total of Variola and Varioloid.	Cases, 1,677	Deaths, 198
1. Bearing marks of vaccination, or said to have been vaccinated.	1,055	75
2. Unvaccinated - - - - -	387	96
3. Having previously had small-pox - - -	57	16
4. Undetermined - - - - -	178	11

It should be added that, in Wirtemberg, great pains were taken, by isolation of the sick, to prevent any general spread of contagion.

13 years in the Danish navy; and these two populations (we are informed) have almost entirely escaped contagion during several epidemics of small-pox.* The practice of Sweden has been similar, and its results also satisfactory.†

The preceding pages have shown that a liability to post-vaccinal small-pox, does, in considerable numbers of persons, tend to develop itself from about the period of puberty, and that against this danger re-vaccination gives the desired security. It remains to be considered, as an important practical question, whether that occasional tendency to lose the advantages of a first vaccination depends on such vaccination having itself been originally imperfect.

Mr. Marson's observations have shown that the *severity* of post-vaccinal small-pox is least where the local signs of vaccination are sufficient and satisfactory. Whether post-vaccinal small-pox be less *frequent* (as well as less dangerous) in the same ratio, is as yet not certainly known. But, while recognising the affirmative to be in the highest degree probable, we must admit that small-pox, though commonly in its most modified degrees, does occur in some whose scars of vaccination are in every respect normal. So that, according to such experience as hitherto exists on the subject, it may be said that, by some change proper to the vaccinated body itself in the course of its development, the protective influence even of apparently perfect vaccination tends, more or less, with time to become weakened.

But, now reverting at length to a doubt which I have already mentioned, is there any reason to believe that this occasional impermanence of protection has, directly or indirectly, depended on impairment in the specific power of vaccine contagion? an impairment become possible since Jenner's first collection of facts? an impairment arising in the transmission of that contagion through many generations of men? On this difficult question contrary opinions have been expressed.

In a recent Annual Report (1854) of the National Vaccine Board the following paragraph occurs: "We "feel it our duty, in order to dispel any doubts which "may still affect the public mind, to repeat what we "have so frequently stated with unabated confidence, "that the vaccine lymph does not lose any of its pro-"phylactic power by a continued transit through suc-"cessive subjects, and that it is a fallacy to predicate "the necessity of resorting to the original source of "the cow for a renewed supply." This opinion, advanced with the authority of an establishment which, for nearly 50 years, has been concerned, and of late almost wholly concerned, in the distribution of vaccine lymph, is entitled to very respectful consideration. It represents, probably, the convictions of the permanent officers of the Board, Dr. Hue and Mr. Tomkins, founded on their own observations and correspondence, and endorsed by the three *ex officio* members of the Board, who, on occasion of this Report, were Dr. Paris, Mr. Luke, and Dr. Nairne.

The opinion, however, does not seem to be universally shared in other countries of Europe; and even in England it has been received with much hesitation by those unofficial persons who have given most labour and ability to the study of vaccination.

Some have argued that the vaccine contagion must naturally and inevitably become deteriorated in its successive human transmissions.‡ Perhaps it is only as against this unqualified belief that the above-quoted, equally unqualified opinion, has many adherents. App. No. 1.

Others believe such degeneration to be only a contingent danger.* But in a large concurrence of testimony it is recognised at least as a possibility which has very frequently been realised.

Facts alleged.

From so long as 40 years back, definite allegations have been made, purporting to prove that the power of vaccine lymph, as derived from successive contagions of the human subject, had progressively diminished. For instance, M. Brisset,† as early as 1818, declared that the past 10 years had made a very marked difference in the visible characters of the vaccine vesicle; adding, that, for protective purposes, it was now necessary to produce, instead of Jenner's two vesicles, eight or ten points of infection; and Dr. Meyer,‡ of Kreutzburg, not only made the important remark that, on examining, in 1824–25, nearly 4,000 vaccinated persons of all ages, he had found the older scars of vaccination much better marked than the recent ones, but also stated, on the authority of the district vaccinators, that the proportion of unsuccessful to successful vaccinations was every year growing larger; and, further, happening at this time to obtain for his own vaccinations a regenerated supply of lymph, he was able to make the supplementary observation that this almost invariably acted with effect, and that the resulting cicatrices were again after the old normal type. Other assertions to the same effect were not infrequent; but opportunities of verification were rare, and the most important investigations of the subject belong to the last 20 years.

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* Page 107.

† Page 111.

‡ In support of this doctrine, reference has been made to what commonly occurs in the *clavélisation* of sheep. In order to procure a mitigation of ovine small-pox, recourse has been had to the same sort of proceeding as used to be followed on the human subject: and the contagion of the disease has been artificially conveyed from sheep to sheep by inoculation with *claveau* or lymph, derived in the first instance from an animal having the natural disease. Monsieur Hurtrel d'Arboval, in his Dictionary of Veterinary Medicine (vol. i., p. 445) gives the following account of what ensues: "Il est une observation bien digne de remarque, c'est "que le claveau perd de son activité et de sa propriété par la "succession de son inoculation. Vierdin a observé qu'à la "cinquième clavélisation, il ne produit pas qu'un bouton unique, "et Boudouin fixe à la douzième ou quinzième clavélisation "successive le dernier degré de l'affaiblissement du claveau. "Passé ce terme, on ne remarque plus de veritable clavélée, ou du "moins on en voit très rarement. Il est donc nécessaire de re-"nouveler de temps en temps le claveau, en le reprenant sur des "bêtes attients naturellement de la clavélée." Mr. Ceely however (to whom I owe my knowledge of this remarkable passage), does not receive, without reserve, the alleged degeneration of small-pox contagion in the sheep. He expresses to Mr. Simonds (*see* the latter's work on Variol. Ovin, p. 123) his doubt whether it may not have arisen in the absence of "care and selection in the trans-"mission." But "if it be true, when great pains are taken to "repeat inoculations with lymph in a proper state, viz., clear and "limpid, it is a very remarkable and highly interesting fact, and "well worthy the attention of the members of the medical and "veterinary professions. . . . . I cannot help suspect-"ing that the difficulty consists in obtaining the virus before it is "too late, for there certainly is a difficulty."

* It is alleged that, without any fault of the vaccinator, certain subjects act deterioratingly on the contagion which they transmit; that lymph taken from them is necessarily an inefficient lymph; that such subjects must occur in every line of succession; that thus at the end of any long series of vaccinations, effected from arm to arm *without selection of subject*, degeneration will certainly have been produced. Still more frequent danger to the efficiency of successive contagions arises of course in acts of personal carelessness, to which reference is hereafter made, especially in taking lymph from vesicles too advanced in their processes (when in fact it has degenerated), or from vesicles that have been disturbed in their course by mechanical or other irritation, or by accidentally concurrent diseases (especially skin diseases) in the subject. I cannot say to what extent the various modified stocks of contagion thus originated are capable of perpetuating their degenerative types; but whatever the extent may be, to that extent the results tend to diffuse themselves in proportion to the number of vaccinations. Whether slow progressive degeneration of the vaccine contagion in its successive human transmission be or be not proved, whether its renewal at stated intervals from the cow be or be not an unconditional necessity, the practical conclusion evidently is that its operation must in every case be intelligently watched; that no line of transmission is to be continued through a subject in whom imperfect infection is produced; that at any such point the vaccinator must stop; and that from all such points as they are arrived at re-application must be made to the parent stock, not necessarily at its source, but at least at some stage of descent in which its infective powers are unimpaired. Upon each individual vaccinator must rest the responsibility of providing in his own practice against those obvious chances of deterioration of supply. It becomes difficult or impossible to fulfil this obligation, except where the vaccinator carries on simultaneously a certain number of vaccinations; so that he may be able at any time to choose between several arms as sources for continuing his contagion, and may never be tempted to take lymph otherwise than from the typical Jennerian vesicle of a thoroughly healthy subject. It is on these grounds that persons who have given most attention to the scientific culture of vaccination (foremost among whom I am permitted to name Mr. Ceely and Mr. Marson) look with some alarm on our present minute subdivision of the duty of public vaccination, as tending to reduce many public vaccinators to an objectionable alternative; either that they must have frequent recourse to extrinsic assistance, or must incur the chance of the contagion degenerating by its transmission through unselected subjects. This danger would of course be greatly increased if (as has been suggested) the subdivision were carried further by arranging for public vaccination under a kind of general contract with the entire medical profession.

† Mem. de la Société de la Faculté de Médecine de Paris, 1818; and Réflexions sur la Vaccine et la Variole; Paris, 1828. *E.g.*: "La manifestation et surtout la cessation des symptomes de la "vaccine me paraissent notablement abrégées; la marche de "cette maladie est plus prompte. . . . La tumeur vaccinale "(dont le développement est si essentiel pour constater l'activité "du virus vaccin et l'efficacité de la puissance préservatrice de la "vaccine) est infiniment moins proéminente, si même on peut "dire qu'elle existe." . . . &c.– Réflex., p. 166.

‡ Quoted by Steinbrenner, op. cit. 493.

App. No. 1.

Comparative experiments.

Successive comparative experiments by M. Bousquet,* Dr. Gregory,† Mr. Estlin,‡ Professor Hering,§ M. Fiard,‖ and Dr. Steinbrenner,¶ have established, I think, beyond the possibility of a reasonable doubt, that certain original properties of the vaccine contagion have very generally declined, after its long successive descent from the cow. It may require separate discussion whether all of these properties are of primary importance to the purpose of vaccination; but the fact at least seems certain, that, when the first difficulties of converting the cow-pox into a human contagion have once been overcome, this newly-humanised contagion shows an amount of infective power which is not usual in lymph of long descent. The former *takes*, as the phrase is, in persons with whom the latter has failed, often, for instance, in re-vaccination. It excites local changes of an intenser kind; so active, indeed, as to render caution necessary in its use. The vesicle produced by it runs a full course, compared with which the progress of common vaccine vesicles seems unduly rapid and their termination premature. Also it renders more certain, and apparently more characteristic, that slight febrile disturbance which is proper to the action of cow-pox on the human system.

Now it is important to remember, that, in the comparative observations referred to the lymph which has been stated more or less to have lost its original properties, has commonly been the current lymph of the country, the lymph of the public service. Those experiments, therefore, virtually say that millions of vaccinations have been performed with lymph not fully possessing its original endowments; and they make it at least very questionable, whether an indefinite length of transmission of the vaccine contagion, without renewal from the cow, has not been of public detriment.

Importa... of these facts in r... lation to the con... tinuance ... small-po...

For, assuming only that vaccine lymph is generally more likely to produce its expected *immediate* results in proportion as it is of short pedigree, I think this difference not unimportant. Frequent failures in vaccinating not only disappoint and annoy both parties concerned, not only discredit the operation and the operator, but likewise too often lead to an ulterior evil. Ignorant persons look rather to the mere doing of vaccination than to its success; and it constantly happens that children who have been thus nominally vaccinated are in fact left with no further attempt to secure them against small-pox.

Namely ... of infant... and othe... ruturnl ... small-po...

Likewise, looking to some other peculiarities which mark the action of vaccine lymph in its earlier generations, especially to that more prolonged course of the local eruption, and to that more decided febrility which attends it; symptoms, both of them, which seem to say that this infection grasps deeper and more largely into the system; I should very much hesitate to consider their occurrence indifferent to the ultimate issue of the operation.* Not venturing to speak otherwise than with sincere diffidence on what I deem one of the deepest problems in pathology, I must urge at least the *probability* that these symptoms may be the very signs and measures of that total bodily change which vaccination is intended to effect. If this be a true interpretation of their meaning surely a vaccination which is deficient in such consequences must inspire less confidence than another. And from the observations I have quoted, it would then apparently result that, after long periods of human transmission, the contagion of cow-pox has proved unable to excite in the vaccinated body its *maximum* of protective change; that lymph of shorter descent has been more successful in disinfecting the body of that ingredient which constitutes its susceptibility to small-pox.

and (2) post-vac... cinal sm... pox.

Is it, then, the case that an extensive use of degenerated lymph has determined that too frequent imper-

Statisti... test.

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* M. Bousquet (sur le Cow-pox decouvert à Passy le 22 Mars 1836) gives an elaborate account, illustrated with coloured plates, of the differences of operation which he observed between the current lymph of 1836, and that of a new source. One important difference was in power of *taking*: "Sur un nombre égal de "vaccinés avec l'ancien et le nouveau virus, le premier a donné "628 boutons et le second 776; différence 148, en faveur du "dernier. Et remarquez que je ne fais souvent que deux piqûres "avec le nouveau vaccin tandis que j'en fais toujours trois avec "l'ancien." This at p. 24; and, as regards some other differences, at p. 20, "On voit que le nouveau vaccin marche tout à la fois "plus vite et plus lentement que l'ancien; plus vite en ce qu'il "donne plus tôt signe de vie; plus lentement, en ce qu'il pro-"longe sa carrière beaucoup plus loin," M. Bousquet adds, that in vesicles produced by the new contagion, the lymph remained effective much later than in vesicles of the former source, and that the lymph was more effective for re-vaccination.

† Dr. Gregory (Med. Gaz. xxi., p. 860) drawing a distinction in 1838, between two qualities of lymph, says of that which he had abandoned, that "For three or four years past he had noticed a "diminution of its intensity; eight or ten incisions produced not "more irritation than the three to which I was accustomed "15 years ago. In March last, Mr. Marson, the resident surgeon, "employed lymph from a different source. The new lymph was "found to be far more intense and active than the old lymph. . . . "These facts have convinced me that vaccine lymph, by passing "through the bodies of many persons, loses, in process of time, "some essential portion of its activity."

‡ Mr. Estlin, in reference to one quality of lymph (Med. Gaz. xxii., p. 297), says, "The alterations in the vaccine infection "which have appeared to me most marked are the smallness of the "vesicle and its attendant areola; its rapid course; the absence "of constitutional disturbance; the small quantity of lymph "yielded by the vesicle; and especially the diminished activity of "its infecting power." And subsequently (Med. Gaz. xxiv., p. 153) in reference to a different supply, which he had recently derived from its source, he observes, "Having watched the virus "through 29 subjects successively (nearly one every week since "the matter was derived from the cow) I have now no hesitation "in stating, that I consider it a valuable supply of virus, more "energetic in its local and constitutional effects, and more in-"clined to produce vesicles resembling what cow-pox was many "years ago, than that employed by the National Vaccine Establish-"ment." Mr. Estlin soon after published (op. cit. p. 208) important testimony from the Vaccine Institution of Glasgow, stating that in 43 trials made with this lymph there had not been a single failure, whereas in the last preceding 43 vaccinations made with a former lymph there had been failure in 10 cases, and spurious or imperfect vesicles in nine others; that at this institution, in the course of the preceding 3½ years, there had "at four different "periods occurred an entire degeneration of the lymph, and a "consequent complete failure of the vaccination"; and that, at the very time when the new supply reached them, such a failure was being illustrated in the fact that "all the children vaccinated "upon the day week preceding, presented, instead of true vesicles, "raw surfaces resembling spots that had been vesicated and then "denuded of their cuticle."

§ Professor Hering, of Stuttgart (über Kuhpocher an Kühen, p. 166) writes, "Die von originärer Kuhpocken-lymphe bei "Kindern entstehenden Pusteln sind meist durch Grösse, stärkere "locale Entzündung, heftigeres Fieber und langsameren Verlauf "ausgezeichnet. In seltneren Fällen kommt aber auch das "Gegentheil vor. Die stärkere Einwirkung auf den mensch-"lichen Körper ist oft noch in der zweiten und dritten Impf-"Generation bemerklich. Die Impfung mit solch erneuertem "Stoffe schlägt seltener fehl als mit dem seit langer Zeit nicht "mehr aufgefrischten. Ein frieselähnliches Exanthem begleitet "manchmal die Impfung mit originärer Lymphe." In the little volume referred to there is an unusual amount of information on the subject: for, during the 10 years 1827–37, genuine cow-pox had been observed in Wirtemberg on 69 different occasions; and its contagion had been successfully transferred to the human subject at least 170 times out of about 210 trials.

‖ M. Fiard, communicating to the Académie des Sciences in 1844 the results of an experimental comparison which he had just instituted between the action of lymph then newly derived from the cow and the action of other lymph which was of eight years' descent, uses these words: "Jusqu'au huitième jour (comme cela a "lieu pour la varioloïde et la variole) la différence est nulle; mais "à dater du neuvième jour, la dessication des pustules de l'ancien "vaccin commence; elle est complète du treizième au quator-"zième jour. Le nouveau, au contraire, poursuit sa marche et "son développement plus lentement, et la dessication n'est "complète que du seizième au dix-septième jour. C'est donc, "entre ces deux vaccins, une différence de trois ou quatre jours. "Le vaccin de Jenner, après un séjour de trente-neuf ans sur "l'homme, comparé en 1836 à celui de 1836, était tombé au point "qua sa dessiccation avait lieu douzième jour, tandis que celui de "1836, comme celui de 1844, n'arrivait à la dessiccation complète "que le dix-septième jour. Il y avait donc une différence de cinq "jours. Celui de 1836, aujourd'hui, après huit ans de séjour sur "l'homme, comparé à celui de 1844, dont la dessiccation n'est "complète que la dix-septième jour, arrive à cette dessiccation du "treizième au quatorzième jour; c'est donc trois ou quatre jours "qu'il a perdu sous le rapport de la durée éruptive. Or, d'après "ce qui précède, il est évident que le vaccin de 1836, en huit ans, a "subi aujourd'hui une atténuation. Donc il faut le remplacer par "le nouveau, puis se mettre en mesure pour opérer le renouv-"ellement tous les cinq ou six ans."—Comptes Rendus des Séances de l'Acad., 1844, p. 749.

¶ Dr. Steinbrenner (op. cit. p. 252) in describing the results of his own comparative experiments, says, "On pourrait presque dire "que les pustules de vaccine ancienne sont aux pustules de "vaccine régénérée ce que les pustules de variolide sont aux "pustules de variole. En effet, comme dans la varioloïde, les "pustules du vaccin ancien sont moins développées, se dessèchent "plus rapidement, l'affection générale qui les accompagne est plus "légère, elles laissent des cicatrices bien moins profondes," &c.

* It is an interesting and instructive fact that, in the days of small-pox innoculation, questions very similar to these were raised. Jenner (op. cit. Edit. 3, p. 52) speaks of innoculation "with "inefficacious variolous matter" which gave no permanent security, though the immediate results were to all appearance sufficient. In one striking set of cases (p. 80) a surgeon had inoculated "from a pustule which experience had since proved, was advanced "too far to answer the purpose intended." The local results, which followed, and the eruptions which appeared about the ninth day (but "died away earlier than common without maturation") were such as induced the operator—and, he says, might have induced any one—"to suppose that the persons were perfectly safe "from future infection." But, of the five who were thus inoculated, "four took the small-pox afterwards in the natural way; "one of whom died, three recovered, and the other, being cautious "to avoid as much as possible the chance of catching it, escaped "from the disease through [the remaining twelve years of] life."

manence of protection against post-vaccinal small-pox? It is chiefly from national statistics that the answer must be sought; and the critical question to be asked in a country where the vaccine supply has seldom or never been renewed from the cow, is this:—Assuming that, from 1800 to 1840, every year's vaccination has included a *certain proportion* of infants who eventually (say 15–25 years afterwards) have become re-susceptible of small-pox—*has this proportion from year to year progressively increased?*

In respect of small-pox itself there are no facts, I believe, nearly sufficient in amount for even an approximative answer to this question;* but in respect of a closely kindred issue there are some materials of a very suggestive sort. For, if it should appear that the *proportionate re-susceptibility of vaccination at a given age* were undergoing a uniform progressive increase, this—like a uniform progressive increase of post-vaccinal small-pox—would make it almost certain that primary vaccination had progressively become less effective. And it is difficult to conceive how the infantine generations of a country could, crop by crop, successively derive less permanent constitutional impressions from vaccination, unless the efficient cause of those impressions—the vaccine contagion itself—has year by year undergone enfeeblement of its powers.

The case which I put as hypothetical, apparently represents the actual and immense experience of the Prussian army. There, the re-vaccination of recruits is a very uniform test. It extends annually to some 40 or 45,000 operations. It is reported on annually. Its records run back 24 years. Its total result must tell of 1,000,000 experiments; and the subjects, naturally, are of like age, in like proportions, and under like circumstances. I have already had occasion to say, that when, in 1833, this system of re-vaccination commenced, the proportion of successful results (including cases in which the success came only with a second attempt) was 33 in every 100 vaccinations. Now the annual percentages of successful results, for the whole time during which re-vaccination has been practised in the Prussian army, beginning with the number, run thus:—33, 39, 42, 46, 49, 50, 51, 54, 57, 58, 57, 57, 58, 60, 64, 64, 64, 61, 64, 69, 69, 69, 69, 70. *The last proportion of success exceeds the double of that with which the series commenced.* Thirty-three per cent. expresses the proportion in which persons vaccinated, say 20 years previously, had, in 1833, to a certain extent lost the influence of their infantine vaccination: it measures the impermanence of certain impressions produced by the vaccinations of 1813. And that impermanence (such as it was) in the effects of vaccination has increased, almost without exception, year by year, during this quarter of a century; *so that the vaccinations of* 1836—tested by eventual re-susceptibility to cow-pox—*were not half so stable as the vaccinations of* 1813.

That post-vaccinal small-pox may depend to some considerable extent on a primary incompleteness of that specific change which vaccination should have excited in the system; and that such incompleteness may have depended on an inactive degenerated state of the vaccine contagion;—these would seem, on analogy, reasonable inferences from the facts I have stated.† More than this I will not venture to say; for that remarkable series of figures, even with the observations previously alleged, does not constitute a proof, though it amply justifies suspicion.

The subject is one that deserves full and patient inquiry. Post-vaccinal small-pox has been a disappointment both to the public and to the medical profession. It has indeed been well to know of it that its attacks are mild in proportion as vaccination has been well performed. But better still would be its utter absence. The information I have quoted to you encourages a belief that, with *uniformly thorough* infantine vaccination, such attacks would be extremely infrequent as well as extremely mild; provided—on the strength of these last intimations—that an essential condition of thorough vaccination shall be the employment of lymph in its utmost original efficiency. Fortunately Mr. Ceely's scientific experiments, and the very useful proceedings of Mr. Badcock at Brighton, have taught the medical profession in this country that it is not requisite to depend, for renewed sources of cow-pox, on the casual occurrence of this disease in the dairy. And, although I do not feel justified in stating it as proved, that what partial insecurity still attends even well-performed vaccination would certainly cease under a more frequent (if careful) imitation of those expedients, yet, at least, I would urge them as deserving deep consideration.

General results as to the good of vaccination.

Finally, then, to sum up in a few paragraphs the practical results of this section, the last half-century's experience of vaccination justifies the following assertions:—

That in countries where vaccination is general, the fatality of small-pox has under its influence declined to some small fraction of that which formerly prevailed; that where formerly, in a given population, there would have occurred 100 deaths by small-pox, there may now occur as few as four or five; and that in this very greatly diminished number annually dying of small-pox the immense majority are unvaccinated or ill-vaccinated persons:

that vaccination performed in infancy in the best manner gives to most persons through life a complete security against attacks of small-pox:

that (in some—hitherto undetermined—proportion to the whole number of the vaccinated) certain persons, as they approach adult life, partially or wholly recover that susceptibility to small-pox which vaccination had once extinguished in them:

that perhaps more universal permanence might be given to the protective influence of infantine vaccination by well-devised arrangements for the periodical renewal of lymph; but certainly, that the renascent liability to small-pox may be guarded against by re-vaccination performed at about the period of puberty:

that even when small-pox is contracted by persons who, having been vaccinated in infancy, have not afterwards thus renewed their protection, the disease is greatly mitigated in favour of these exceptional sufferers; so that among the best-vaccinated of their number, according to the experience of the London Small-pox Hospital, its fatality is but $\frac{1}{5}$ and its chance of being confluent but $\frac{1}{10}$ as compared with the fatality and the chance of confluence of natural small-pox in unvaccinated persons:

that if, beyond the above qualifications, there still remain apparent exceptions to the uniform protective power of vaccination, they illustrate only that very infrequent peculiarity which occasions some individuals (especially in certain families) to suffer natural small-pox itself twice or thrice or even oftener; and

that, if vaccination were universally performed in the best known manner, deaths by small-pox would be among the rarest entries in the register.

It deserves to be noticed, however, that so long ago as 1833 Mr. Loy of Whitby gave (Med. Gaz., vol. xii., p. 48) an affirmative answer to the question: "I have observed, (he says) in my own "practice for many years, that vaccination afforded uniform pro-"tection; and since then an influence from vaccination less and "less effectual in resisting the contagion of small-pox;" and after citing instances to justify his belief, that post-vaccinal small-pox was progressively becoming both more frequent and less modified, he comes to a "conclusion, that the vaccine virus had lost parts of "its virtues," and recommends "reverting to its origin" as a remedy for this evil.

† It would not also follow that the imputed condition of lymph had been an *inevitable* consequence of its long descent. The alternatives apparently would be these; either the enfeeblement of the contagion has resulted, slowly but necessarily, from this mere fact of its many successive transmissions; or else, the effects of personal carelessness in the selection of lymph (*see* note, p. 79) are capable of perpetuating and diffusing themselves enough to affect, very considerably, the natural statistics of small-pox.

App. No. 1.

IV.—Alleged Drawbacks from the Advantages of Vaccination, and alleged Dangers of its Practice.

Retrospect.

In England, since the termination, fifty years ago, of that important inquiry which was conducted by the College of Physicians, medical literature, even of the obscurest class, contains no more mention of "new, "unheard-of, and monstrous diseases," ascribed to the influence of vaccination. Nor, so far as I know, can it be said that any person enjoying in the smallest degree the confidence of the profession, or in the smallest degree entitled to offer an opinion on medical evidence, maintains that properly-performed vaccination is a dangerous proceeding. Diseases produced by vaccination occupy in medical teaching and medical conversation about the same space as diseases produced by witchcraft and the evil eye; and it seems a waste of time to revert to what, even half a century back, was recognised to be mere stupidity or mischief-making.

Foreign echoes of our old controversy.

But in some other parts of the world these questions were not in the first instance so freely canvassed as in England; and perhaps on this account it may be that within the last ten years there have been published abroad papers which correspond to our Stuart-and-Rowley period in the history of vaccination. To the English medical reader such papers, if they come at all, come only as a kind of literary fossil; reminding him of something so utterly unpractical, antediluvian, and extinct, that the last act he would think of committing against them would be to argue. Yet these foreign publications obtained a momentary notice in the last Parliament. And now, standing at the very threshold of the subject on which I must enter, they compel some recognition at my hands.

It is really quite impossible for me to speak of such writings with even the semblance of respect. I am willing to believe that the authors are not actuated by unworthy intentions. But the works are so ignorantly and so impudently written—their staple consists of such reckless guesswork or such mere declamation and balderdash—that it would be a mockery to treat them as belonging to the literature of science.* I can regard them only as trivial romances; and accordingly, while I propose discussing in this section of my Letter every substantial statement which has been raised against the practice of vaccination, I must claim to leave unfollowed the mere meanderings of nonsense in which those writers indulge. Instead of arguing with them whether vaccination has increased men's consumption of tobacco and lessened their tendency to dance, I will bring before you—in reference to more important issues—such accurate knowledge as I can gather, from national statistics and from the records of scientific experience, as to the real health of vaccinated populations.

Questio which n fairly be asked.

For undoubtedly, as to alleged incidental evils of vaccination, there are questions which may reasonably be asked. The fifty-nine years' experience which has established the merits of vaccination—has it shown any countervailing harm? Have vaccinated persons, in acquiring their insusceptibility to small-pox, become more susceptible of any other disease? Has anything tended to show that vaccination, however perfect for its purposes, is in other respects a disadvantage?

Fallacy be guar against putting question

In proceeding to investigate this matter, there is, first, a source of fallacy to be guarded against. Those millions whom vaccination saves from one kind of premature death must of course die eventually. Susceptibility to small-pox is a very definite state of body; equally definite and distinct are the susceptibilities to other specific diseases; and it has never been pretended that man becomes less susceptible of one because he is less susceptible of the others. Vaccination is directed against the one susceptibility only; and a child whose liability to small-pox has just been extinguished by well-performed vaccination may to-morrow, like an unvaccinated child, be run over, or be drowned, or sicken of measles, or suffer with teething, or be struck with any other of the numberless shafts of death. And the vaccinated subject advancing to adolescence, to mid-life, or to old age, must encounter, like the unvaccinated, the several risks of each period of life. And obviously, if vaccination on a given day in England secures a thousand lives against death by small-pox, sooner or later those lives will be subject to the inevitable lot; sooner or later the thousand deaths will be written against the names of other diseases than small-pox; and such diseases may then be said to have been rendered more frequent by vaccination. In the same sense every life that is snatched from fire, or flood, or poison, counts at last as a death from some other cause; and to say *in this sense* that such causes are more fatal than before vaccination, is but another form of saying, what Jenner would most have wished to hear, that small-pox is less fatal than it was.

Questic its ame form.

But are deaths *proportionately* more numerous? On a given number of persons (say a million) is the general death-rate higher, or is the death-rate at any particular age higher, or is the death-rate of any particular disease higher, now, than in the days of inoculated or natural small-pox? Has the suppressed mortality of small-pox commuted itself for other premature death?

The material of vital statistics is hitherto not sufficiently perfect, indeed, the science in its more precise applications is of too recent date, for this question to be answered exhaustively. But I have collected some very strong statistical evidence on the subject; and, such as it is, it tallies very thoroughly with what pathology would suggest as probable—that to have mitigated the horrors of small-pox is, indeed, an unmixed good.

I. Gene death-r

First, for the *general death-rates*:—Taking all ages together and all diseases together, what used to be before the practice of vaccination, and what has been since the practice of vaccination, the annual proportion of deaths to a given number of living persons?

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As regards England, the means of comparing death-rates are confined to London; for before 1838 there was no general registration of deaths; and even in London they must be regarded as only approximative to the truth. During times before vaccination, there were the old Bills of Mortality; and for the last 20 years there are the Registrar-General's Reports. The Bills of Mortality are notoriously imperfect. They record not deaths, as such, but burials; and not all burials within the given area, but only parochial Church of England burials. Therefore much may have been omitted from them. But it is satisfactory to know, for the purposes of the present comparison, that whatever imperfectness there is in these records would make the older times appear less unhealthy than they were.

Now the question being whether, in proportion to the diminution of small-pox, there have grown up other influences to neutralise or even reverse the advantage,

* M. Verdé de Lisle (de la Dégénérescence Physique et Morale de l'Espèce Humaine déterminé par le Vaccin; Paris, 1855) opens his case thus:—"L'espèce humaine dégénère; aux puissantes races "des siècles passés a succédé une génération petite, maigre, chétive, "chauve, myope, dont le caractère est triste, l'imagination sèche, "l'esprit pauvre . . Remontons enfin à l'origine; la cause "unique de ce désastre multiple c'est la vaccine . Voyez cette "génération inerte, rachitique, frappée en naissant d'impuissance "et de vieillesse. Prenez-la dès le collége, froide, en proie à une "paresse triste . pauvres enfants, qui n'admettent que la malice "paisible, pour qui l'espièglerie est trop gaie, l'exercice trop fati-"guant . Suivez-les . ils n'ont jamais dansé . . Rappelez-"vous nos pères, la forte race de l'empire? aujourd'hui les com-"pagnies d'hommes de cinq pieds six pouces appartiennent à "l'histoire . . Après Voltaire, après Beaumarchais . le triste "spectacle d'une foule de petits personnages qui ne peuvent "élever leur présomption plus haut que la collaboration et la "critique . . L'Angleterre . n'a même plus ni un Sheridan, "ni un Dryden quelconque; son éloquence parlementaire s'arrête "à la pléiade contemporaine de Lord Palmerston. L'Allemagne "s'est arrêtée à Jean Paul . . En musique, à défaut des "Gluck, des Mozart . des Boieldieu . le métier nous donne "les nombreux arrangeurs. En peinture, après les Rubens, les "Van-Dick . il nous faut tomber sans transition de la puissance "de Géricault à la patience de Meissonnier. . . On prétend "être sérieux; tout simplement on est grave et ennuyé. . A un "mal, ils en ajoutent un autre; ils compliquent le premier em-"poisonnement, ils fument pour avoir l'air de penser . . Les "exemptions du service militaire . ont pris des proportions de "plus en plus considérables. . . A quoi bon l'air? Les pores "de la peau sont oblitérés, les poumons sont tuberculisés. . A "quoi bon la nourriture saine? à quoi bon préserver l'économie "des miasme pestilentiels?" etc.

It requires no medical knowledge to gauge the capacity of this fiction. Its nonsense is only to be equalled in burlesque literature; and perhaps the nearest parallel is presented in a familiar line of the *Rejected Addresses*, where the indignant author of "A Loyal Effusion" intimated that Napoleon Buonaparte had "filled the "butchers' shops with large blue flies." The physical degeneration of man is, indeed, an old cry. Every age in its turn has looked back wistfully on some imagined possession of the golden past—some strength, or stature, or nobility which belonged exclusively to its good old times. Not two of Homer's contemporaries (οἷοι νῦν βροτοὶ εἰσι) could move such stones as Ajax and Æneas hurled, and the same tendency to believe in a gradual degeneration of mankind has, from then till now, been expressed in innumerable forms. That "the world is in its dotage," is a doctrine, which a century ago, was sufficiently current and sufficiently ridiculous to be used for the purposes of the humorist. The reader of the Vicar of Wakefield remembers it in the mouth of Ephraim Jenkinson as representing just that sort of gabble which could be used for the stock speech of a sham philosopher; and Dr. Primrose might well, on the second occasion, think he had "heard all this before."

I am able, so far as the general death-rate of London is concerned, to give you the following evidence. My colleague, Dr. Greenhow, Lecturer on Public Health at St. Thomas's Hospital, has made an elaborate examination of the bills of mortality at two different periods, far apart, before the discovery of vaccination; selecting the two particular decennial terms, 1681–90 and 1746–55, only because at a central year in each of these terms the population of London was estimated, and this estimate of population is a necessary element in the comparison. Dr. Greenhow has kindly assisted me with a paper (p. 99, H.) in which he gives at length the results of this interesting comparison; and I attach the more importance to his conclusions as I know that they have been arrived at with caution and impartiality. The annexed Table gives an abstract of so much as relates to the present point. It enables you, at a glance, to judge, in respect of London at least, how far it would be correct to say, that, with the decline of small-pox, the general death-rate of the population has increased. You will notice that in the decennial period 1846–55,—*though epidemic influenza and two visitations of cholera* fell within it,—the general death-rate per 10,000 of living population was 25 per cent. less than in the decennial period 1746–55, and 40 per cent. less than in the decennial period 1681–90; having successively declined since the remoter period from 421 to 355, and from 355 to 249.

AVERAGE ANNUAL DEATH-RATES in LONDON from all Causes and at all Ages.

Date.	Per 10,000 Living.
1638–80	421
1746–55	355
1846–55	249

Materials for a similar but more extensive comparison are given from the pen of Dr. Farr, in the fourth edition (vol. ii. p. 613) of McCulloch's "Descriptive and Sta- "tistical Account of the British Empire." From this valuable paper I have extracted (seq. page 88) a Table which is of great interest in reference to all the present section of my subject; and I here insert from it those totals which illustrate the point I am discussing.

You will observe that in the successive lines of the annexed table the general death-rates of London are given for seven different periods of time during more than two centuries. The first line (A) shows for the period 1629–35 (though almost exempt from epidemic disease) a general death-rate just double our present one; in the second line (B) it is seen that for the 20 years 1660–79 (including the fatal one 1665) the rate was 3½ times as great as it now is; and in the fourth line (D) it is shown that during 10 years (1771–80) towards the end of last century, when small-pox was 14 or 15 times as fatal as now, the general death-rate was still double.

AVERAGE ANNUAL DEATH-RATES in LONDON from all Causes and at all Ages.

Date.	Per 10,000 Living.
A. 1629–35	501
B. 1660–79	800
C. 1728–57	520
D. 1771–80	500
E. 1801–10	292
F. 1831–5	320
G. 1840–54	248⅝

nmark. Means of extending such comparisons to other countries than our own are but scanty; yet fortunately there are illustrations enough to show that London is not alone in respect of the evidence which it gives. A statistical sheet (page 107) which accompanied the general information given us by the Danish Government contains an account relating to the city of Copenhagen, not only of deaths by small-pox for the years 1750–1850, but also of the total deaths, and of the births and population, during the same long period—half a century before and half a century after the introduction of vaccination. Causes of death are not (except small-pox) specially noticed; but the general result is enough to show that the statistics of Copenhagen concur with the statistics of London: for the sheet in question gives evidence of progressive improvement in the health of the population, and the year 1823, when for thirteen consecutive years there had not been a single death from small-pox, was also in other respects among the healthiest of the series. And the general progress of the population may be inferred from these particulars:—Of the 26 years 1750–75 there were 23 in which the deaths exceeded the births; of the 40 years 1776–1815 there were 25 in which the deaths exceeded the births; during the 35 years 1816–50 the births have exceeded the deaths on all but six occasions. Annually during the first period there were on an average 853 more deaths than births; annually during the last period there were on an average 304 more births than deaths.* App. No. 1.

Births and Deaths in Copenhagen.	Excess of Births over Deaths.	Excess of Deaths over Births.	Average Annual Excess.
1750–75	—	22,186	Deaths 853
1776–1815	—	3,285	Deaths 82
1816–50	10,648	—	Births 304

Sweden. The more minute statistics of Sweden (to which I must presently refer again) are equally silent as to those compensatory deaths which the suppression of small-pox is imagined to cause. In the annexed Table, ranging through the past hundred years, it is seen that in that well-vaccinated country the general death-rate of the population in 1841–50 is 29 per cent. lower than it was in 1755–75. If a third of this improvement be due to the comparative absence of small-pox, the remaining two-thirds must be referred to the simultaneous decrease of other diseases.

AVERAGE ANNUAL DEATH-RATE in SWEDEN from all Causes and at all Ages.

Date.	Per 1,000 Living.
1755–75	289
1776–95	268
1821–40	235
1841–50	205

N.B.—The *annual* small-pox death-rate during the period 1841–50 averaged less than the *weekly* death-rate from small-pox and measles during the period 1755–75.

So far, then, as these populations are concerned, it appears that, while under the influence of vaccination, small-pox has been diminishing its ravages, so under other influences have other diseases been diminishing theirs. Under other influences, I say; for the causes of fever, the causes of cholera, the causes of consumption, are several and special causes. Each disease is affected for better or worse by influences proper to itself; and the prevention of small-pox no more implies the prevention of fever than to sow barley implies the reaping of wheat. But what has to be noticed (so far as these materials inform us) is, that annihilation of small-pox may be tried for as an unqualified physical good; that hitherto there is no trace of evidence that other diseases become more malignant in proportion as that one is subdued. Conclusion from general death-rates.

It now remains to be seen whether, by a more detailed analysis of mortuary records—by inquiry into the death-rates of particular ages and into the prevalence of particular diseases—it may perhaps be possible to discover any kind of evil which the general death-rates have failed to betray. II. Death-rates at particular ages and from particular diseases.

Recent pamphleteers against vaccination chiefly rely M. Carnot's doctrine.

* Eighty years ago the notion that London might contain an increasing population seems to have been strange to men's minds. In a pamphlet of that period (letter to Dr. Lettsom, by an uninterested spectator of the Controversy upon General Inoculation: London, 1779) I read the following paragraph:—"I claim not the "merit of starting this idea of an increased population in London "as a novelty; it has been hinted by others, particularly by your "self in your medical memoirs, and by a writer who signs J. S. ., "but I think his reasoning is not quite conclusive."

App. No. 1.

on certain fragmentary statistics, collected with more zeal than judgment by a former artillery officer, M. Carnot.* This writer believes he has discovered what he calls a *displacement of mortality*, namely, that within the present century, deaths which used to occur in early infancy have come to occur between the ages of 15 and 30. He alleges that the female death-rate in Paris for the ages 15–25 has doubled in the last 38 years; that the annual mortality of the French army on home service, was 2 per 100 during the period 1819–47, but had been only 1 per 100 before the Revolution of 1789; that of male and female deaths in Paris at ages above 15, only 35 per 100 used to happen between the ages of 15 and 45, and that now 50 per 100 are in this category; that the chances of an infant reaching 41 years of age are the same now as they were in the last century; that the death-lists of Paris for 1840–49, compared with those for 50 years previously, show some diseases (typhus, cholera, dysentery, and colic) to have increased almost as much as others (small-pox, measles, convulsions, and croup) have declined; that the annual marriages in France exceed twice as much as they 40 years ago exceeded the marrying proportion ($\frac{1}{8}$) of females who annually (on Duvillard's estimate) reach the connubial time of life, and that this increase denotes a doubled annual number of second marriages, or in other words a doubled annual quantity of early widowhood; that with a greatly increased number of marriages in France there is a diminished number of births; that the births are rapidly tending to become less numerous than the deaths; that the depopulation of France is an imminent danger, which must begin to realise itself within the next few years; that gastro-intestinal disease, especially typhoid fever, is the agent of this destruction; and, finally, that the cause of this complicated derangement is the practice of vaccination.

Its logic.

Now, first, let the concluding word of the summary be criticised. M. Carnot's statistics allege a difference in adult vitality between the France of to-day and the France of last century. Supposing the statistics to be correct, does he give any sufficient reason for ascribing to vaccination that deteriorated state of adult life which he professes to have discovered? So little does he this that in any of the sentences where damnatory conclusions are drawn, if there were substituted at hazard for his word *vaccination* the mention of any other historical event belonging to about the same period of time as Jenner's discovery, M. Carnot's logic would scarcely suffer by the change, or his new conclusion be less warrantable than his first. *Post ergo propter* was never more whimsically illustrated. For the argument goes simply to claim as the *effect* of vaccination whatever evils have happened *since* its discovery; and M. Carnot's moderation may be praised, that, with the infinite resources of this proof, he did not also convict Jenner of causing last year's inundations of the Rhone.

Its facts

But are the facts such as M. Carnot pretends? I do not feel myself competent to discuss a doubtful question in the vital statistics of France: for I am but imperfectly acquainted with the relative value of those semi-official documents to which reference is made.*

M. Dupi counter statemer

Instead of offering opinions of my own, I will inform you that immediately after the publication of M. Carnot's first statements, M. Charles Dupin, before the Academy of Sciences (20 November 1848) treated the pretended discovery as an unmodified mare's-nest, and soon afterwards (4 December) advanced counter statistics, which claimed to show the expectation of human life at every age in France as having notably improved since the last century.†

Dr. Ber tillon's c culation

More recently, Dr. Bertillon, Physician to the Hospice de Montmorency, after statistical researches which include both periods under discussion, has communicated to the Academy of Medicine results which are in direct opposition to M. Carnot's deductions.‡ In the Vaccination Report of 1854 of the Academy of Medicine, M. Bertillon's labours are mentioned in terms of the highest praise, and his conclusions are adopted without reserve.

Chances against Death $\left(\frac{\text{Pop.}}{\text{D.}}\right)$ at different Ages of Life.	Successive Periods of 18th Century.				1849–50. Deaths by Heuschling, and Population by various Authorities.			
	Dupré St. Maur.	Montyon.	Messance.	Duvillard.	Population cited as Fallacious.	Population by Guillard.	Population by Mathieu.	Population by Census of 1851.
0 to 5 years	7·17	7·05	9·50	8·28	12·05	13·09	14·80	13·19
5 „ 10 „	50·16	48·90	41·93	88·10	78·11	91·89	98·89	93·57
10 „ 20 „	113·90	103·80	85·30	108·00	124·74	146·39	157·99	151·50
20 „ 30 „	67·97	66·40	64·67	73·55	73·38	86·29	92·89	93·00
30 „ 40 „	46·45	47·56	58·00	58·73	78·85	92·06	95·89	103·09
40 „ 50 „	38·34	38·67	45·00	46·14	60·57	71·29	70·40	77·09
50 „ 60 „	26·92	28·11	32·00	30·72	34·47	51·09	48·29	54·09
60 „ 70 „	17·17	17·17	18·00	17·31	21·78	25·28	23·39	24·29
70 „ 80 „	8·21	8·21	10·35	8·84	10·37	12·18	10·58	10·59
80 „ 90 „	5·63	5·56	6·68	4·68	5·21	6·12	4·78	4·48
90 „ 100 „		3·84	5·34	3·87	3·76	4·17	2·82	2·73

The above Table gives a summary of these conclusions, as stated in the report of the Academy. It states, for eleven periods of life, what was and what is the average expectation of death, viz.: first, for different times in the last century, according to the several accounts successively published (1749–1806) by Dupré St. Maur, Montyon, Messance, and Duvillard; and, secondly, for the years 1849–50, according to M. Heuschling's account of the deaths in France and to several recent accounts (one of them founded on census) of the French population. In the fourth line (which is critical for the present question) the Table is read thus:—For persons aged between 20 and 30 the chance of dying was, in the first period, one in 67·97; in the second period, one in 66·40; in the third period, one in 64·67; in the fourth period, one in 73·55; in the fifth period, according to various more or less defective

* Essai de Mortalité comparée avant et depuis l'introduction de la Vaccine en France; Autun, 1849; followed by an Appendice:—Analyse de l'influence exercée par la variole, ainsi qui par la réaction vaccinale; Autun, 1851:—Parallèle de l'état sanitaire de Paris avant et depuis la vaccine; Rév. Méd. 1856.

* Only I must observe that M. Carnot's superstructure of arithmetical conclusions rests on a treacherous basis; for his main argument proceeds from certain assumptions as to the ages of the population, and I have reason to believe that such assumptions are little warranted by existing knowledge. Death-rates at given ages, and expectations of life at given ages, are questions of proportion between the two quantities—how many at such ages are *living* and how many at such ages *die?* The latter element may generally be gathered from civil registers; but the former can only be got from a census of the population classified according to ages; and I am not aware that any such census had been made in France before the present century.

† M. Dupin concludes his paper in the following terms:—
" L'allongement de la vie à toutes les époques de l'enfance, de
" l'adolescence, de la virilité, de l'âge mûr et de la vieillesse, pour
" les personnes de conformation pareille, voilà le grand fait établi
" par les comparaisons rigoureuses que nous venons de présenter.
" C'est le bienfait obtenu par les progrès des sciences et des arts
" appliqués au bien-être du genre humain, Formons des vœux
" pour que nos démonstrations mathématiques mettent un terme
" aux assertions erronées et desolantes, propagées par mille écrits
" et par mille déclamations qui s'appuient sur les mortalités pré-
" tendues croissantes par l'effet du malheur et de la misère, qui
" diminuent au lieu d'augmenter notre patrie."—Comptes Rendus de l'Acad. vol. xxvii. p. 571.

‡ L'Union Medicale, 1855; and Rapport sur les Vaccinations pratiquées en France pendant l'anée 1854. This Report, though

estimates of the population (the first of which specially illustrates a statistical fallacy) one in 73·38, one in 86·20, one in 92·80; or finally, according to the census of the population, one in 93. Or if, simplifying the comparison, we take only the first column, which corresponds to the middle of last century, with the last column, which purports to be the most trustworthy account of the present state of life in France, and reduce the figures in both to the form of *death-rates per* 10,000 *living at the ages in question*, we find it stated, that for persons aged between 20 and 30 the death-rate used to be 147, and is now only 107½; that for persons aged between 30 and 40 the death-rate used to be 215, and is now only 97.

timate by French ademy of dicine of above tement d counter tements.

The following are the terms in which the French Academy of Medicine reports its judgment on Dr. Bertillon's work, and on the controversy which occasioned it:—

"De cette longue et laborieuse investigation il résulte
" que, de quelque manière qu'on interprète les documents
" anciens et nouveaux de la statistique, à la condition de
" n'abdiquer ni les lois de la logique ni celles de la
" science, on arrive à des conclusions écrasantes pour
" les adversaires de la vaccine en particulier, et en
" général pour les contempteurs ceptiques du progrès.
" Car ce n'est pas par l'examen d'un ou deux documents
" individuels, c'est par l'accord unanime de tous les
" documents, qu'il est démontré que, depuis le siècle
" passé, depuis l'époque qui a précédé immédiatement
" notre grand révolution, la mortalité s'est considéra-
" blement atténuée à toutes les périodes de la vie; que
" particulièrement de vingt à trente ans, âge auquel,
" d'après les anti-vaccinateurs, la variole, d'abord
" vaincue, exercerait sournoisement de mortelles re-
" présailles, le danger de mort a diminué d'environ
" un quart. Aujourd'hui, 1,000 citoyens de vingt à
" trente ans ne fournissent que 10 à 11 décès, tandis
" qu'autrefois le même nombre de sujets en donnait
" au moins 13 à 14. Et les autres âges sont beaucoup
" plus favorisés que celui-ci!

"Enfin, bien que, pour l'armée et pour la ville de
" Paris, les documents soient insuffisant pour mesurer
" avec exactitude, même depuis 1820, la diminution de
" mortalité, ils suffisent pour affirmer qu'il n'y a en
" nulle aggravation; tandis qu'au contraire des con-
" siderations puisantes démontrent pour Paris une ten-
" dance manifeste, dans un si court espace de temps, à
" la diminution des chances de mort, bien que le re-
" grettable silence de la municipalité ne nous permette
" pas de dégager complément cette tendance pour l'ap-
" précier numériquement. Rien, par consequent, abso-
" lument rien qui puisse motiver les excentriques et
" persévérantes assertions des détracteurs de la vaccine.

"Si nous voulons résumer les causes qui les ont
" égarés, nous dirons que toutes leurs erreurs ont pour
" source commune l'ignorance des principes de la statis-
" tique et l'inexpérience de sa methode, le manque
" complet de discussion et de critique, critique d'autant
" plus indispensable que les documents sont plus im-
" parfaits. A chaque instant on les voit s'appuyer sur
" des hypothèses en contradiction formelle avec les
" conclusions bien connues de célèbres et nombreux
" travaux. On les voit prendre pour mesure de la
" mortalité moyenne d'une nation, ici la mortalité al-
" légée des rentiers, ailleurs la mortalité aggravée des
" soldats. Plus loin, il confondent la table de survie
" avec la table de population, et tiront de l'une les
" conclusions que l'autre seule permettait. N'ayant
" aucune notion des lois qui régissent les mouvements de
" population, ils prennent pour une calamité la diminu-
" tion lente et progressive des naissances, bien que ce
" mouvement régulier suive la prolongation de la vie
" humaine, et détermine dans la nation la prédominance
" des âges producteurs. S'ils veulent la survie appli-
" cable à une ville dont la population est la plus mobile,
" la plus incessamment et profondément remué dans
" toutes ses parties, ils se servent d'une methode, qui
" suppose l'immobilité et la régularité absolue dans la
" succession des vivants et des mourants. Ils suppo-
" sent stationnaire une population croissante; ils la
" supposent décroissantes suivant les âges, quand elle
" croît d'un âge à l'autre.

"Il ne leur suffit point de se jouer si audacieusement
" de la statistique; ils ne respectent pas davantage les
" simples lois de calcul. Ils raisonnent, avec des quan-
" tités qui ne sont vraies que relativement à d'autres,
" comme si elles étaient vraies absolument. Ailleurs, au
" contraire, quand un rapport seul peut les instruire du
" danger de mort, ils omettent de s'en informer. Et ce
" qui est plus étrange encore que tous ces contresens,
" que tous ces défis portés à la science, c'est l'aisance
" parfaite avec laquelle ils s'y abandonnent, ne parais-
" sant pas se douter que ces matières aient pu être
" traitées avant eux; c'est sans discussion préalable
" qu'ils supposent non avenus les célèbres travaux des
" Malthus, des d'Ivernois, des Benoiston, des Villermé,
" des Quetelet, en sôrte que ce qu'on peut faire de
" mieux en leur faveur est d'accuser leur instruction
" pour disculper la légèreté de leur procédés."*

App. No. 1.

Thus much in answer to the question, whether the main facts of the case are such as M. Carnot pretends. A very slow increase, or possibly a decrease, of the French population at the present time seems indeed to be an admitted fact; and it is stated (I believe on the authority of official documents) that the standard of height for admission to the French army has of late years of necessity been reduced, because of the decreased stature of the general population; while nevertheless the proportion of conscripts found physically incapable of service has undergone a continuous increase.†

Observation of other countries.

Be it so. Admit these allegations. Admit also every arithmetical conclusion, however contested, which M. Carnot founds on ambiguous fragments of imperfect local evidence. Admit every hypochondriacal presentiment—every assertion which M. Dupin and Dr. Bertillon and the French Academy of Medicine concurrently declare to consist in mere statistical error. And what then? Would any reasonable person proceed from these particulars to construct a universal theory (the first deduction from which must be that such particulars are general in Europe), never verifying his theory by any second instance, never looking for those imputed effects of that same cause in other lands where it operates? Should it not be a first impulse to ask, are these things so elsewhere? Do other countries suffer like this pitiable image of France? Is England beginning to be depopulated? Are its women becoming less fruitful? Does Sweden show a *déplacement de la mortalité?* Is its adult life now more precarious than 50 years back? In Geneva, where mortuary records have been kept for three centuries, are any such results reported? Is the re-vaccinated army of Prussia wasting away with a quadrupled mortality? Does Bavaria, among its conscripts for military service, show an increased proportion of incapables?

The most cursory examination of this kind migh have convinced M. Carnot that, whether his arithmetic be right or wrong, his medical conclusions are untenable.

Increase of population in Great Britain.

He might have read, for instance, in the report of the census of Great Britain in 1851, an announcement (1. p. 82.) that "the most important result which the "inquiry establishes is, the addition in half a century "of 10,000,000 of people to the British population; that "the increase of population in the half of this century "nearly equals the increase in all preceding ages; and "that the addition in the last 10 years of 2,300,000 to "the inhabitants of these islands exceeds the increase "in the last 50 years of the eighteenth century." Or, so far as relates to the 19 years during which a general registration of births has existed in England, he might have learned that, with us, at least, there is no evidence of a failing fecundity; that is the early part of this period (1838–40) for every 1,000 women aged between 15 and 45 there were registered 133⅓ living births, and in the latter part of the period (1851–6) for every 1,000 such women 144⅓ living births.

Death-rates of different ages in Sweden.

And whatever fallacy belongs to the imperfect condition of vital statistics in France might have been avoided, if M. Carnot had but studied the admirable records of Sweden; where not only would he have found, in respect of that well-vaccinated country, no evidence of the "displacement of mortality" which he ascribes to vaccination, but would have seen how much better now than during last century are the chances of every period of life. In the following Table (for which I have to thank Dr. Farr) an abstract is given of the Swedish returns. You will observe that even in the penultimate period (within which the fatal cholera epidemic of 1834 killed 12,637 persons) the population at all ages under 30 years of age, consisting of course for the most part of vaccinated persons, showed a much less

* Rapport sur les Vaccinations de 1854, pp. 66–69.

† It is beyond my present business even to question the truth of these assertions; much more, to investigate what, if they be true, may have been the real causes of the alleged deterioration and comparative sterility of the French people. The subject has been a good deal discussed in the periodical literature of the day; and there M. Carnot may easily learn that for his favourite facts there exist more reasonable explanations than his own.

relating to 1854, is but recently published, and was not received here till March 25, 1857.

App. No. 1.

death-rate than the population of the like ages in the former century. And in the next period (1841–50) when vaccination would have affected at least all ages up to that of 40 years, the corresponding death-rates show an improvement on the earlier vicenniad 1821–40, and a still more striking improvement on the death-rates of the last century.

ANNUAL MORTALITY to 1,000 PERSONS LIVING.

Ages.	21 Years (1751–75).	20 Years (1776–95).	20 Years (1821–40).	10 Years (1841–50).
0–5	90·1	85·0	**64·3**	**56·9**
5–10	14·2	13·6	**7·6**	**7·8**
10–15	6·6	6·2	**4·7**	**4·4**
10–20	7·6	7·0	**4·9**	**4·8**
20–30	9·2	8·9	**7·8**	**6·8**
30–40	12·2	11·6	11·8	**9·8**
40–50	17·4	16·1	16·7	14·5
50–60	26·4	23·9	26·0	23·6
60–70	48·1	49·3	49·4	46·3
70–80	102·3	104·1	112·9	102·8
80–90	207·8	197·4	243·7	228·5
90 and upwards	394·1	351·3	396·4	375·8
All ages	28·9	26·8	23·3	20·5

The figures which are put in larger type relate to that section of the population which has been born since the introduction of vaccination, and of which (persons under 30 in the fourth, and under 40 in the fifth column) the greatest part is undoubtedly vaccinated. Of persons 10 years older, especially in the last column, many are vaccinated; of persons still older, a diminished and diminishing proportion.

As regards the city and canton of Geneva, specially interesting for comparison because of the great length of time over which the records extend, M. D'Espine, with no controversial object, arrived some years ago at results which can afford no encouragement to M. Carnot; and the appended Table is part of one in which M. D'Espine has very compendiously expressed his conclusions. You will observe, that although in its first column it bears testimony to the diminished pressure of infantile disease, the mortality which has been saved to infancy and childhood shows no signs of having been displaced into the next following periods of life. On the contrary, while the per-cental chance at birth of living to 10 years of age has increased in Geneva within the last century from 60 to 74; the per-cental chance for those who complete 10 years, that they will continue living to the age of 40, has increased from 68 to 72.

Survivance in Geneva at various periods from 1560 to 1843.	Per-centage of those Born who reach 10 Years of Age.	Per-centage of those living at 10 Years of Age who Survive to 40.
CITY OF GENEVA:		
1560–1600	42	43
1601–1700	48	53
1701–1760	60	68
1761–1800	61	71
1801–1813	69	72
1814–1833	74	72
CITY AND SUBURBS:		
1816–1839	74	74
CANTON:		
1838–1843	74	71

Annales d'Hygiène publ. et de Méd. légale, tom. xxxviii.

England.

The English population was never classified according to ages till the census of 1841; and therefore a similar comparison between its past and present condition is not possible. But at least, in looking at the comparison of a given number of deaths now in the previous century, it is easy, where one compares similar populations, to see that deaths in early adult life have not taken the place of those which formerly befell infancy. Thus, if I contrast Dr. Short's account* of 405,951 deaths within the bills of mortality of London for the years 1728–43 with an account† which I kept of 22,332 deaths registered within the city of London during the years 1848–55, I find (as to the annexed Table) that the two periods differ considerably as to the proportion which different ages contributed to every 1,000 deaths. In the former periods, persons aged 60 and upwards were only 136 per 1,000; in the latter period, were 216. In the former period, deaths under 40 years of age were 689 per 1,000; in the latter period, only 602. And of deaths at ages above 15, those between 15 and 45 constituted in the latter period not (as in Paris) 50, but about 37 per cent. This argument, of course, is not nearly so good in kind as might be drawn from the divisional death-rates of a population classified according to age; but the latter material, as I have said, is inaccessible;‡ and I adduce the present argument, though unsatisfactory, chiefly because M. Carnot has used it in respect of the Parisian population; and I wish to notice, in illustration of the essentially local character of his facts (if facts they be) that the mortuary records of London and Paris would lead him to opposite conclusions.

COMPOSITION of 1,000 Deaths in LONDON at two different periods.

Ages.	Bills of Mortality, 1728–43.	Registration of City of London, 1848–55.
0–5	435	375
5–10	36	42
10–20	31	42
20–30	76	63
30–40	91	80
40–50	93	90
50–60	82	92
60–70	62	100
Over 70	74	116

Military establishments.

Similarly, when M. Carnot deplores (it is said, mistakenly) the enfeebled health of the French army, *infiniment moins capable que leurs devanciers de supporter les privations et les fatigues inséparables de la guerre*; and when another statistician of the same school alleges that the proportion of French conscripts declared physically unfit for military service has, since 1816, been an increasing one; how obvious the course, if one would understand such facts (assuming them for the moment to be facts) to inquire whether they belong only to France, or are common to many European countries. Such an inquiry would have led the alarmists to doubt the accuracy of their own local observations. It would

* "New Observations on City, Town, and Country Bills of Mortality," &c. By Thomas Short, M.D., London. 1750, p. 92.

† Report on the Sanitary Condition of the City of London for the year 1854–5, Table VI.

‡ The only approach to a standard of comparison is that very limited one furnished by the Tontines of 1774–8 and 1790; but this (besides being insecure from the smallness of its material) is made almost inapplicable for my present purpose by the fact that the nominees in these Tontines were *selected*—chiefly of course with reference to their chances of comfort and longevity; and to compare our *average* death-rates with the death-rates of a population so selected, would be to defeat the objects of comparison. Mr. Finlaison has kindly obliged me with his calculation of the Tontine death-rates, and I have embodied them in the subjoined table side by side with certain other death-rates for the same periods of life. For special comparison with the Tontine death-rates, I have inserted the death-rates of two populations of the present time, where circumstances operated in some respect equivalently to the selection which I have described. I have taken, first, the *death-rates of the provident classes* from materials given by Mr. Neison in his recent contributions to vital statistics; and secondly, the *death-rates of the population of the 63 healthiest registration districts of England and Wales*, as estimated by Dr. Farr. These populations—the former in respect of somewhat easier circumstances and better-regulated lives, the latter in respect of advantages of residence—may be considered as select populations, fairly comparable with Tontinists. I have also inserted in the Table the general (unselected) death-rates of England and Wales, as given by the Registrar-General for the years 1845–54. I must, however, confess that the standard of comparison appears to me radically defective. The great difference between the death-rates of the two sexes of Tontinists shows, I think, one of two

have told them that in the Bavarian army,* during the period 1821–51, the per-centage of physically unavailable conscripts has not increased, but diminished, from 23¼ at the beginning of the period to 21¾ at its close: that in this army, vaccinated and re-vaccinated as it is, the death-rate for the years 1844–47 has been even better than that somewhat arbitrary standard of healthiness which M. Carnot adopts from Deparcieux's *select* lives of the last century; and that in the Belgian and Prussian armies, according to the same authority, the death-rates were little less favourable.

The preceding evidence will have satisfied you, I think, that M. Carnot's assertions are such as he cannot substantiate. You have seen that, even as regards France, his fundamental statements are flatly contradicted; and that the sanitary statistics of France, if they were such as M. Carnot pretends, would bear no such particular reference to the subject of vaccination, nor be so corroborated by the statistics of other countries, as in any degree to justify his conclusions.

Yet let me beg you, before leaving the subject, to look at it in one other aspect. Although the accusers have not been very scrupulous about their arguments, still they have thought it necessary to enter into some detail as to the mode in which the world is to be depopulated, and as to the symptoms of that vaccination poisoning which they denounce. It is well that they have done so. The more detailed an inquiry, the more advantageous it becomes to truth; and those who are accustomed to the cross-examination of witnesses will not wonder that the traducers of vaccination have committed themselves to opposite details.†

Whether these gentlemen agree or differ is, after all, of little importance. They are so ignorant of medicine, that what they accept or reject is a matter of no scientific moment. But the question whether vaccination, in rendering persons less susceptible of small-pox renders them more susceptible of any other disease, is one of pathological interest, and one which may reasonably be considered.

To a great extent it is already answered, and especially so in a practical sense. The preceding statistics having shown you for the present century frequent instances of large reduction in general death-rates, with improvements in the expectation of life at all ages, it becomes comparatively unimportant to consider whether this or that disease contributes more or less to the diminished total. But there are special classes of disease to which it is well to advert; because, respecting them, some random assertions have been made, that they, since the introduction of vaccination, have become more numerous.

I refer first to what are call *scrofulous affections*, including that terrible scourge of human life, pulmonary consumption, or phthisis; secondly, to *continued fevers*, and especially to that kind or variety (typhoid fever) in which certain glands of the intestinal canal undergo a characteristic inflammation.

It will be obvious to you that the comparison of present with past diseases is one extraordinarily liable to fallacy. Names of disease are constantly varying: not only because the language of physic changes with the general language of the country; but more especially because, as the anatomical and chemical knowledge of disease is extended, nomenclature becomes more precise, and maladies which had been lumped together under one undescriptive name get their several distinctive titles. Instead of troubling you with medical instances of this very notorious fact, I may remind you that zoology and botany and chemistry illustrate the same process. This may be seen in comparing our scientific lexicons with those of the last century, and observing that animals and plants, and chemical elements and compounds, have "increased since the practice of vaccination," simply because the study of nature has not stood still since the age of Linnæus, Buffon, and Scheele. Later science has added facts to their inventory, has recognised old affinities in another light, and broken into new parcels the former groups of premature classification. So it has been with diseases: our increased vocabulary has been in proportion to the great scientific progress of the last 30 years; it denotes that *more distinctive enumeration of disease by anatomical or chemical characters* which is due to the labour of Laennec and Louis, and Rokitansky and Bright, and innumerable others who have developed these studies of medicine. App. No. 1. past and present diseases.

Therefore I cannot refer to statistics with entire facility. But, taking such as can be found, you will notice that all their evidence points one way. Statistics of the subject.

The two annexed tables (to which I have already referred) furnish the means of comparison as regards London. The former of them gives the abstract of Dr. Greenhow's investigation: the latter is the work of Dr. Farr. As you glance below at the names of disease transcribed from the old Bills of Mortality, and as you read the notes to Dr. Greenhow's table in the Appendix (p. 101) you will appreciate the difficulty to which I just referred. Both tables have been constructed with due regard to those sources of fallacy; and it seems impossible to examine their details without being satisfied on the matter in hand. London.

GENERAL and DIFFERENTIAL ANNUAL DEATH-RATES in LONDON per 100,000 living at three different Periods, during the 175 Years 1681–1855.

DATE.	From all Causes.	From Small-pox.	From Pulmonary Affection.		From Fevers.	From Strumous Diseases.
			Including Pneumonia.	Exclusive of Pneumonia.		
1681-90	4,210	313·9	693	693	633	801
1746-55	3,550	304·4	734	734	539	1,099
1846-55	2,490	33·8	682	528	385	205

things; either that the population basis of these calculations has been too small for a trustworthy result, and that some fallacy affects the death-rate of one sex or the other; or else that circumstances, unknown to the present age, did really at the periods referred to, make that large difference between the death-rates of the sexes. In either case it would be unsafe to draw conclusions from the comparison; and therefore it is that the Table is set here rather than inserted in the text. In the last part of the Table is set the mean rate for the two sexes in respect of each of the five populations compared, and in this of course the discrepancy is concealed. But I am not prepared to say that any trustworthy conclusion may be drawn from it;—

ANNUAL DEATH-RATE per 10,000 living at AGES and in POPULATIONS as below.

AGES.	MALES.					FEMALES.					MEAN.					AGES.
	Tontines of 1774-8.	Tontine of 1790.	Friendly Societies of Great Britain.	Sixty-three Healthy Districts of England, 1849-53.	England and Wales, (Reg. Gen.) 1845-54.	Tontines of 1774-8.	Tontine of 1790.	Friendly Societies of Great Britain.	Sixty-three Healthy Districts of England, 1849-53.	England and Wales, (Reg. Gen.) 1845-54.	Tontines of 1774-8.	Tontine of 1790.	Friendly Societies of Great Britain.	Sixty-three Healthy Districts of England, 1849-53.	England and Wales, (Reg. Gen.) 1845-54.	
15-25	111·467	118·634	61·9	69·1	83·3	83·149	84·268	66·5	76·5	86·3	97·308	101·451	64·2	72·8	84·8	15-25
25-35	117·302	118·683	75·5	81·8	101·5	101·254	85·299	75·1	89·4	108·3	109·278	101·991	75·3	85·7	104·9	25-35
35-45	139·351	130·520	93·9	93·8	130·9	114·416	99·283	92·8	99·8	129·3	126·883	114·901	93·4	96·4	130·1	35-45

* "Würdigung der Vortheile der Kuhpockenimpfung," von Dr. Reiter, p. 40; and "Die Vaccination und ihre neuesten Gegner," von Dr. Haeser, p. 32.

† "Under the mastick tree" and under the "holm tree" were the small but sufficient discrepancies of two famous accusers; and this case is recalled to one's mind, as one finds that the theories which charge vaccination with destructive results differ as to the diseases by which it kills. "Les maladies du poumon n'ont pas eu "de part sensible à l'accroissement de la mortalité de la jeunesse," is the result of M. Carnot's arithmetic. "Le vaccin a corrodé les poumons," is among the impudent invectives of M. Verdé de Lisle. To the former accuser, croup is among the diseases which have diminished; while to the latter (who will admit no gleam of hope for mankind) it is among those which are "presque généralisés par le vaccin."

App. No. 1.

General and Differential Annual Death-rates in London per 100,000 Living at Seven Different Periods during the 226 Years 1629–1854.

Causes of Deaths.	Bills of Mortality.						Registration Returns (Dr. Guy).
	1629–35.	1660–79.*	1728–57.	1771–80.	1801–10.	1831–5.	1840–54.
Small-pox	180	417	426	502	204	83	40
Measles	16	47	37	48	94	86	58
Scarlet fever	?	?	?	?	?	53	90
Fever	636	785	} 785	621	264	111	101
Spotted fever	45	90					
Plague	125	1,225	—	—	—	—	—
Dysentery	221	894	50	17	1	1	9
Surfeit or Cholera	63	148	1	?	?	135	78
Pleurisy	14	6	10	5	4	39	6
Asthma and tisick	?	?	112	85	89	136	45
Consumption	1,021	1,255	905	1,121	716	567	323
King's evil (scrofula)	14	19	5	5	?	3	12
Dropsy	146	349	218	225	131	133	59
Apoplexy and suddenly	47	30	48	55	49	59	81
Palsy and Lethargy	14	17	12	18	19	28	46
Old age, bedridden	370	388	415	324	241	357	130
Casualties	65	76	85	70	40	57	77
Childbed and miscarriages	80	100	43	47	32	43	19
Chrisomes, overlaid, convulsions, worms, teething, mold-shot head, dropsy on the head, inflammation of brain, rickets, liver-grown, canker, thrush, croup, hooping-cough	1,681	1,591	1,827	1,682	789	625	} 1,314
Inflammation	?	?	10	31	101	307	
Unknown causes	?	?	?	?	?	88	
Other diseases	253	565	211	144	146	289	
All causes	5,000	8,000	5,200	5,000	2,920	3,200	2,488

Fever.

First, with regard to fever:—Dr. Greenhow, throwing into one group all those deaths of the present day which might have been included under the old application of the word "fever" (counting scarlet fever, and inflammation of the brain, and inflammation of the lungs in this category), still finds that, even with this large addition, the so-called "fever" of the present day occasions only a death-rate of 3·85 per 100,000, whereas a century ago its death-rate was close on 539. And Dr. Farr, in commenting on the somewhat similar materials which he contributed to McCulloch's work, remarks, without reference to any controversial point, that "fever has progressively subsided since 1771"; and that the combined mortality of small-pox, measles, and scarlatina is now "only half as great as the mortality "formerly occasioned by small-pox alone."

Scrofula. Consumption.

So, again, says Dr. Greenhow, with scrofulous affections. Exclude phthisis from the comparison (because of the formerly imperfect means of recognising its presence), and the scrofulous death-rate per 100,000, which in 1681–90 was 801, and in 1746–55 was nearly 1,099, is now but 206; so that, looking to the middle of the last century, the golden age of the vaccino-phobists, we find a *scrofulous death-rate more than five times as great as our present one.* And then, trying by a different process to estimate the former fatality of phthisis—examining namely, for the three periods compared what deaths have been attributed to diseases of the respiratory organs—we find that, even with the utmost amplification of this list (including pneumonia, which formerly may have been counted to "fever," and including respiratory affections of infancy, which would formerly have been counted to "chrisomes," and including similar affections of advanced life, which would formerly have been counted to "old age"), still *the pulmonary death-rate of the present time is 7 per cent. lower than the pulmonary death-rate of* 1746–55. Dr. Farr's conclusions quite confirm the tendency of Dr. Greenhow's evidence; and he remarks, as the general result of his inquiry, that "the proportion of persons "destroyed by consumption with other forms of scrofula "has (except in the anomalous period 1771–80) pro-"gressively declined in London."

Circumstantial in particular cases fatal to M. Carnot's theory

As regards more detailed statistical inquiries, such, namely, as depend on the minute examination of particular cases, it may be observed that there has never been adduced a title of evidence to show that vaccinated individuals suffer more than non-vaccinated individuals from any ailment whatsoever. On the contrary, where such inquiries have been made, they have distinctly refuted the supposition.*

* That death-rate of 8 per cent., the average for London during the 20 years succeeding the Restoration, may have been in Mr Macaulay's mind when he wrote a beautiful passage in his history (end of Chapter III.) criticising the delusion "which leads men to "overrate the happiness of preceding generations." "It is now "(he says) the fashion to place the golden age of England in "times when noblemen were destitute of comforts the want of "which would be intolerable to a modern footman; when farmers "and shopkeepers breakfasted on loaves the very sight of which "would raise a riot in a modern workhouse; when men died "faster in the purest country air than they now die in the most "pestilential lanes of our towns, and when men died faster in the "lanes of our towns than they now die on the coast of Guiana." According to M. Carnot there ought to have been very little natural small-pox in those days. What say our diarists of London life? In the pages of Pepys and Evelyn there are many references to small-pox; from 1660—when "in the midst of all this joy and "jubilee, the Duke of Gloucester died of it in the prime of youth, "and a prince of extraordinary promise"—to January 1695, when (the disease having already raged for two months, and the queen having died of it) "the deaths by small-pox increased to 500 more "than in the preceding week;" and perhaps the strongest expression occurs in the very middle of that period when other diseases were so fatal. In 1668 (Feb. 9) Pepys writes, "and among other "things, if I have not already set it down, it hardly ever was re-"membered for such a season for the small-pox as these last two "months have been; people being seen all up and down the streets "newly come out after the small-pox." It was in 1685 that Evelyn (as he relates "in bitterness of sorrow and reluctancy of a tender "parent") lost his own daughter by the disease.

* In the year 1814 Mr. Macgregor, then surgeon to the Royal Military Asylum at Chelsea, published (Med. Chir. Transact. vol. v.) an account of observations which he had made in that establishment during the ten preceding years in order to ascertain "whether measles, hooping cough, and scarlet fever had been more "fatal and severe in the children, male and female, that had "undergone vaccination, than in those that had been subjected to "the casual or inoculated small-pox." Of children in the latter category there had been 1,550; among whom had occurred 420 cases of measles, hopping cough, and scarlet fever, leading to 19 deaths. Of children in the former category there had been 891; among whom there had been 239 cases of the same diseases, leading to nine deaths. The fatality of these diseases, then, to such as they attacked was one in 22 among the variolated class; one in 26½ among the vaccinated class; so that what difference existed was in favour of the latter.

App. No. 1.

As soon as M. Carnot's assertions were made public, as soon as he had committed himself to a statement* that typhoid fever was to be considered as the vaccinational substitute for small-pox, there was something definite for the physicians of France to investigate. They proceeded to do so. They did not shelter themselves under any general arguments. They did not confine themselves to saying to M. Carnot, that where he had found a new disease there was really but a new name. They did not superciliously refer him to common text-books of medicine, from which he might learn what were the ravages of typhoid fever, under other names, long before the discovery of vaccination. But with a candour and humility which did them honour, they accepted the medical hint of their arithmetical opponent, and set to work on the subject. And with what result? Why, that as fast as facts could be collected, the facts refuted him;† that the typhoid infection was observed not only to pay no special regard to the unvaccinated, but even to attack persons in the very hour of their emergence from small-pox; that, conversely, small-pox would attack others in their actual convalescence from typhoid fever; that to have had the one disease, or to have escaped it, made absolutely no difference to having the other disease or escaping it; susceptibility to the one infection standing in no discoverable relation towards susceptibility to the other, and vaccination having no more to do with typhoid fever than with any other casualty of life which befalls vaccinated and unvaccinated alike.

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Second class of facts fatal to M. Carnot's theory.

What happens when vaccinated persons are exposed to variolous infection.

Apart from those demonstrations, a second great series of facts, observed for the last 50 years, is conclusive against M. Carnot's imagination.

When masses of vaccinated persons are exposed to the infection of small-pox, if some of them suffer, do they suffer typhoid fever or any intestinal ulceration, inflammation, or disturbance? Here is exactly M. Carnot's postulate, small-pox infection acting on the vaccinated body; and the result is among the most extensively and most accurately observed phenomena of clinical medicine. In it there is the utmost possible refutation of M. Carnot. On his showing, there should be typhoid fever. In fact, there is nothing like it. Under the happy influence of Jenner's discovery, the small-pox is mitigated, perhaps almost to nothing. A few pustules, rapidly drying up, may alone attest that the once dreadful enemy is working in vain against a protected body. Of typhoid fever, of intestinal complication, of any other like disturbance, there is literally not a trace. But, just in proportion as the pustules are few, just in proportion as the protectedness against small-pox has been all but complete, so, in diametrical contrast to M. Carnot's notion, the other sufferings of the patient will be slight and his convalescence rapid.

Sanitary experience of the real causes of typhoid fever.

It may further be observed, that investigations made in this country have established among the certainties of medicine that typhoid fever mainly depends on causes quite remote from the causes of small-pox. And in respect of those districts or institutions in France where this disease is said to decimate the inhabitants, I will venture to affirm, as confidently as if I had visited the localities, that any qualified person inquiring into the *diet and atmosphere* of such populations, especially into their drinking water, drainage, and domestic arrangements for cleanliness and ventilation, would be able readily to explain from local circumstances and almost as readily to obviate by local improvements, any such specific mortality as M. Carnot alleges to exist.

Scrofulous affections.

As regards the second class of diseases to which special reference has been made, the scrofulous or tubercular class, the pathological argument is at least equally applicable. The causes of such disease are radically different from the causes of small-pox. To talk of such diseases being the vaccinational varieties or introversions of small-pox, to talk of their promising to be developed in proportion as small-pox becomes suppressed, is simply to talk at random.

What is meant by scrofula.

There are two scientific senses in which the word *scrofulous* is used; first (somewhat indefinitely) in

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* In this doctrine M. Carnot has found two adherents, whose works require no distinctive notice; viz., M. Ancelon, who has written "des transformations des fièvres essentielles dont le cow-pox est la cause," and M. Bayard, who has communicated similar crudities to the Academy of Sciences. The following passage from the *Comptes Rendus* of this body (Feb. 10, 1851) may be conveniently quoted, as expressing in a succinct form those doctrines of which my text shows the refutation:—"M. Bayard, "dans cette nouvelle note, présente une série de propositions se "rattachant toutes plus ou moins directement à cette idée déjà "soutenue par lui dans ses précédentes communications, que la "maladie désignée sous le nom de fièvre typhoïde n'est qu'une "variole interne attaquant les individus que la vaccine a préservés, "dans leur jeune âge, de la variole avec eruption externe. De ces "douze nouvelles propositions, nous nous contenterons de repro-"duire les deux suivantes. XI. La variole confluente et la fièvre "typhoïde ne sont, très-probablement, qu'une seule et même "maladie, externe dans un cas, interne dans l'autre, produite par "la combinaison du typhus et de la variole. XII. L'inoculation du "virus varioleux dans l'enfance préserve le sujet inoculé des com-"plications, souvent mortelles, dues à la combinaison de la variole "avec les causes morbides intercurrentes."

† For instance, in the Report for 1852 of the Vaccination Board of the Department of the Rhone, Dr. Roy, of Lyons, writes as follows:—"Une jeune fille varioleuse avec taches ecchymotiques "entrée au mois d'Octobre dans notre service, succomba dans les "vingt-quatre heures qui suivirent son entrée. Trois jours après, "deux malades convalescentes de fièvre typhoïde sont prises de "variole; une d'elles a succombé. Nous avons observé deux cas "de fièvre typhoïde chez des ouvrières qui portaient des cicatrices "nombreuses de variole antérieure."

And again, the Report for 1853 of the same Board, besides other references, quotes these cases from Dr. Piérou:—"Dans une "maison, les six personnes qui l'habitaient ont eu, en 1853, la "fièvre typhoïde; sur ce nombre, deux avaient eu antérieurement "une variole confluente, ce qui n'empêcha pas la fièvre typhoïde "d'être aussi grave que chez les personnes vaccinées. Un homme "de 48 ans, soignant son fils vacciné, atteint de fièvre typhoïde, et "portant lui-meme des traces de variole confluente antérieure, a "eu la même fièvre que son fils; tandis que sa femme, bien "vaccinée, en fut exempte, quoiqu'elle eût soigné son fils et son "mari, passant les nuits près d'eux pendant près de deux mois. "Enfin, M. Piérou cite encore deux femmes, avec cicatrices vario-"liques nombreuses, atteintes plus tard de la fièvre typhoïde."

Subjoined to the latter Report is a paper which had recently been communicated to the Académie de Médecine of Lyons, by Dr. Teissier, Physician of the Hôtel Dieu; telling that among 170 cases of typhoid fever which, during the past eighteen months, had been under his treatment, there were 30 where the patient bore marks of previous small-pox; and adding, that within the same period he had seen more than 20 illustrations of small-pox attacking persons who had previously had typhoid fever; two of whom were at that moment still in his ward, having been seized with the former disease when just convalescing from the latter.

The Paris Academy, in its report for 1852, speaks of interminable facts of the same sort, specifying only a few of them:—"M. Barth "a vue, dans son service à l'hopital Beaujon, quatre cas de fièvre "typhoïde sur des sujets non vaccinés, et marqués de la petite "vérole. Un seul est mort, c'était justement le plus marqué. Et "l'inverse, il a vu encore plus souvent la petite vérole après la "fièvre typhoïde. . . . . M. le Docteur Lasnon a raconté "qu'appele dans le cours d'une épidemie, pour voir quatre enfans "de la meme famille, il out la douleur de voir périr les deux "garçons, âgés de 25 à 26 ans; les deux sœurs s'en tirèrent, mais "elles ne se relevèrent de la petite vérole que pour mourir plus "tard de la fièvre typhoïde. . . . . Un honorable académicien "a trouvé dans un seul rapport dix-sept cas de fièvre typhoïde, dont "neuf sur des sujets qui avaient eu la variole naturelle."

In the Gazette Médicale de Paris, 1854 (p. 580), Dr. Thore writes a paper, in which, besides quoting similar cases from several other authorities, he details from his own experience, as follows: first, eight cases of typhoid fever, sometimes of great severity, following small-pox in non-vaccinated persons aged from 19 to 51; and secondly, six cases of small-pox, modified and unmodified, following typhoid fever in vaccinated and non-vaccinated persons aged from 9 to 20. Dr. Thore appropriately quotes Stoll's information about fever in Vienna in the last century, to the effect that, during a period of 12 years, about two-fifths of all Vienna deaths were produced by it, and that it proved fatal to nearly one seventh of all whom it attacked.

Professor Forget, of Strasburg, had published in 1852 (Gaz. des Hôpit. p. 79) an important memoir, discussing the question on general pathological grounds, and giving cases in support of his opinion. He institutes an extended comparison of the two diseases, as to their respective anatomical affinities and the nature of their morbid processes, and the symptoms (especially the relation of the fever to the local changes) of each. He argues that "l'apparence "pustuleuse de la dothinentérie est exceptionelle et ne constitue "qu'une forme assez rare;" and he concludes, "(1) que la com-"paraison entre les deux maladies n'est pas soutenable; (2) que "l'enterite folliculeuse ne préserve pas de la variole; et (3) que "l'une pouvant succéder immédiatement à l'autre et vice versâ, "c'est le comble de l'inconsequence que d'établir entre ces deux "affections une solidarité que rien ne justifie."

A careful description by M. Blot, communicated to the Société de Biologie (Gaz. Méd. 1854, p. 731), illustrates this further point; that when, rarely enough, small-pox does develop pustules along the intestinal canal, these differ essentially in their distribution and character from that affection of a specific glandular structure, which is characteristic of typhoid fever. It is remarkable, too, that in M. Blot's case not even M. Carnot could have regarded the intestinal pustules as *la variole détournée par le vaccine:* for never had patient been so little vaccinated: the intestines were those of a *fœtus;* the mother herself, not vaccinated, had had modified small-pox; and the intra-uterine child had thus contracted small-pox, died, and been expelled. In addition to an abundant variolous eruption on the skin there were great numbers of pustules in the stomach, and all along the small intestine at every part of its circumference.

In *Canstatt's Jahresbericht* for 1851 I read of a paper by Dr. Debourge (published in the Brussels *Journal de Médecine*, Nov. 1851) answering M. Carnot with the following illustration:—A village in M. Debourge's neighbourhood had been visited by typhoid fever so severely, that almost the whole population—especially that part which was between 20 and 40 years of age—had suffered. Four years afterwards, small-pox prevailed there (nearly the whole population being unvaccinated) and attacked and killed indiscriminately those who had, and those who had not, suffered from the typhoid infection.

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reference to sub-acute and chronic *inflammations*, often of an ulcerative kind, which arise, generally with little or no exterior provocation, in various textures of feeble and ill-nourished persons; secondly and more strictly, in reference to a specific constitutional weakness, which more or less disqualifies the circulating juices of the body from ripening to their natural pattern, and disposes them to such modification of development as results in their partial solidification and concretion into *tubercles* of dead material

Scrofula without tubercles.

Its real causes.

Scrofula in the first-mentioned sense is not independent of hereditary influences; but its principal causes have to do with the mere keeping and feeding of the individual sufferer. Scientific experiments can produce it in the brute creation; and unintentional experiments on millions of mankind have shown, on an awful scale, how mere an index it is of bodily depression—how sadly it is the sequel of poverty and privation—how constantly it goes with grief and hunger and squalid uncleanliness, with exhausting toil and monotonous imprisonment.

Vaccination a powerful indirect influence against it.

It would be difficult, therefore, to conceive against vaccination a charge more ludicrously inapplicable, than that it has tended to aggravate diseases which are essentially the diseases of debility. For if you compare the extreme degree in which natural small-pox weakens and exhausts those whom it refrains from killing, with the contrary and entire absence of such results among the ordinary effects of vaccination, you have in this comparison a measure of the important influence which Jenner's discovery has exerted—not in aggravating, but—in mitigating the diseases in question.

Scrofula with tubercles.

Phthisis.

Its real causes.

Scrofula—in that second-mentioned and more definite sense which restricts it to pulmonary consumption and other tubercular affections—eminently tends to be an hereditary disease. In persons hereditarily predisposed to it, some circumstances will very much promote, other circumstances will very much impede, its manifestation. But the root of the disease lies beyond very immediate contact with exterior conditions. It lies in those *laws of development* under which the chemical changes of the body, like its growth of stature and of features, are made conformable to a particular parental type; it belongs to the family-likeness between parent and child; it forms part of a definite entail. So little does it stand in any apparent connection with vaccination, that on the contrary—it even shows marked preference for those very periods of life, when the protective influence of infantine vaccination has often partially become obliterated.

What then do those writers mean who talk of tubercular diseases being made more frequent by vaccination? Do they mean that vaccination *propagates* from one person to another the developmental peculiarity which I have described? They might as well say, it communicates a Roman nose or a landed estate. Do they mean that in persons or families there is evidence of an *inverse proportion* between small-pox and tubercular diseases? Nothing of the kind exists. Do they mean that such ingredients of the skin as constitute its susceptibility to small-pox are *transmutable* into those elements of blood and lymph which, in scrofulous persons, are blighted into the characteristic substance of tubercle? All known facts and analogies tell to the contrary. Or do they mean, comparatively speaking, that vaccination belongs to the *circumstances which promote*, and small-pox to the circumstances which impede, the manifestation of the hereditary tendency? Again I say, only let them read the history of small-pox. In respect of these tubercular affections, as of the mere scrofulous inflammations previously discussed, let them note that, among recognised developing conditions of both classes of disease, *impoverishing and depressing influences* hold, by common consent, the most considerable place;* that, so far as we know, it is only as an impoverishing and depressing influence that either small-pox or vaccination can be imagined to operate; that all writers on small-pox attest the frequency with which scrofulous affections follow in its train; and that in such measure as vaccination is less impoverishing and less depressing than small-pox, in just such measure does its substitution for small-pox act in prevention of scrofula.

Vaccination indirectly preventive of tubercular, as of non tubercular, scrofula.†

Summary of results on the morbid liabilities of vaccinated persons.

So far, then, as regards properly-performed vaccination, there is absolutely no reason to believe or suspect that, in rendering persons less liable to contract small-pox, it renders them eventually more liable to contract other diseases. Neither in speculative pathology, nor in common practice, is there the slightest semblance of support for any such doctrine. It ranks with the old misgiving that vaccination would make horns grow, and cover the body with cow-hair. Those who would have believed the one may believe the other.

What do vaccinations really do to the human body?

Is properly-performed vaccination, then, an absolutely inoffensive proceeding? Not at all, nor does it pretend to be so. The very meaning of the thing is, that it shall artificially and designedly produce a transient and trifling indisposition; that for some days the infant shall be uncomfortable with a sore arm and a slight irritation of the adjacent axillary glands, and a perceptible amount of general feverishness. Within the limits of this description, one child may be a little more, another a little less, inconvenienced; but those limits are rarely exceeded. And if it cannot strictly be said that the immediate effects of well-performed vaccination *never* exceed the intentions of the vaccinator, at least it may be affirmed that any permanent injury resulting from it is an accident barely known in the practice of surgery.

Does vaccination cause cutaneous eruptions and glandular swellings?

Persons hostile to vaccination allege against it, that it produces eruptions on the skin and glandular swellings; and others, not unfavourable to the practice, doubt whether this may not to some extent (and especially as regards unhealthy-predisposed scrofulous children) be a true allegation.

Vaccination might afford to bear these imputations. For, to what do they amount? Were they ever so true, the alleged evil, even to the sufferer, would be little in comparison with his gain; and the total amount of such evils, compared to the social advantages of vaccination, would, literally speaking, be too small to appreciate.

Circumstances under which these disorders occur.

But, in fact, the imputation is—at least generally—erroneous. There is in it again that common fallacy of calling whatever happens to come after an event its effect. *Propter, quia post.* The infant is commonly vaccinated at three or four months of age. Thus whatever physical or moral evils belong to human life are very likely to have been preceded by vaccination; and it is not extraordinary that, especially by ignorant persons, this operation should often be charged with producing incredible results. When you consider, too, that the few months after vaccination include events which are very critical to infant life, you will see what frequent room there must be for misconception. Even to the healthiest and best cared for of children, weaning and teething are not perfectly safe and comfortable processes; to delicate and ill-nurtured children they are often fatal; to vast numbers they occasion, sometimes during many months, distressing or alarming symptoms. Such symptoms, I need hardly tell you, affect both vaccinated and unvaccinated. They have been known

* Monsieur d'Espine, of Geneva, has attempted to measure, with some degree of statistic precision, the influence of poverty in producing certain diseases. He says:—"Les décès par vice scrofuleux "forment le $\frac{31}{100}$ des décès déterminés dans la mortalité générale, "le $\frac{1}{100}$ des décès des riches, et le $\frac{121}{100}$ des décès des pauvres. La "prédisposition scrofuleuse chez les pauvres est ici aussi frappante "que l'influence préservatrice de l'aisance. Les décès par vice "tuberculeux entrent pour les $\frac{7}{100}$ dans les décès déterminés de la "mortalité générale, tandis que chez les riches il n'y a que 68 décès "pour 1,000 qui se rapportent aux tubercules; chez les pauvres, on "en compte 233 pour 1,000. Ici encore on trouve une influence "très predisposante de la misère et une action préservatrice de "l'aisance."—Annales d'Hygiène Publique, t. xxxviii.

† It deserves notice, that this indirect *prevention of scrofulous affections* was among Jenner's hopes when he announced the discovery of vaccination. In various passages of his writings (*e.g.*, op. cit. pp. 60, 116, 181) he refers to the notorious frequency with which such affections were excited by small-pox; and he appeals to general consent as to inoculated small-pox often occasioning them. "In constitutions predisposed to scrofula, how frequently "we see the inoculated small-pox rouse into activity that distressful "malady. . . . Every practitioner in medicine who has extensively inoculated with the small-pox, or who has attended many "of those who have had the distemper in the natural way, must "acknowledge that he has frequently seen scrofulous affections, in "some form or other, sometimes rather quickly, showing themselves "after the recovery of the patients." It is worth while to remember that these charges were brought against the practice of small-pox inoculation long before the discovery of vaccination; and not only amid the frantic prejudices against its first introduction, but even to the end of the century, when certainly its dangers in this respect must have been greatly diminished by the improved methods of treating inoculated patients. In a pamphlet written between 1798 and 1798 earnestly in defence of inoculation (Advice to Parents on the Management of their Children in the Natural Small-pox and during Inoculation: Newark and London, n. d., p. 3), I find the following passage:—"The propriety of inoculation is confirmed "as well by reason as experience; and though some unfavourable "circumstances have happened in the hands of ignorant and illiterate persons; though repeated eruptions have given rise to the "false report of patients having the disease a second time; though "the *vis vitæ* of some whose constitutions were not very strong, "and the proper medicines through a want of skill not duly proportioned, has been injured; though persons with weak lungs "have been thrown into pulmonic complaints; yet these contingencies are by no means to be charged to the method itself."

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as incidental to infancy from periods long anterior to Jenner's existence. Now, an extremely frequent one of such symptoms is an inflammation of skin (known by the technical name of *eczema infantile*) producing on the child's head and face, or on other—perhaps many or most—parts of the body a dense eruption of little pimples, which presently convert into an itching and discharging surface so much of the skin as they occupy; and since irritations of the skin are peculiarly apt to propagate themselves in the direction of the return-current of the circulation of blood to certain organs—the so-called *lymphatic or absorbent glands*—which are subsidiary to this circulation, so it very commonly happens that more or less irritation and swelling of these glands will accompany that eczematous eruption; and that, for instance, the child who has the eruption about its head and face (which are among the most usual seats of the unsightly disease) will often be still further disfigured by glandular swellings in the neck. Though I have spoken of this infantile complaint as incident to the time of teething and weaning, yet in fact it may arise at earlier periods of life, even within a few weeks of birth, and, of course, before vaccination as well as after it. Indeed, frequently it is a reason for which vaccination is postponed; and perhaps I can give you no readier means of estimating how little vaccination has to do with its occurrence, than by telling you, first, that before the discovery of vaccination small-pox inoculation was charged with producing it; and, secondly, that in 1714, when small-pox inoculation was yet unknown in England, Dr. Daniel Turner* expressed himself in the following terms: "Among diseases of infants and young children scarce any attends more frequently than pustulary or scabby eruptions in several parts of their bodies, as in the breech, but more especially their foreheads, brows, and other parts of the face, which we find oftentimes overrun with dry and crusty scabs."

ir relation, direct indirect, vaccination.

The circumstances under which both infantile eczema and glandular swellings arise are familiarly known to the medical profession. To say that properly performed vaccination can have *directly* to do with them, that it can directly cause general eczema, or directly affect any glands but those which it is intended and expected to affect, would be an assertion not warranted either by practical experience or by any pathological probability. To say that *indirectly* it may do so, that, in the very few instances where it produces excessive results, the disturbance thus occasioned may, by depressing or fevering the child, temporarily assist or excite other causes of disturbance, that, under such very exceptional circumstances, it may for the time of its operation predispose the child to this complaint and to that, may excite the scrofulous child to show its scrofula, and the eczematous child to show its eczema, these are assertions which may or may not be true; which are more easily made than either established or refuted; but which, if admitted in their utmost scope, really allege against vaccination nothing which might not as practically be alleged against a cold in the head, a cut finger, an undigested meal, or any other one of the thousand minor accidents of everyday life.

So much for what has been alleged against properly performed vaccination, against such vaccination as alone ought to prevail in any country where the State requires its performance. So much for the drawbacks which have falsely been said to detract from its inestimable advantages, and the dangers which, with almost equal falsehood, have been said to attend its performance.

-performed vaccination.

It is less easy and less necessary to dispose of what may be said against ill-performed vaccination; understanding in this phrase not merely such vaccination as is done with an unskilful hand, for commonly the worst effect of clumsiness is only that the operation fails; but especially referring to such vaccination as is done without due inquiry into *the health of the child* to be vaccinated, or without due care for *the quality of lymph* to be employed.

xtreme cessity careful- ss in cination;

If local scandals have arisen against vaccination, and if some prejudices against it seem to have in them a show of reason, those are the sources from which such serious evils have come. All that belongs to the mere manual trick of vaccination is learnt from a minute's teaching and an hour's practice; but not so easily the philosophy of the procedure, or the precautions which are requisite to make it harmless and useful. From Jenner onward, all great masters of vaccination have urged that its merits will always appear proportionate to the merits of its performers; that if sickly children are vaccinated without due regard to their actual condition of health, children breeding other disorders, children having skin disease, children teething, and the like; or if children, healthy or unhealthy, are vaccinated with improper material, the results must be at least unsatisfactory, and possibly dangerous. And all competent persons accordingly recognise that one who would vaccinate must thoroughly study these things.

especially to choice lymph.

Especially as regards the quality of vaccine lymph, the careless or uneducated vaccinator is using a dangerous weapon. It is only during part of the course of a vaccine vesicle that its lymph is suitable for further vaccinations; for after a given moment, at which the contents of the vesicle possess their maximum of simple contagiousness, they tend more and more towards the quality of common inflammatory products; and matter now taken from the vesicle is no longer the simple agent of a specific infection, but both has less efficiency for its real purpose, and is specially able to produce other undesired results. A danger of somewhat similar kind is that of taking lymph from vesicles which already have been accidentally ruptured, or where from any other cause, local or constitutional, their specific fluid is likely to have been modified by common irritative processes. Still more critical changes occur in lymph when removed from the body, unless appropriate means be taken to preserve it; for, under the influence of air and moisture, it tends, like other dead organic matter, to putrid decomposition; and inoculation with it, when thus changing, can hardly be more useful or less dangerous than a casual scratch inflicted in the dissecting-room. According to the usual practice of vaccination, error is less likely to be committed in this particular than in the one first mentioned; for, when the operation is not performed from arm to arm, use is very generally made of lancets or ivory points on which lymph has been allowed to dry. Under this system (at least in our climate) the matter is almost secure from change; and there is little room for such accidents as might arise from failure in those delicate procedures by which lymph is sometimes kept moist for use. But the danger of taking matter from irritated vesicles, and from vesicles at too advanced a period of their course, is one which circumstances render frequent; and there is reason to believe that, in at least a very large proportion of those cases where abnormal effects have resulted from so-called vaccination, it has been the employment of this ambiguous irritative matter which has occasioned the mischief and scandal.

Can accidental infections occur in vaccination?

Suspicions are sometimes expressed that a slovenly vaccinator, careless in his choice of lymph, may thus communicate to one child the constitutional or local diseases of another. If this were true, it were nothing against vaccination. It is no argument against bread, that alum constipates the bowels; still less it is an argument against quinine, that some drunken shop-boy may give one strychnia instead of it. And, without intending disrespect to gentlemen whose opinions on this point may be less decided than my own, I must say that I believe it to be utterly impossible, except under circumstances of gross and punishable misconduct, for any other infection than that of cow-pox to be communicated in what pretends to be the performance of vaccination. A vaccinator must forget his duty in more than one particular; he must be indifferent both to the feelings of others, and to the social progress of the great good which he claims to administer, if he affronts the natural antipathies of those who bring their children to be vaccinated, by drawing his lymph for vaccination from the vesicles of diseased subjects. And, practically speaking, I can conceive no circumstances in this country which would justify a departure from the rule (recognised by the medical profession as unreservedly as it is desired by the public) that lymph be taken only from healthy subjects.

Opportunity of testing it ought in fact never to occur.

But, supposing that, in breach of this rule, lymph be taken from the Jennerian vesicle on the arm of a subject suffering constitutional disease; what then? *On the assumption only that it be a true Jennerian vesicle at the proper period of its development*, there are cogent reasons for believing that such vaccination can produce none but normal results.

Vaccine lymph from persons suffering small-pox.

There is one simple mass of experience, which, to my mind, seems conclusive. It has been proved on a large scale that vaccine lymph, taken from persons actually suffering small-pox, conveys to those who are vaccinated with it no other than the vaccine infection. This most remarkable truth has been established, I say, on a large scale; for, not once or twice, but at least hundreds of times, something to the following effect has occurred. A patient has been vaccinated a little too late for pro-

* Treatise on Diseases of the Skin, p. 44, where the references given by Turner extend back to Galen.

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tection. He had previously been exposed to an atmosphere infected with small-pox. Warned of his danger he has had recourse to vaccination when already small-pox was latent in his system; and (under a law which expresses the intimate affinity of these two agents) the operation of the inhaled variolous contagion, and the operation of the inoculated vaccine contagion, have proceeded simultaneously on his person; the former producing the general disturbance and general eruption of small-pox; the latter producing, at the vaccinated spots, characteristic Jennerian vesicles. And with the lymph of these vesicles, again and again, successful vaccination has been performed. Again and again it has been shown that such lymph is capable only of communicating the Jennerian infection.

Extension of this analogy.

Since then it is a quite unquestionable certainty that, even when the system is drenched with that subtlest infection of small-pox, the Jennerian vesicle preserves its own contagion pure and isolated, the argument may reasonably be extended. And, even if there were no evidence in relation to other diseases, this analogy would have rendered it eminently improbable that any, the most infectious, of their number could admix its contagion with the specific products of cow-pox. Indeed, so definitely and so constantly characterised are those local changes which different morbid poisons severally and specifically produce, that to say of a given phenomenon "this is a typical "Jennerian vesicle" is, I believe, tantamount to saying "this is a vesicle, which only one unmodified influence "can produce, which no second influence can concur "in producing, and in the contagion of which no "second principle of infection can possibly reside."

Maladies which are alleged to have been communicated by vaccination.

Turning, however, from these general considerations, I may inform you that the diseases which it has been suspected that vaccination might communicate have chiefly been scrufulous and syphilitic complaints, and various eruptions of the skin. In all but a very limited number of these cases it may be conclusively answered that the suspected mischief is physically impossible. Scrofula, for instance, and most skin diseases, even when, for experiment, their specific discharges and other products are deliberately inoculated on the healthy, are absolutely incommunicable by contagion; and it is inconceivable that the vaccine lymph, even if it could include these products, would alter the essential condition of their nature. Of some others among the diseases referred to, it may no doubt be admitted that certain of their specific products are infectious; but then again comes the question (which is already by anticipation almost disposed of) whether the constitutional existence of such diseases can qualify the contents *without modifying the characteristic development* of a true Jennerian vesicle.

Experiments on the subjects.

Experiment, where it has been deliberately addressed to the solution of this question, has invariably answered *No*; and such experiment is worth more than many arguments.

M. Taupin.

The early reports* of the French Academy contain numerous particulars on this interesting subject; but observations on the largest scale appear to have been made by M. Taupin during his residence as medical officer in the Paris Hospital for Sick Children; and Messieurs Blanche and Guersont, physician and surgeon to this Institution, having occasion to discuss the general question, have included an account of M. Taupin's experiments in a passage which altogether is of so much importance that I transcribe it at length from their paper.*

"Le virus vaccin ne paraît pas s'allier avec d'autres virus: lorsqu'on inocule un mélange de virus vaccin et de varioleux, on n'a qu'une de ces maladies, ou, si elles se développent toutes les deux ensemble, elles marchent chacune séparément avec le caractère qui lui est propre. Dans un très-grand nombre d'expériences tentées par le comité de vaccine ou par ses correspondants, on a pris du vaccin sur des pustules vaccinales développées à dessein au milieu de dartres, d'ulcères scrofuleux, de teigne favus, de vésicues de gale: on n'a remarqué que le vaccine sans aucun mélange de gale ou d'autres maladies. De nombreuses expériences sur ce sujet ont été répétées par la Docteur Taupin, à l'Hôpital des Enfants Malades. Nous empruntons ce qui suit à un mémoire inédit sur la vaccine, et qu'il a eu l'obligeance de nous communiquer. Pendant les quatre années qu'il a passées à cet hôpital, il a, sous les yeux des chefs de service, vacciné plus de deux mille sujets placés dans des conditions différentes d'âge, de santé, &c.; il a suivi et noté avec soin le résultat de l'inoculation, et il s'est surtout attaché à observer quelle modification les diverses maladies pouvaient faire éprouver à la vaccine, et quelle influence celle-ci pouvait exercer sur elles à son tour. Il a pu observer que le vaccin recueilli chez des enfants atteints de maladies aiguës ou chroniques, de fièvres essentielles, affection typhoïde, fièvres éruptives, de phlegmasies thoraciques, cérébrales, abdominales, de névroses, telles que chorée, hystérie, épilepsie, &c., était tout aussi actif que s'il eût été emprunté à des enfants bien portants; qu'il donnait lieu à une vaccine tout aussi abondante et regulière, et qui préservait tout aussi efficacement de la variole; et ce qu'il n'importait pas moins d'établir par un nombre considérable d'observations, c'est que le virus ne transmettait aucune maladie, soit aigue, soit chronique, contagieuse ou non contagieuse. Un grand nombre d'enfants atteints de gale, de scarlatine, de rougeole, de varicelle, de varioloïde et de variole, ont fourni un vaccin qui n'a jamais communiqué aucune de ces maladies contagieuses. Il en a été de même pour le vaccin pris sur des sujets atteints de rachitis, de scrofules, de syphilis, de tubercules, d'éruptions chroniques du cuir chevelu, de dartres, &c. Dans aucun cas, nous y insistons à dessein, le virus n'a rien communiqué que la vaccine toute seule. Loin de nous l'idée de conclure de cette innocuité qu'on doive employer indifféremment du vaccin pris sur des sujets sains ou malades; mais nous voulions rapporter ces faits bien avérés pour faire justice de ce préjugé qui attribue à du vaccin malsain les maladies qui surviennent quelquefois chez le sujets vaccinés, longtemps même après l'inoculation."

I am not aware of any counter experiments suggesting different conclusions to those which are expressed and justified in the preceding passage. They assert for vaccine lymph the principle which Dr. Mead a century ago asserted for the virus of small-pox inoculation:—"It is more material into what kind of body it be "infused, than out of what it be taken."† Indeed, in

* Rapports présentés à M. le Ministre de l'Intérieur par l'Académie Royale de Médicine sur les Vaccinations pratiquées en France. From four of these Reports I extract the following paragraphs:—(Rapport 1808-9., pp. 54, 55.) "M. Pellieux, médicin à Baugency, nous a paru avoir fait l'expérience la plus concluante en inoculant le vaccin d'un sujet varioleux à vingt-trois sujets qui ont eu simplement la vaccine. . . . . Des sujets dartreux, galeux, teigneux, vénérieux, scrofuleux, ont également fourni à "quelques praticiens de la matière vaccinale, dont l'inoculation a "produit son effet ordinaire sans donner la moindre marque de la "maladie dont les enfans étaient attaqués. (Rapport 1821-22, "p. 41.) "Quelques personnes peu éclairées répugnent encore à "faire vacciner leurs enfans parcequ'elles supposent que les "maladies des individus qui fournissent la matière, peuvent se "transmettre par l'intermédiaire de la vaccine aux sujets sur "lesquels on l'inocule. Cette crainte, détruite dans nos premières "expériences et toujours combattue depuis cette époque, l'a été de "nouveau par plusieurs de nos correspondans. Ainsi M. Rochot, "médicin à Seurre, a vacciné dans un village du département de "la Côte d'Or un enfant de six mois, dont la mère était atteinte du "mal vénérien, et qui lui même avait quelques pustules au front. "Il inocula le vaccin de cet enfant à plusieurs autres sur lesquels "la vaccine se développa sans aucune complication d'affection "syphilitique. M. Debar, médecin à Rue, a fait la même ex-"périence, et avec le même succès. M. Voisin, officier de santé à "Solignac, a inoculé le vaccin d'un sujet galeux sans donner la "gale. Enfin, M. Labesque a inoculé quatre personnes avec du "vaccin provenant d'un sujet qui était en pleine suppuration de "petite vérole et la vaccin s'est développée seule." (Rapport "1829, p. 15.) "On sait depuis longtemps que le virus vaccine "ne se charge d'aucun principe contagieux. Cette année plusieurs "médecins, parmi lesquels se trouve M. Boucher de Versailles, "l'ont inoculé après l'avoir puisé chez des varioleux qui avaient à "la fois la variole et la vaccine, et n'ont donné que cette dernière "maladie." (Rapport 1834, p. 45.) Le virus vaccin ne communique et ne développe que la vaccine.

* Dictionnaire de Médecine (seconde édition) art. *Vaccine.*

† It deserves mention that these fears about the possible transfer of some unintended contagion belonged to the days of small-pox inoculation, and were then much discussed. In Kirkpatrick's Analysis of Inoculation, mention is made of a case where he tried, with no ill effect, the inoculation of small-pox matter from a syphilitic patient. Dr. Mead (Chap. 5) writes of those who, "infected with "an incurable itch of writing and taking great pleasure in contra-"dicting others to whom they bear envy, . . still go on to terrify "us by saying that there is danger lest, together with the small-pox, "some other infection inherent in the blood and humours of the sick "person should be transmitted into the sound body, . . and such "perhaps are scrofulous swellings and the venereal disease. Yet I "can hardly believe that it ever happens that the seed of one dis-"temper should bring along with it mixed the procreative matter "of another of a nature quite different from it. . . It is in my "opinion more material into what kind of body the venom be in-"fused than out of what it be taken." It is remarkable, too, that the first opponent of vaccination (Moseley, op. cit. xi.) discusses this point—not in reference to vaccination (against which it had not then been raised) but in reference to small-pox inoculation:—"Suppose a subject in the small-pox to have inveterate scurvy, "scrofula, itch, syphilitic affection, or consumption, certainly no "person ought to take matter from such a person for inoculation. "But it might be done with as much safety as if none of these "disorders were present. Peculiar circumstances, which I had no "share in creating, have rendered me acquainted with some of "these facts, and accident the others." [illegible]

the whole list of diseases, syphilis is the only one to which serious suspicion could attach; and, in regard to its communicability by the lymph of a true Jennerian vesicle, various other observers confirm the accuracy of M. Taupin's results.*

Moreover, Professor Sigmund of Vienna (whose researches on everything relating to the inoculation of syphilis have been on a very large scale) has added to M. Taupin's results one, which, quite in a different manner, is equally against the possible invaccination of syphilis. In an official report on the division of the hospital over which he presides (Aerztlicher Bericht des Allgem. Krankenhauses; Wien, 1855) he relates experiments to show that syphilis in its inoculable form prevents, within the sphere of its infection the simultaneous formation of a vaccine vesicle. The discharge of chancre (in which form alone syphilis is universally recognised to be inoculable) has been designedly mixed, as by nature it never could be mixed, with ordinary vaccine lymph; and the insertion of this compound poison in the skin has been followed only by the ordinary local results of syphilitic infection. No Jennerian vesicle has been formed; no signs have existed of any possible combination of the two infections. Dr. Friedinger, who conducted these important experiments in Professor Sigmund's wards, and under his observation, has also communicated their result to the Society of Surgeons at Vienna.†

It is unquestionable, however, that cases are recorded in which the lookers-on (sometimes including a medical practioner) have believed syphilis to have been communicated by vaccination. A moment's reflection suggests, that in such cases there must generally be sources of fallacy, which render them, in contrast with experimental results, almost valueless for instruction. When a child is born with the heritage of syphilis (a very frequent incident, if its parents have been suffering from that infection) the characteristic symptoms commonly do not appear till some weeks after birth; and then the scandal discloses itself. Now, among persons with any sense of shame, the knowledge that one had transmitted syphilis to one's child would always be a sore subject. There would be strong temptations to employ false pretexts. Not only would parents often conjointly wish to disguise from their medical attendant, or from members of their household, the real explanation of the child's ailment; but also, not unfrequently, one parent would wish to conceal from the other that the origin of the disease had been a conjugal infidelity. In respect even of unmarried people, every surgeon knows what utterly false, far-fetched, and absurd explanations are given of syphilitic symptoms, primary and secondary; and it requires little experience to imagine how much more pertinacious will be the demand for excuses, and how much more active the supply of falsehood, under the complicated circumstances of connubial syphilis. Accordingly it is matter for surprise, that vaccination has not almost generally been pitched upon by persons in search of an apology for their syphilitic children. But in truth even such allegations against it have been few; and their paucity (assuming them all to have been made in good faith) would be a strong reason for regarding them with mistrust;‡ for surely if syphilis could be diffused by the vaccine lymph of children with an hereditary taint of that disease, this possibility must long ago have been made evident on a scale far too considerable for question.*

Real cases of inoculation of syphilis in pretended vaccination have arisen in a different manner.

Among the scanty number of recorded cases in which such allegations have been made, there are, however, some in which, so far as I can judge, it seems almost certain that a person pretending to vaccinate did really effect a syphilitic inoculation. Properly to estimate these grievous instances of malpractice, two considerations must be adverted to: First, to the already quoted negative results obtained by Taupin and many other observers in their experimental inoculations of lymph from the true Jennerian vesicles of syphilitic children; secondly, to the fact that secondary syphilis itself is very possibly not communicable even by direct inoculation of matter from the ulcers and eruptions which it occasions; for many of the ablest experimenters in Europe declare that in hundreds of trials they have never once succeeded in thus conveying from person to person the slightest infection of syphilis. And, regard being had to these considerations, it becomes almost certain that, in the cases referred to, the matter of chancres, the matter of primary syphilis, was used instead of vaccine lymph by the vaccinator, a mistake (however it may have occurred) of so gross and criminal a nature that the medical profession would feel no sympathy for the person through whose neglect or incompetence it happened.

Cases where small-pox matter has been unintentionally used in vaccination.

Other illustrations of culpable malpractice in vaccination, though rare, are not unknown. In the French report (which has just reached us) on the vaccinations of 1854, mention is made of an outbreak of small-pox due to the unintentional employment of variolous matter, instead of vaccine lymph, for inoculation. And I have been informed that a grievous instance of the same kind, leading to not inconsiderable loss of life, recently occurred in this country.

But in coming to cases of this description, there is no longer question of the merits of vaccination. If recorded instances of the kind, instead of being so few that you may count them on your fingers, were of innumerable frequency, they would make no argument against vaccination. Only they would, if possible, render more obvious than it is, the expediency and duty of providing that this great self-defence of nations against pestilence be not ignorantly and recklessly administered.

General result.

Here indeed is the whole gist of the matter. Earlier parts of this letter have shown that by vaccination, properly administered, the once enormous fatality of small-pox may be reduced almost to nothing. The present section justifies a conclusion that against this vast gain there is no loss to count. Of the various alleged drawbacks to such great advantages the present state of medical knowledge recognises no single trace. Jenner's discovery, properly utilised, has been a pure blessing to mankind, an unmixed addition to the strength and happiness of nations.

To say of vaccination that it has sometimes been ill-administered; to say that, under pretext of its administration, harm has sometimes been given instead of good, poison instead of antidote, is to speak, not against it, but, whether rightly or wrongly, against its administrators.

The vaccinations of Europe are now counted annually by millions. It may be vain to hope that every lancet

* Dr. Heymann (Henke's Zeitsch. 1856, p. 195) quotes some experiments by Dr. Schrier of Ratisbon which are to the same effect:—"Zwei in hohem Grade syphilitische Kinder geimpft und "aus den vollkommen entwickelten Impfblattern die klare "Pockenlymphe auf gesunde Kinder übertragen, was nicht den "geringsten Nachtheil für die Geimpften zur Folge hatte;" and he gives some remarkable observations made by himself at Java. Children having scrofula, syphilis, itch, the endemic frambæsia, and other complaints, were used, indifferently with others, as sources of vaccine lymph; and no evidence ever appeared of any disease being thus communicated. This, he says, was especially observable in vaccination performed on the generally clean-skinned and constitutionally sound Chinese, from the Javans, who were so often the opposite.

† Abhandl. der Gesellschaft der Aerzte zu Wien, 1854–5.

‡ Medical sources of fallacy are really too numerous for enumeration. But there is one against which, in my opinion, peculiar caution is required. I have personally reason to know that a simple surgical incision, on a child having latent in it the taint of hereditary syphilis, may become the seat of ulceration, which will present the ordinary characters and require the specific treatment of a secondary syphilitic sore. Some years ago I performed on a little boy, having no apparent ill-health, a very trifling surgical operation, that for phimosis. In a few days the incision was, as is usual, all but well. In a few more it had begun to ulcerate. For some weeks there continued in the part an indolent inflammatory process, with considerable swelling, and slow but progressive ulceration. A variety of treatment failed to do good. At length a suspicion occurred to my mind which led me to prescribe iodide of potassium. Within eight-and-forty hours the wound had thoroughly changed its character, every reason for alarm was gone; and within a few days complete healing was accomplished. I now learnt that the child had been born with a strong hereditary taint, and had, long before the operation, required constitutional treatment on account of the usual symptoms of infantine syphilis. I believe, also, but here it is easier to be deceived, that I have seen the same constitutional influence modify a primary syphilitic sore (contracted by an adult already suffering from secondary syphilis) and convert it, at its period of repair, into what had all the characters of secondary syphilitic ulceration. At least I have seen such a sore, after months of unsuccessful treatment, change its character in a few hours, and rapidly advance to healing under the use of iodide of potassium. Now, what certainly happened in the first case with the clean cut of a surgical knife, and probably in the second case with a sore which had been the seat of a specific infection, might, I presume, happen at the vaccine punctures of a child having latent constitutional syphilis. Under the operation of this constitutional taint, they, or one of them, might become the seat of secondary syphilitic ulceration, and greatly perplex any observer in ignorance of the real cause; especially, of course, if the parents were endeavouring to disguise the previous facts of the case.

* Dr. Heim (op. cit. p. 613) observes that an universal infection (allgemeine Landesseuche) of scrofula must very long since have occurred if this disease could have been communicated by vaccination; and, he adds, that perhaps it would not have been much better with the diffusion of secondary syphilis. Dr. Heim is among those who have experimented on the subject; and his results accorded with M. Taupin's conclusions as to the non-communicability of syphilis by the lymph of a Jennerian vesicle.

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shall be used with equal skill and equal carefulness, or that all populations shall be equally anxious to render those operations successful; but Medicine at least has contributed her share in showing that, subject to these conditions, small-pox need cause no further fear, nor its antidote be accepted with mistrust.

(A.)

EVIDENCE given before a Committee of the House of Commons, 22nd March 1802, by Dr. JENNER.

My inquiry into the nature of the cow-pox commenced upwards of 25 years ago. My attention to this singular disease was first excited by observing that among those whom in the country I was frequently called upon to inoculate, many resisted every effort to give them the small-pox. These patients I found had undergone a disease they called cow-pox, contracted by milking cows affected with a peculiar eruption on their teats. On inquiry it appeared that it had been known among the dairies time immemorial, and that a vague opinion prevailed that it was a preventive of the small-pox. This opinion I found was comparatively new among them; for all the older farmers declared they had no such idea in their early days; a circumstance that seemed easily to be accounted for, from my knowing that the common people were very rarely inoculated for the small-pox till that practice was rendered general by the improved method introduced by the Suttons, so that the working people in the dairies were seldom put to the test of the preventive powers of the cow-pox.

In the course of the investigation of this subject, which, like all others of a complex and intricate nature, presented many difficulties, I found that some of those *who seemed to have undergone the cow-pox*, nevertheless, on inoculation with the small-pox, felt its influence just the same as if no disease had been communicated to them by the cow. This occurrence led me to make inquiry among the practitioners in the country around me, few of whom were acquainted with the disease, but all agreed in this sentiment, that the cow-pox was not to be relied upon as a certain preventive of the small-pox. This for a while damped, but did not extinguish, my ardour; for, as I proceeded, I had the satisfaction to learn that the cow was subject to some varieties of spontaneous eruptions upon her teats; that they were all capable of communicating sores to the hands of the milkers, and that whatever sore was derived from the animal was called in the dairy the cow-pox. Thus, I surmounted a great obstacle, and in consequence was led to form a distinction between these diseases; one of which only I have denominated the *true*, the other the *spurious*, cow-pox; the latter not possessing any specific power over the constitution. This impediment to my progress was not long removed before another, of far greater magnitude in its appearance, started up.

There were not wanting instances to prove that, when the *true* cow-pox broke out among the cattle at a dairy, a person who had milked an infected animal and had thereby apparently gone through the disease in common with others, was liable to receive the small-pox afterwards. This, like the former obstacle, gave a painful check to my fond and aspiring hopes; but reflecting that the operations of Nature are generally uniform, and that it was not probable the human constitution, having undergone the cow-pox, should in some instances be perfectly shielded from the small-pox, and in many others remain unprotected, I resumed my labours with redoubled ardour. The result was fortunate; for I now discovered that the virus of cow-pox was liable to undergo progressive changes from the same causes precisely as that of small-pox, and that when it was applied to the human skin in its degenerated state, it would produce the ulcerative effects in as great a degree as when it was not decomposed, and sometimes far greater; but having lost *its specific properties*, it was incapable of producing that change upon the human frame which is requisite to render it unsusceptible of the variolous contagion; so that it became evident that a person might milk a cow one day, and, having caught the disease, be for ever secure; while another person, milking the same cow the next day, might feel the influence of the virus in such a way as to produce a sore or sores, and in consequence of this might experience an indisposition to a considerable extent; yet, as has been observed, the specific quality being lost, the constitution would receive no peculiar impression.

Here the close analogy between the virus of small-pox and of cow-pox becomes remarkably conspicuous; since the former, when taken from a recent pustule and immediately used, gives the perfect small-pox to the person on whom it is inoculated: but when taken in a far advanced stage of the disease, or when (although taken early) previously to its insertion, it may be exposed to such agents as, according to the established laws of nature, cause its decomposition, it can no longer be relied on as effectual. This observation will fully explain the source of those errors which have been committed by many inoculators of the cow-pox. Conceiving the whole process to be so extremely simple as not to admit of a mistake, they have been heedless about the state of the vaccine virus; and finding it limpid, as part of it will be, even in an advanced state of the pustule, when the greater portion has been converted into a scab, they have felt an improper confidence, and sometimes mistaken a spurious pustule, which the vaccine fluid in this state is capable of exciting, for that which possesses the perfect character.

During the investigation of the casual cow-pox I was struck with the idea that it might be practicable to propagate the disease by inoculation, after the manner of the small-pox, first from the cow, and finally from one human being to another. I anxiously waited some time for an opportunity of putting this theory to the test. At length the period arrived. The first experiment was made upon a lad of the name of Phipps, in the spring of the year 1796, in whose arm a little vaccine virus was inserted, taken from the hand of a young woman who had been accidentally infected by a cow. Notwithstanding the resemblance which the pustule, thus excited on the boy's arm, bore to variolous inoculation, yet as the indisposition attending it was barely perceptible, I could scarcely persuade myself the patient was secure from the small-pox. However, on his being inoculated some months afterwards, it proved that he was secure.* This case inspired me with confidence; and as soon as I could again furnish myself with virus from the cow, I made an arrangement for a series of inoculations. A number of children were inoculated in succession one from the other; and after several months had elapsed they were exposed to the infection of the small-pox, some by inoculation, others by variolous effluvia, and some in both ways; but they all resisted it.

The result of these trials gradually led me into a wider field of experiment, which I went over, not only with great attention, but with painful solicitude. This became universally known through a treatise published in June 1798. The result of my further experience was also brought forward in subsequent publications in the two succeeding years, 1799 and 1800. The distrust and scepticism which naturally arose in the minds of medical men, on my first announcing so unexpected a discovery, has now nearly disappeared. Many hundreds of them, from actual experience, have given their attestations that the inoculated cow-pox proves a perfect security against the small-pox; and I shall probably be within compass if I say, thousands are ready to follow their example, for the scope that this inoculation has now taken is immense; 100,000 persons, upon the smallest computation, have been inoculated in these realms. The numbers who have partaken of its benefits throughout Europe, and other parts of the globe, are incalculable; and it now becomes too manifest to admit of controversy, that the annihilation of the small-pox, the most dreadful scourge of the human species, must be the final result of this practice.

(B.)

REPORT from the Committee on Dr. JENNER'S Petition to the House of Commons.

The Committee to whom the petition of Edward Jenner, Doctor of Physic, was referred,—

Have, pursuant to the Order of the House, examined the matter thereof; which is divided into three distinct heads of inquiry:—

1. The utility of the discovery itself, which is the foundation of the petition;
2. The right of the petitioner to claim the discovery;
3. The advantage, in point of medical practice and pecuniary emolument, which he has derived from it.

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* This boy was again inoculated nearly five years afterwards, with variolous matter, but no other effect was produced beyond a local inflammation around the punctured part upon the arm.

Upon the first head a number of witnesses of the highest characters and most extensive experience in the profession were examined, whose names, with the substance of their respective evidence (strongly confirmed by their general practice, as well as by that in their own families), appear in the supplement; nor was it for want of the testimony of several other equally respectable physicians and surgeons, whom the petitioner was desirous of producing, that many other names are not inserted; but because your Committee, after having received so considerable a body of evidence to the same purport, and with so little variation in opinion, thought that his case could sustain no injury in being left to rest upon the concurring depositions of those already examined, who had both the most ample experience of the facts, and the best means of forming a judgment upon them. The testimony, also, of some persons not professional has been admitted, who could speak to occurrences that tend to illustrate particular points connected with the subject. The result, as it appears to your Committee, which may be collected from the oral testimony of these gentlemen (with the exception of three of them) is, that the discovery of vaccine inoculation is of the most general utility, inasmuch as it introduces a milder disorder in the place of the inoculated small-pox, which is not capable of being communicated by contagion; that it does not excite other humours or disorders in the constitution; that it has not been known, in any one instance, to prove fatal; that the inoculation may be safely performed at all times of life (which is known not to be the case with regard to the inoculation of the small-pox) in the earliest infancy, as well as during pregnancy, and in old age; and that it tends to eradicate, and, if its use becomes universal, must absolutely extinguish, one of the most destructive disorders by which the human race has been visited.

The written evidence which is inserted in the supplement (for your Committee have judged it proper to make a selection, from a great mass, of what appeared most important) is more various, but directed to the same objects: part of it relates to the very extensive and successful practice of this mode of inoculation in every quarter of the globe, the efficacy of which does not seem abated by the cold of the northern, nor by the heat of southern and tropical climates; and though there are no means of examining the authors from whence these attestations come, it would be an act of injustice to the petitioner to exclude such important documents, which show the consideration in which this discovery is held, and the benefit with which it has been attended in so many other countries, to at least as great an extent as in our own.

As a comparison between this new practice and the inoculated small-pox forms a principal consideration in the present inquiry, some facts with regard to the latter engaged the attention of your Committee, and in the supplement are inserted statements of the mortality occasioned by the small-pox in 42 years before inoculation was practised in England, and of the 42 years from 1731 to 1772; the result of which appears to be an increase of deaths amounting to 17 in every 1,000; the general average giving 72 in every 1,000 during the first 42 years, and 89 in the 42 years ending with 1772, so as to make the whole excess of deaths in the latter period 1,742. The increase of mortality is stated by another witness (No. 10) to be as 95 to 74, comparing the concluding 30 years with the first 30 of the last century, and the average annual mortality from small-pox to have been latterly about 2,000; for though individual lives are certainly preserved, and it is true that a smaller loss happens in equal numbers who undergo the small-pox now than there was formerly, yet it must be admitted that the general prevalence of inoculation tends to spread and multiply the disease itself; of which, though the violence be much abated by the present mode of treatment, the contagious quality remains in full force. It deserves also to be noticed, that the deaths under the inoculated sort of small-pox, with all the improvements of modern experience, are not inconsiderable; it is stated by one of the witnesses at about one in every 300 throughout England (Nos. 5 and 7); by another, as about 100 in London (No. 15); while the loss in the natural small-pox is probably not less than one in six (No. 8). Nor ought it to be overlooked, that mistakes have been known to arise in the inoculated small-pox, and instances are cited by some of the witnesses in which persons supposed to have gone through the small-pox by inoculation have caught it afterwards in the natural way (Nos. 28 and 39). The general law of vaccine and variolous disease are extremely similar, and it is not surprising that they should resemble each other in their anomalies.

A spurious or imperfect sort of cow-pox having been mentioned in some of the examinations, your Committee have been particularly diligent in their inquiries into every individual case that came within their notice, where suspicions had arisen, or facts were alleged tending to bring into doubt the preventive power of vaccine inoculation; and although, for the reasons before given, they have restricted and abridged the proofs in favour of this practice, they have thought proper to withhold no part of the evidence that has been received relative to the cases that appear to controvert it; of which it will be observed that some (Nos. 6, 17, and 24) evidently resolve themselves into variolous infection, taken previously to the vaccine inoculation; others (Nos. 6 and 23) into the patient not having taken the cow-pox at all; others again (Nos. 10 and 48) from the vaccine matter being, by want of attention in preserving it, decomposed, or mixed with variolous matter (Nos. 38 and 48), or from the fluid being taken at too late a period of the pustule; to which last cause it seems probable that most of the errors and dubious cases are to be referred (Nos. 10, 11, and 38). All the practitioners agree that there is no difficulty in distinguishing the real disorder from every spurious or imperfect appearance, and that the regular progress of the pustule itself, if attended to, cannot be mistaken.

Some cases (Nos. 40 and 42) are not explained in a manner so satisfactory and indisputable as the foregoing, but in leaving them to have such weight as they may appear to deserve, your Committee cannot avoid recurring to the multitude of instances in which endeavours have been used to communicate the small-pox to patients who have been known to go through the regular vaccine disease, in which neither repeated inoculations, nor exposure to the most malignant small-pox, have been able to produce any effect (Nos. 5, 9, 14, 15, 19, 27, 32, and 39).

Upon the second head the whole of the oral depositions, as well as all the written documents from abroad, are uniform and decisive in favour of Dr. Jenner's claim to originality in the discovery; but as some pretensions have been advanced to a knowledge at least of this practice before Dr. Jenner's publications, it may be proper to notice shortly what the nature of those claims is, and in what manner they bear upon this part of the petitioner's case. Such extracts as can be considered in any degree material are contained in pages 155, 156, and 159. The disorder itself and its specific property of securing against small-pox infection was not a discovery of Dr. Jenner, nor of any of those whose writings are referred to, for in various parts of England, in Gloucestershire and Devonshire particularly, there was an opinion of that sort current among the common people employed in dairies, which the observation of inoculators for the small-pox tended to confirm. It appears not improbable that, in some very rare instances, this knowledge was carried one step further, and that the cow-pox was communicated either by handling the teat or by inoculation from the animal for the purpose, and with the intention, of securing against the danger of small-pox; but the practice of which Dr. Jenner asserts himself to be the original inventor is the inoculation from one human being to another, and the mode of transferring indefinitely the vaccine matter without any diminution of its specific power, to which it does not appear that any person has ever alleged a title; and these papers and experiments, whatever accuracy of observation and spirit of research they may evince in their respective authors, and to whatever extent they may be supposed to go, as they were never given to the public, so neither is there any intimation that they were imparted to Dr. Jenner; nor is it contended that the world became acquainted with this discovery by any other means than by the course of trials conducted by the petitioner, and by his ample and unreserved communications.

Upon the last division of the subject, evidence has been received from persons who were acquainted with the medical practice and former situation of Dr. Jenner (No. 23), which confirms the allegation contained in the petition, that he has not only reaped no advantage from his discovery, but that he has been a considerable loser by the persevering attention which he has bestowed upon this one subject to the neglect of his other business, and without an opportunity of replacing himself in the situation, which a desire of publishing and diffusing more extensively, and establishing, beyond the reach of controversy, the practice itself induced him to

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quit. What his gains might probably have been if he had been solicitous to keep the secret within his own practice and that of his immediate pupils, as far as medical men in great practice themselves can form a conjectural opinion, may be collected from the testimonies expressed in Nos. 7 and 30, in which no more than justice is done to the liberality and public spirit of the petitioner in pursuing the propagation and extension of this important discovery, and in rendering it rather of universal utility to the human race than of emolument to himself.

(C.)

REPORT of the Medical Council of the Royal Jennerian Institution, 2 January 1806.

THE Medical Council of the Royal Jennerian Institution having been informed that various cases had occurred which excited prejudices against vaccine inoculation, and tended to check the progress of that important discovery in this kingdom, appointed a committee of 25 of their members to inquire, not only into the nature and truth of such cases, but also into the evidence respecting instances of small-pox alleged to have occurred twice in the same person.

In consequence of this reference, the committee made diligent inquiry into the history of a number of cases, in which it was supposed that vaccination had failed to prevent the small-pox, and also of such cases of small-pox as were stated to have happened subsequently to the natural or inoculated small-pox.

In the course of their examination the committee learned that opinions and assertions had been advanced and circulated which charged the cow-pox with rendering patients liable to particular diseases, frightful in their appearance, and hitherto unknown; and judging such opinions to be connected with the question as to the efficacy of the practice, they thought it incumbent upon them to examine also into the validity of these injurious statements respecting vaccination.

After a very minute investigation of these subjects, the result of their inquiries has been submitted to the Medical Council, and from the report of the committee it appears,—

I. That most of the cases which have been brought forward as instances of the failure of vaccination to prevent the small-pox, and which have been the subjects of public attention and conversation, are either wholly unfounded or grossly misrepresented.

II. That some of the cases are now allowed, by the very persons who first related them, to have been erroneously stated.

III. That the statements of such of those cases as are published have for the most part been carefully investigated, ably discussed, and fully refuted by different writers on the subject.

IV. That, notwithstanding the most incontestable proofs of such misrepresentations, a few medical men have persisted in repeatedly bringing the same unfounded and refuted reports and misrepresentations before the public; thus perversely and disingenuously labouring to excite prejudices against vaccination.

V. That in some printed accounts adverse to vaccination, in which the writers had no authenticated facts to support the opinions they advanced, nor any reasonable arguments to maintain them, the subject has been treated with indecent and disgusting levity; as if the good or evil of society were fit objects for sarcasm and ridicule.

VI. That when the practice of vaccination was first introduced and recommended by Dr. Jenner, many persons, who had never seen the effects of the vaccine fluid on the human system, who were almost wholly unacquainted with the history of vaccination, the characteristic marks of the genuine vesicle, and the cautions necessary to be observed in the management of it, and were therefore incompetent to decide whether patients were properly vaccinated or not, nevertheless ventured to inoculate for the cow-pox.

VII. That many persons have been declared duly vaccinated when the operation was performed in a very negligent and unskilful manner, and when the inoculator did not afterwards see the patients, and therefore could not ascertain whether infection had taken place or not; and that to this cause are certainly to be attributed many of the cases adduced in proof of the inefficacy of the cow-pox.

VIII. That some cases have been brought before the committee, on which they could form no decisive opinion, from the want of necessary information as to the regularity of the preceding vaccination, or the reality of the subsequent appearance of the small-pox.

IX. That it is admitted by the committee that a few cases have been brought before them of persons having the small-pox who had apparently passed through the cow-pox in a regular way.

X. That cases, supported by evidence equally strong, have been also brought before them, of persons who, after having once regularly passed through the small-pox, either by inoculation or natural infection, have had that disease a second time.

XI. That in many cases in which the small-pox has occurred a second time after inoculation or the natural disease, such recurrence has been particularly severe, and often fatal; whereas, when it has appeared to occur after vaccination, the disease has generally been so mild as to lose some of its characteristic marks, and even sometimes to render its existence doubtful.

XII. That it is a fact well ascertained, that in some particular states of certain constitutions, whether vaccine or variolous matter be employed, a local disease only will be excited by inoculation, the constitution remaining unaffected; yet that matter taken from such local vaccine or variolous pustule is capable of producing a general and perfect disease.

XIII. That if a person bearing the strongest and most indubitable marks of having had the small-pox be repeatedly inoculated for that disease, a pustule may be produced, the matter of which will communicate the disease to those who have not been previously infected.

XIV. That although it is difficult to determine precisely the number of exceptions to the practice, the Medical Council are fully convinced that the failure of vaccination, as a preventive of the small-pox, is a *very rare* occurrence.

XV. That of the immense number who have been vaccinated in the army and navy, in different parts of the United Kingdom, and in every quarter of the globe, scarcely any instances of such failure have been reported to the committee, but those which are said to have occurred in the metropolis or its vicinity.

XVI. That the Medical Council are fully assured that in very many places in which the small-pox raged with great violence, the disease has been speedily and effectually arrested in its progress, and in some populous cities wholly exterminated, by the practice of vaccination.

XVII. That the practice of inoculation for the small-pox on its first introduction into this country was opposed and very much retarded in consequence of misrepresentations and arguments drawn from assumed facts, and of miscarriages arising from the want of correct information, similar to those now brought forward against vaccination; so that nearly 50 years elapsed before small-pox inoculation was fully established.

XVIII That, by a reference to the Bills of Mortality, it will appear that, to the unfortunate neglect of vaccination, and to the prejudices raised against it, we may, in a great measure, attribute the loss of nearly 2,000 lives by the small-pox in this metropolis alone within the present year.

XIX. That the few instances of failure, either in the inoculation of the cow-pox or of the small-pox, ought not to be considered as objections to either practice, but merely as deviations from the usual course of nature.

XX. That if a comparison be made between the preservative effects of vaccination and those of inoculation for the small-pox, it would be necessary to take into account the greater number of persons who have been vaccinated within a given time; as it is probable that, within the last seven years, nearly as many persons have been inoculated for the cow-pox as were ever inoculated for the small-pox since the practice was introduced into this kingdom.

XXI. That, from all the facts which they have been able to collect, it appears to the Medical Council that the cow-pox is generally mild and harmless in its effects, and that the few cases which have been alleged against this opinion may be fairly attributed to peculiarities of constitution.

XXII. That many well-known cutaneous diseases, and some scrofulous complaints, have been represented as the effects of vaccine inoculation, when in fact they originated from other causes, and in many instances occurred long after vaccination; and that such diseases

are infinitely less frequent after vaccination than after either the natural or inoculated small-pox.

Having stated these facts, and made these observations, the Medical Council cannot conclude their report upon a subject so highly important and interesting to all classes of the community without making this *solemn declaration*:—

That in their opinion, founded on their own individual experience, and the information which they have been able to collect from others, mankind have already derived great and incalculable benefit from the discovery of vaccination; and it is their full belief that the sanguine expectations of advantage and security which have been formed from the inoculation of the cow-pox will be ultimately and completely fulfilled.

(Signed) Edward Jenner, M.D., President of the Council.
J. C. Lettsom, M.D., V.P.
John Ring, V.P.
Joseph Adams, M.D.
John Addington.
C. R. Aikin.
Wm. Babington, M.D.
M. Baillie, M.D.
W. Blair.
Gil. Blane, M.D.
Isaac Buxton, M.D.
Wm. Chamberlaine.
John Clarke, M.D.
Astley Cooper.
Wm. Daniel Cordell.
Richard Croft, M.D.
Tho. Denman, M.D.
John Dinsdale.
Henry Field.
Edward Ford.
Joseph Fox.
Wm. M. Fraser, M.D.
William Gaitskell.
Wm. Hamilton, M.D.
John Hingestone.
Everard Home.
Robert Hooper, M.D.
Joseph Hurlock.
John Jones.
Thomas Key.
Francis Knight.
E. Leese.
L. Leese.
William Lewis.
William Lister, M.D.
Alex. Marcet, M.D.
Jos. Hart Myers, M.D.
Jas. Parkinson.
Thos. Paytherus.
John Pearson.
George Rees, M.D.
John Gibbs Ridout.
J. Squire, M.D.
Jas. Upton.
J. Christian Wachsell.
Thos. Walshman, M.D.
Robert Willan, M.D.
Allen Williams.
James Wilson.
J. Yelloly, M.D.
John Walker,
2 January 1806. Secretary to the Council.

(D.)

Report of the Royal College of Physicians of London on Vaccination. (Ordered to be Printed, by the House of Commons, 8th July 1807.)

The Royal College of Physicians of London, having received His Majesty's commands, in compliance with an address from the House of Commons, "to inquire "into the state of vaccine inoculation in the United "Kingdom, to report their opinion and observations "upon that practice, upon the evidence which has been "adduced in its support, and upon the causes which "have hitherto retarded its general adoption," have applied themselves diligently to the business referred to them.

Deeply impressed with the importance of an inquiry which equally involves the lives of individuals and the public prosperity, they have made every exertion to investigate the subject fully and impartially. In aid of the knowledge and experience of the members of their own body they have applied separately to each of the Licentiates of the College; they have corresponded with the Colleges of Physicians of Dublin and Edinburgh; with the Colleges of Surgeons of London, Edinburgh, and Dublin; they have called upon the societies established for vaccination for an account of their practice, to what extent it has been carried on, and what has been the result of their experience, and they have, by public notice, invited individuals to contribute whatever information they had severally collected. They have, in consequence, been furnished with a mass of evidence, communicated with the greatest readiness and candour, which enables them to speak with confidence upon all the principal points referred to them.

I. During eight years which have elapsed since Dr. Jenner made his discovery public, the progress of vaccination has been rapid, not only in all parts of the United Kingdom, but in every quarter of the civilised world. In the British Islands some hundred thousands have been vaccinated, in our possessions in the East Indies upwards of 800,000, and among the nations of Europe the practice has become general. Professional men have submitted it to the fairest trials, and the public have, for the most part, received it without prejudice. A few, indeed, have stood forth the adversaries of vaccination, on the same grounds as their predecessors who opposed the inoculation for the small-pox, falsely led by hypothetical reasoning in the investigation of a subject which must be supported or rejected upon facts and observations only. With these few exceptions the testimony in favour of vaccination has been most strong and satisfactory, and the practice of it, though it has received a check in some quarters, appears still to be upon the increase in most parts of the United Kingdom.

II. The College of Physicians, in giving their observations and opinions on the practice of vaccination, think it right to premise that they advance nothing but what is supported by the multiplied and unequivocal evidence which has been brought before them, and they have not considered any facts as proved but what have been stated from actual observation.

Vaccination appears to be, in general, perfectly safe, the instances to the contrary being extremely rare. The disease excited by it is slight, and seldom prevents those under it from following their ordinary occupations. It has been communicated with safety to pregnant women, to children during dentition and in their earliest infancy. In all respects it possesses material advantages over inoculation for the small-pox, which, though productive of a disease generally mild, yet sometimes occasions alarming symptoms, and is, in a few cases, fatal.

The security derived from vaccination against the small-pox, if not absolutely perfect, is as nearly so as can perhaps be expected from any human discovery; for among several hundred thousand cases, with the results of which the College have been made acquainted, the number of alleged failures has been surprisingly small, so much so as to form certainly no reasonable objection to the general adoption of vaccination; for it appears that there are not nearly so many failures in a given number of vaccinated persons as there are deaths in an equal number of persons inoculated for the small-pox. Nothing can more clearly demonstrate the superiority of vaccination over the inoculation of the small-pox than this consideration; and it is a most important fact, which has been confirmed in the course of this inquiry, that in almost every case where the small-pox has succeeded vaccination, whether by inoculation or by casual infection, the disease has varied much from its ordinary course; it has neither been the same in violence nor in the duration of its symptoms, but has, with very few exceptions, been remarkably mild, as if the small-pox had been deprived, by the previous vaccine disease, of all its usual malignity.

The testimonies before the College of Physicians are very decided in declaring that vaccination does less mischief to the constitution, and less frequently gives rise to other diseases than the small-pox, either natural or inoculated.

The College feel themselves called upon to state this strongly, because it has been objected to vaccination that it produces new, unheard of, and monstrous diseases. Of such assertions no proofs have been produced, and, after diligent inquiry, the College believe them to have been either the inventions of designing or the mistakes of ignorant men. In these respects, then, in its mildness, its safety, and its consequences, the individual may look for the peculiar advantages of

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vaccination. The benefits which flow from it to society are infinitely more considerable; *it spreads no infection, and can be communicated only by inoculation.* It is from a consideration of the pernicious effects of the small-pox that the real value of vaccination is to be estimated. The natural small-pox has been supposed to destroy a *sixth* part of all whom it attacks, and that even by inoculation, where that has been general in parishes and towns, about one in 300 has usually died.

It is not sufficiently known, or not adverted to, that nearly *one tenth*, some years more than one tenth, of the whole mortality of London is occasioned by the small-pox; *and however beneficial the inoculation of the small-pox may have been to individuals, it appears to have kept up a constant source of contagion, which has been the means of increasing the number of deaths by what is called the natural disease. It cannot be doubted that this mischief has been extended by the inconsiderate manner in which great numbers of persons, even since the introduction of vaccination, are still every year inoculated with the small-pox, and afterwards required to attend two or three times a week at the places of inoculation,* through every stage of their illness.

From this, then, the public are to expect the great and uncontroverted superiority of vaccination, that it communicates no casual infection, and, while it is a protection to the individual, it is not prejudicial to the public.

III. The College of Physicians, in reporting their observations and opinions on the evidence adduced in support of vaccination, feel themselves authorised to state that a body of evidence so large, so temperate, and so consistent, was perhaps never before collected upon any medical question. A discovery so novel, and to which there was nothing analogous in nature, though resting on the experimental observations of the inventor, was at first received with diffidence; it was not, however, difficult for others to repeat his experiment, by which the truth of his observations was confirmed, and the doubts of the cautious were gradually dispelled by extensive experience. At the commencement of the practice almost all that were vaccinated were afterwards submitted to the inoculation of the small-pox; many underwent this operation a second and even a third time, and the uniform success of these trials quickly bred confidence in the new discovery. But the evidence of the security derived from vaccination against the small-pox does not rest alone upon those who afterwards underwent variolous inoculation, although amounting to many thousands; for it appears, from numerous observations communicated to the College, that those who have been vaccinated are equally secure against the contagion of epidemic small-pox. Towns, indeed, and districts of the country in which vaccination had been general have afterwards had the small-pox prevalent on all sides of them without suffering from the contagion. There are also in the evidence a few exapmles of epidemic small-pox having been subdued by a general vaccination. It will not, therefore, appear extraordinary that many who have communicated their observations should state, that though at first they thought unfavourably of the practice, experience had now removed all their doubts.

It has been already mentioned that the evidence is not universally favourable, although it is in truth nearly so, for there are a few who entertain sentiments differing widely from those of the great majority of their brethren. The College, therefore, deemed it their duty in a particular manner to inquire upon what grounds and evidence the opposers of vaccination rested their opinions. From personal examination, as well as from their writings, they endeavoured to learn the full extent and weight of their objections. They found them without experience in vaccination, supporting their opinions by hearsay information and hypothetical reasoning; and upon investigating the facts which they had advanced they found them to be either misapprehended or misrepresented, or that they fell under the description of cases of imperfect small-pox before noticed, and which the College have endeavoured fairly to appreciate.

The practice of vaccination is but of eight years' standing, and its promoters, as well as opponents, must keep in mind that a period so short is too limited to ascertain every point, or to bring the art to that perfection of which it may be capable. The truth of this will readily be admitted by those acquainted with the history of inoculation for the small-pox. Vaccination is now, however, well understood, and its character accurately described. Some deviations from the usual course have occasionally occurred, which the author of the practice has called spurious cow-pox, by which the public have been misled, as if there were a true and a false cow-pox; but it appears that nothing more was meant than to express irregularity or difference from that common form and progress of the vaccine pustule from which its efficacy is inferred. Those who perform vaccination ought therefore to be well instructed, and should have watched with the greatest care the regular progress of the pustule, and learnt the most proper time for taking the matter. There is little doubt that some of the failures are to be imputed to the inexperience of the early vaccinators, and it is not unreasonable to expect that further observation will yet suggest many improvements that will reduce the number of anomalous cases, and furnish the means of determining with greater precision when the vaccine disease has been effectually received.

Though the College of Physicians have confined themselves in estimating the evidence to such facts as have occurred in their own country, because the accuracy of them could best be ascertained, they cannot be insensible to the confirmation these receive from the reports of the successful introduction of vaccination, not only into every part of Europe but throughout the vast continents of Asia and America.

IV. Several causes have had a partial operation in retarding the general adoption of vaccination. Some writers have greatly undervalued the security it affords, while others have considered it to be of a temporary nature only; but if any reliance is to be placed on the statements which have been laid before the College, its power of protecting the human body from the small-pox, though not perfect indeed, is abundantly sufficient to recommend it to the prudent and dispassionate, especially as the small-pox, in the few instances where it has subsequently occurred, has been generally mild and transient. The opinion that vaccination affords but a temporary security is supported by no analogy in nature, nor by the facts which have hitherto occurred. Although the experience of vaccine inoculation be only of a few years, yet the same disease, contracted by the milkers of cows, in some districts, has been long enough known to ascertain that in them, at least, the unsusceptibility of the small-pox contagion does not wear out by time. Another cause is the charge against vaccination of producing various new diseases of frightful and monstrous appearance.

Representation of some of these have been exhibited in prints in a way to alarm the feelings of parents, and to infuse dread and apprehension into the minds of the uninformed. Publications with such representations have been widely circulated, and, though they originate either in gross ignorance or wilful misrepresentation, yet have they lessened the confidence of many, particularly of the lower classes, in vaccination. No permanent effects, however, in retarding the progress of vaccination need be apprehended from such causes, for as soon as the public shall view them coolly and without surprise, they will excite contempt, and not fear.

Though the College of Physicians are of opinion that the progress of vaccination has been retarded in a few places by the above causes, yet they conceive that its general adoption has been prevented by causes far more powerful, and of a nature wholly different. The lower orders of society can hardly be induced to adopt precautions against evils which may be at a distance; nor can it be expected from them, if these precautions are attended with expense. Unless, therefore, from the immediate dread of epidemic small-pox, neither vaccination nor inoculation appears at any time to have been general, and when the cause of terror has passed by, the public have again relapsed into a state of indifference and apathy, and the salutary practice has come to a stand. It is not easy to suggest a remedy for an evil so deeply imprinted in human nature. To inform and instruct the public mind may do much, and it will probably be found that the progress of vaccination in different parts of the United Kingdom will be in proportion to that instruction. Were encouragement given to vaccination, by offering it to the poorer classes without expense, there is little doubt but it would in time supersede the inoculation for the small-pox, and thereby various sources of variolous infection would be cut off; but, till vaccination becomes general, it will be impossible to prevent the constant recurrence of the natural small-pox by means of those who are inoculated, except it should appear proper to the Legislature to adopt, in its wisdom, some measure by which those who still, from terror or prejudice, prefer the small-pox to the

vaccine disease, may, in thus consulting the gratification of their own feelings, be prevented from doing mischief to their neighbours.

From the whole of the above considerations, the College of Physicians feel it their duty strongly to recommend the practice of vaccination. They have been led to this conclusion by no preconceived opinion, but by the most unbiassed judgment, formed from an irresistible weight of evidence which has been laid before them. For, when the number, the respectability, the disinterestedness, and the extensive experience of its advocates is compared with the feeble and imperfect testimonies of its few opposers; and when it is considered that many, who were once adverse to vaccination, have been convinced by further trials, and are now to be ranked among its warmest supporters, the truth seems to be established as firmly as the nature of such a question admits; so that the College of Physicians conceive that the public may reasonably look forward with some degree of hope to the time when all opposition shall cease, and the general concurrence of mankind shall at length be able to put an end to the ravages at least, if not to the existence, of the small-pox.

(Signed) Lucas Pepys,
President.

Royal College of Physicians,
10th April 1807.

Jas. Hervey,
Registrar.

(H.)

On the present Death-rates of London, at different Ages and from different Diseases, as compared with the corresponding Death-rates at the End of the 17th and in the Middle of the 18th Century, by Dr. Greenhow, Lecturer on Public Health at St. Thomas's Hospital, Physician to the Western General Dispensary.

I believe there is no good reason for supposing that vaccinated persons, because they are less susceptible of small-pox, are therefore more liable to be attacked by other diseases, either of an infective or constitutional character. It has, indeed, been asserted that the comparative immunity from small-pox produced by vaccination has been counterbalanced by a greater prevalence and fatality of other diseases, and particularly of fever, phthisis, and strumous affections. This assertion is, however, totally without the support of facts; for both the mortality from all causes, and the mortality occasioned by each of these diseases, have largely diminished since the period when the prevalence of small-pox was unchecked by preventive measures. This opinion of mine is founded upon a careful examination of the London bills of mortality, and a comparison of the average death-rates from all causes, and from each of these specified causes, calculated over three periods of 10 years each, viz., from December 14, 1680, to December 16, 1690,* previous to the introduction of inoculation, from December 1745 to December 1755,† and again from the 10 years from 1846 to 1855 inclusive, during which vaccination has been in general use.

The facts are shown in the accompanying table, in reference to which, however, it is necessary to explain that, whilst it is as nearly as possible correct in respect of the general mortality of the third period, the present death-rates from fever, diseases of the chest, and strumous affections, are somewhat over-rated in comparison with the same classes of disease in the earlier periods. On the other hand, both the general and particular death-rates of the 10 selected years of the 17th and 18th centuries are under-estimated, from the circumstance that the bills of mortality took cognizance only of interments in parochial burial grounds within the limits of the metropolis; no account being taken of the deaths of persons buried in parish cemeteries adjacent to London, or in the extra-parochial burial-grounds of St. Paul's Cathedral, Westminster Abbey, the Temple, the Rolls, Lincoln's Inn, St. Peter's in the Tower, the Charter House, or the hospitals. For the same reason the deaths of many Dissenters, Jews, and Roman Catholics, who were buried in sectarian places of sepulture, must have been omitted from the returns. App. No. 1.

The population of London in 1685 was estimated by King at 530,000, an estimate which is considered to have been a very near approximation to the truth. The deaths at that period, and for long afterwards, considerably exceeded the births; or to speak more properly, the baptisms fell short of the burials by about one third.* The population of the metropolis is, therefore, supposed to have been very stationary for a long period; the immigration into it from rural districts and provincial towns having done little more than compensate for the loss sustained by the excess of deaths over births. The correctness of this opinion is in a great measure confirmed by the fact that the population of London within the old bills of mortality amounted in 1801 to only 742,625 persons, showing an increase of little more than 40 per cent. during the 116 years that had elapsed since the date of King's computation, although there is no doubt that the population had latterly increased directly, as well as by its growth from external sources.

By some authorities the death-rate of London far onwards in the 18th century is said to have been as high as 500 per annum out of every 10,000 inhabitants. Assuming the correctness of King's estimate of the population in 1685, the average annual death-rate of London within the bills of mortality for the 10 years 1681 to 1690 inclusive (calculated upon the number of funerals recorded in the weekly bills), appears to have been 421 in the 10,000. For the reason already assigned, this estimate is probably a good deal under the truth. Its inaccuracy is augmented by the fact that a considerable infusion of healthy persons, at the least fatal period of life, annually poured into the metropolis in pursuit of the more lucrative occupation therein procurable. These sources of inaccuracy, however, since they tend to lessen the death-rates of that period, do but lend additional force to the fact that the present death-rate is only 250 in the 10,000; or, if corrected so as to include only the district comprised within the old bills of mortality, about 260 in the 10,000; showing a decrease in the general death-rate of, at the least, 160 persons out of every 10,000 annually since the close of the 17th century. In other words, if the mortality within the limits of the metropolis, as defined in the baptismal and mortuary returns of the 17th century, were now equal to its mortality 165 years ago, London would be sustaining an annual loss by death of more than 25,000 persons over and above the number of those who, in our time, compose its list of dead. Or, if the present mortality within the limits of the Registrar-General's weekly returns were equal to that of the metropolis of the 17th century, the gross annual loss would be raised by the addition of upwards of 40,000 deaths. The deaths would thus again exceed the births; and, as in the 17th and 18th centuries, the population of London could only be maintained by the immigration of persons from rural districts. The public health of London, as indicated by the rate of mortality, has therefore improved in the proportion of 26 to 42 since the close of the 17th century.

The general death-rate of the middle period selected for this comparison (1746–55), 355 in the 10,000, occupies just that intermediate place in point of numbers, between those of 1685 and 1851, which it does in regard to time. It may, therefore, be fairly assumed, that the improved state of the public health has been a gradual process, keeping pace with the general progressive improvement in the habits and circumstances of the people.

The improvement in regard to the special diseases asserted to have taken the place of small-pox is, with the exception of pulmonary affections, still more remarkable; and even the latter, although more dependent on climate than most diseases, have become less fatal during the last century and a half. The annual average mortality from the causes classed in the old bills of mortality, as "consumption and tissick," "pleurisy," and "cold and cough," which together correspond with "phthisis" and diseases of the organs of respiration in the present weekly bills, during the 10

* This period was chosen because it corresponds with King's calculation of the population of London, and because small-pox (the mortality from which increased after the introduction of inoculation) was uninfluenced in its course by any artificial interference.

† The Companion to the Almanack for 1828 contains a computation of the London population for 1750, which has been used for the present purpose.

* The old bills of mortality referred only to funerals and baptisms performed at parish churches. There was no proper registration of births and deaths until the passing of the present Registration Act. The christenings were in excess of the burials thrice only during the 18th century; namely, in 1790, 1797, and 1799.

App. No. 1.

years extending from 1681 to 1690, was 69·3 in the 10,000. This is, however, an inadequate estimate, since upwards of 1,000 deaths annually were attributed to old age, many of which would in our day have been unquestionably referred to affections of the chest; for, while comparatively few persons die of natural decay, a large number of aged persons perish from attacks of pneumonia or bronchitis. The increased death-rate from diseases of the chest in the second period is, perhaps, partly, owing to the reference of many deaths which had been classed as fever at the former period, to their proper place in this division. Epidemics of pulmonary disease appear also to have existed in two out of the ten selected years, for the mortality from this cause was largely in excess both in 1746 and 1749. Alvine flux, a disease closely resembling if not identical with the cholera of the present century, was exceedingly fatal in the concluding years of the 17th century. The average mortality it produced between 1680 and 1690 was about 2,560 annually; and, no doubt, many of its victims were previously suffering from chronic affections, among which diseases of the chest would form a large section. The mortality from flux rapidly and progressively decreased in the 18th century, so that the annual average mortality occasioned by it fell from upwards of 1,000 in the first 10 years of the century to only 110 for the 10 years, 1746 to 1755. The immediate consequence of this improvement in the public health would be the reference of an increased number of deaths to the various chronic affections which had previously furnished victims to the flux, among which, as I have already said, pulmonary affections would occupy a prominent place.

During the 10 years of the present century that have been selected for the purpose of this comparison, the deaths from diseases of the organs of respiration and from phthisis (which to obviate all doubts as to diagnosis, are thrown into a single class) have annually been at the rate of 68·2 in the myriad. It is, however, probable that a large proportion of the deaths which are now referred to pneumonia, and perhaps even some of the more rapid cases of phthisis, would have formerly been attributed to fever, on account of the pungent heat of skin by which these diseases are characterised. If, therefore, the deaths from pneumonia, which are included in the foregoing calculation of the present death-rate from pulmonary affections, be taken from the class of diseases of the chest and transferred to that of fevers, the annual death-rate from diseases of the organs of respiration (exclusive of pneumonia and including phthisis) is reduced from 68·2 to 52·8 in the myriad. Moreover, in thus comparing the death-rates of the 17th, 18th, and 19th centuries from diseases of the chest, due allowances should be made for the already recited fact, that these affections are very much influenced, both in their prevalence and fatality, by climate and seasonal conditions, which, however much they may vary between particular years, are tolerably constant when the comparison is extended over considerable periods. On this account we ought not to expect the same reduction in the mortality from this cause as from the others presently to be noticed. Furthermore, the larger amount of mechanical impurities inhaled with the atmosphere, the nature of several manufacturing operations, and perhaps, also, the more sedentary habits of many classes of workmen in the present day, all undoubtedly tend to maintain the prevalence and add to the fatality of pulmonary diseases. Whatever doubt, therefore, may be entertained as to the amount of diminution in the mortality from pulmonary complaints, it is at least very evident that no increase has been consequent upon the lessened prevalence of small-pox.

The diseases classed in the bills of mortality as "fever" and "spotted fever" were fatal, on an average, to 63·3 persons out of every 10,000 of the inhabitants of London, in each of the 10 years between 1681 and 1690. Sixty years later the average annual death-rate from fever, calculated over the 10 years from 1746 to 1755, had fallen to 53·9. In the present day, it is frequently difficult to distinguish between primary cephalic affections and fever accompanied by cephalic symptoms. It is more than probable that many deaths, now correctly referred to disease of the head, as well as certain chest affections, accompanied, as they often are, by an intense and pungent heat of skin, would be accounted as fever by the unskilled persons who formerly assigned the cause of death. Moreover, no mention is made of scarlet fever, which, although it might occasionally be returned with measles, must likewise have aided to swell the gross annual mortality from fever. To obviate these sources of fallacy the six diseases, scarlet fever, remitting fever, infantile fever, typhus, cephalitis, and pneumonia, have been thrown together to form the class of fever, for the purpose of comparing the present mortality from this cause with that of the 10 years of the 17th and 18th centuries. The present death-rate of the class of fever thus formed is only 38·5 in the 10,000, showing a diminution of 24·8 since 1685, and of 15·4 during the last 100 years; thus unequivocally proving that fever has not usurped the place vacated by small-pox.

The diminution in the death-rate from strumous affections is even larger than that of fever. Excluding the deaths classed under the term "chrysoms and infants," many of which were probably of strumous origin, and which amounted to between 200 and 300 annually, upwards of 80 persons in the myriad died in each year, between 1681 and 1690, from the class of strumous diseases formed of the deaths registered under the heads of "convulsions," "rickets," "water in the head," and "evil." Between 1746 and 1755, the annual death-rate of these same diseases had risen to 109·9 per myriad; an increase, perhaps, like that in the class of pulmonary affections, partially caused by the greatly decreased death-rate from alvine flux; but probably still more largely occasioned by the diminution in the number of deaths recorded from "chrysoms and infants," and their reference to the head of "convulsions," which increased almost in exact proportion as the other lessened. The analogous diseases, scrofula, hydrocephalus, and convulsions, with the addition of tabes mesenterica, a form of strumous affection which, not being separately mentioned in the older bills, is not comprised in the calculation for the two earlier periods,* are in our time conjointly fatal to less than 21 out of every myriad of the living population. In other words, scrofulous disease, considered apart from consumption, is nearly three-fourths less fatal, now that the deaths from small-pox form but a small part of the gross mortality, than it was anterior to the adoption of inoculation. To revert once more to pulmonary diseases, may not this very large diminution in the number of deaths from the strumous affections of early life be one indirect cause of the maintenance of a large mortality from tubercular phthisis, persons who would formerly have fallen victims to hydrocephalus, convulsions, or rickets, being preserved at the present day until the development of their constitutional malady in the form usually assumed at a later period of life.

Notwithstanding the uncertainties of nomenclature, and the apparent fluctuations between the first and second series of years, it is quite certain that both the general mortality and that from special diseases has very largely declined since the end of the 17th and middle of the 18th centuries; and that there is not the slightest foundation for the assertion that any kind of disease has increased *pari passu* with the decrease of small-pox, or the employment of vaccination.

Another assertion which has been made in reference to the employment of vaccination as a prophylactic of small-pox is, that although the practice of vaccination has tended to prevent death in early life, this advantage has only been temporary, and has been more than counterbalanced by the increased number of deaths at a later period; and that, viewed as an economical question, the result has been to add to the public burthens by lengthening the existence of a class of lives that cost the community much, but are cut off as soon as they reach the productive period of life, and before they have contributed their proportion towards the common stock. Even if this were true it would be but a questionable argument against vaccination, for vaccination would be

* There can be little doubt that tabes mesenterica existed in the former periods, but that it was referred to some other head, perhaps, accompanied as it is by two such prominent symptoms as large belly and diarrhœa, partly to tympany and partly to flux. There is perhaps as little doubt that the same constitutional tendency which at one time becomes developed into a certain form of disease may under a change of circumstances assume a different form. It is thus that I would account for the entire disappearance of rickets from the causes of death, the place they formerly occupied being perhaps, in our time, partly assumed by mesenteric disease. That some such substitution of one form of disease for another really occurs I do not hesitate to believe; but it is rather a conversion of analogous diseases arising from the same constitutional vice into one another than a substitution, and is very different from the substitution of other diseases for small-pox so unphilosophically, and, as above shown, so erroneously asserted, without, so far as I know, the adduction of a single corroborative fact.

TABLE showing the Average Annual Mortality of London from all Causes, and from Affections of the Chest, Fevers, Strumous Diseases, and Small-pox, in three periods of 10 years each, viz., from 1681 to 1690, from 1746 to 1755, and from 1846 to 1855, inclusive. App. No. 1.

Date.	[1] Population of the Metropolis within the Bills of Mortality.	Average Annual Number of Deaths.						Average Annual Death-rate per 10,000 Persons.					
		Average Number of Deaths in each of the Ten Years.	[2] Average Annual Number of Deaths from Pulmonary Affections, including Pneumonia.	Average Annual Number of Deaths from Pulmonary Affections, exclusive of Pneumonia.	Average Annual Number of Deaths from Fevers.	Average Annual Number of Deaths from Strumous Diseases.	Average Annual Number of Deaths from Small-pox.	Death-rate per 10,000 Persons, calculated on a Ten Years' Average.	Average Annual Death-rate from Small-pox, per 10,000 Persons.	Average Annual Death-rate from Pulmonary Affections (including Pneumonia), per 10,000 Persons.	Average Annual Death-rate from Pulmonary Affections (exclusive of Pneumonia), per 10,000 Persons.	Average Annual Death-rate from Fevers, per 10,000 Persons.	Average Annual Death-rate from Strumous Diseases, per 10,000 Persons.
1681-90	530,000	22,362	3,673 [3]	3,673 [3]	3,356 [7]	4,248 [9]	1,664 [11]	421·0	31·39	69·3 [15]	69·3 [15]	63·3	80·1
1746-55	653,909	23,216	4,804 [4]	4,804 [4]	3,526 [7]	7,183 [9]	1,201 [12]	355·0	30·44	73·4	73·4	53·9	109·9
1846-55	2,362,236	59,014	16,131 [5]	12,481 [6]	9,112 [8]	4,886 [10]	799 [13]	249·0 [14]	3·38	68·2	52·8	38·5	20·6

[1] The population is given according to the estimate formed for the middle year of the series, viz., King's computation for 1685; a computation published in the "Companion to the Almanack" of 1828 for 1750; and the Census of 1851. King's calculation is considered to have been a very fair approximation; but, if in error, it was rather in excess of numbers than the contrary. The estimated population of 1750 is also probably in excess; for if we admit King's estimate as correct, it makes the ratio of increase between 1750 and 1801 to have been somewhat less than that between 1685 and 1750, which is unlikely, seeing that the proportion of deaths to births was constantly decreasing during the latter portion of the 18th century.

[2] Upwards of 1,000 deaths annually are set down as caused by "old age." Undoubtedly many of these would now find a place under pneumonia and bronchitis.

[3] "Consumption and tissick," "pleurisy," and "cold and cough."

[4] "Consumption," "cough," "asthma and tissick."

[5] Diseases of the respiratory organs and phthisis.

[6] Phthisis and diseases of the respiratory organs, minus pneumonia.

[7] Consisting of the articles "fever" and "spotted fever," therefore probably including scarlet fever and cases of cerebral and pulmonary disease, attended by much heat of skin.

[8] Comprising scarlet fever, remitting fever, infantile fever, typhus, cephalitis, and pneumonia.

[9] "Convulsions," "rickets," "water-in-head," and "evil."

[10] Scrofula, tabes-mesenterica, hydrocephalus, and convulsions.

[11] In three of these years small-pox greatly exceeded the average.

[12] In four of these years small-pox greatly exceeded the average.

[13] In four of these years the average was greatly exceeded, and in 1848 more than doubled.

[14] The death-rate of the portion of the present metropolis comprehended within the limits of the old Bills of Mortality is somewhat higher, being nearly 260 in the 10,000.

[15] Pneumonia is not distinguished as a separate disease in the old bills. It has been excluded in the second calculation, under the belief that it would formerly be set down as "fever."

a great boon if it led to the prolongation of life only for a brief space; and especially if, in consequence of its use, the feeble members of the community were cut off by non-contagious, less loathsome, and to those who survive less disfiguring diseases, than small-pox. Fortunately there is no difficulty in disproving this mischievous assertion, which, like that already disposed of, is untrue, and has been apparently made without any investigation of the real facts. For this purpose it is necessary to compare the mortality at different periods of life, anterior and subsequent to the introduction of vaccination. I have accordingly selected four periods of 10 years each, during the last and present centuries, for this comparison. Commencing with 1728, being the first year in which the ages of the dead were published in the bills of mortality, I have abstracted from the returns the number of deaths at all ages, and at each of the principal periods of life, for the 10 years ending at Christmas 1737. From the data thus obtained the numbers dying at each period of life out of every thousand of the dead have been calculated. Allowing intervals of 30 years to elapse between each series, similar calculations have been made for the 10 years between 1768–77, and again between 1808–17. Lastly, I have made the like calculation for the 10 years from 1842 to 1851 inclusive, being compelled to take these particular years instead of allowing an interval of 30 years to elapse, because the periods of life at which deaths have taken place are differently arranged in the Registrar General's reports since 1851.

The accompanying table, which exhibits the results of this investigation, together with the principal data upon which they are founded, incontestably proves that the ages of the dead in London do not afford the semblance of support to the alleged statement. The facts shown by the table are indeed just the reverse of the assertion; for it is evident that, whilst there has been a large diminution in the mortality at the early periods of life, there has likewise been a large increase in the number of deaths at the more advanced age of 60 years and upwards since the introduction of vaccination. Thus, we learn from the table, that whilst the deaths of children under five years of age have fallen from 474 to 399, or nearly one-sixth out of every thousand deaths at all ages, during the interval between 1737 and 1842, those of persons who have survived to the age of 60 and upwards, have, during the same period, risen from 121 to 203, or in the proportion of 10 to 6. Again, the deaths below the age of 20 have fallen from 541 out of each thousand deaths during the 10 years comprised between 1728–37 to 485 in the 10 years 1842–51, or about one-ninth. As might have been anticipated, the variations in the middle period of life, between the ages of 20 and 60, have been less; the changes have also been less constantly in one direction, but the fluctuations have been small, and lend no support to the opinion that the diminished number of deaths anterior to the age of 20 has been attended by an increased mortality in early manhood. It must, moreover, be recollected that the figures in the table do not represent death-rates, and that a diminished number of deaths at the early period of life necessarily increases the proportion of deaths at the subsequent ages. If, therefore, whilst the value of life under 20 years of age had improved as much as it has during the period over which this investigation has extended, the expectation of life to persons that should attain the age of 20 had remained stationary, the result of the lessened fatality of early life would have shown itself in a table of this kind by a large increase in the proportion of persons dying between the ages of 20 and 60. The truth, however, is, as we have seen, that whilst the fatality of early life has been steadily diminishing, the number of persons who attain to a good old age has as regularly increased; for, whereas the deaths of persons aged 60 years and upwards, during the decennium 1728–37, fell short of one-eighth of the entire mortality, the deaths of the same class in the decennium 1842–51 exceed a fifth of the whole number of deaths.

In truth, from the two main facts set forth in this paper, the diminished death-rate of several diseases, and the increased value of life in the present day, we might, with reason, turn the tables on the opponents of vaccination, and infer, that apart from the prevention of small-pox, vaccination has been a great blessing to the human race, since the diminished mortality from strumous affections, and perhaps from some other diseases, is partly to be ascribed to the greatly lessened prevalence of so powerful a cause of their development as this formidable exanthem must have been in those who recovered from the immediate attack.

App. No. 1. TABLE showing the Total Mortality of London, the Total Number of Deaths at Four several Periods of Life, and the Proportion of deaths to 1,000 deaths at all Ages, at each of these Periods, for four series of 10 Years each, in the 18th and 19th Centuries.

DATE.	Total Number of Deaths in each period of 10 Years.	Total Number of Deaths at each period of Life in 10 Years.				Composition of every 1,000 Deaths according to the Ages of the Dying.			
		Under 5 Years.	Between 5 and 20.	Between 20 and 60.	60 and upwards.	Under 5 Years.	Between 5 and 20.	Between 20 and 60.	60 and upwards.
1728-37 - -	267,150	126,744	18,017	90,004	32,385	474	67	338	121
1768-77 - -	221,189	102,213	16,639	72,070	29,667	462	75	329	134
1808-17 - -	188,814	74,949	14,044	65,864	33,956	397	74	349	180
1842-51 - -	532,260	212,740	45,511	116,052	107,957	399	86	312	203

SUPPLEMENT TO (J).

REMARKS in reference to the Question whether "Vaccinated Persons, in being rendered less susceptible of Small-pox, become more susceptible of any other Infective Disease, or of Phthisis."—By Dr. Baly, of St. Bartholomew's Hospital, F.R.S.

No facts that I have met with have led me to believe or suspect that vaccinated persons, in being rendered less susceptible of small-pox, become more susceptible of any other infective disease, or of phthisis. Other infectious diseases are observed to spread according to laws of their own, and almost without exception they attack persons of the lower classes of society, amongst whom vaccination is much neglected, with more frequency and more virulence than those of the higher classes, who have, with few exceptions, been vaccinated.

Phthisis is, in a very large proportion of cases, inherited. It then often affects several children of a family, and it does this with more certainty among the lower than among the higher classes, although vaccination is much more generally practised among the latter. Phthisis also arises independently of hereditary predisposition, in single individuals of different families, owing usually to some special circumstances having weakened or disturbed the health. And this, too, occurs much more frequently in the lower than in the higher classes of society.

A French author has propounded the notion that typhoid fever, or intestinal typhus, is only the internal form of small-pox, and maintains that vaccination, while it prevents the development of small-pox on the outer surface of the body, merely turns it upon the internal surface of the bowels. He seems to base this theory chiefly on two grounds:—(1) the recent recognition of the typhoid fever; and (2) the fancied resemblance of form between the intestinal disease in this fever and the eruption on the skin in small-pox.

This theory must appear utterly absurd to any physician well acquainted with the two diseases; but as it might, nevertheless, be received by the laity as a valid argument against vaccination, I venture to state some of the facts which show its futile character.

With regard to the recent recognition of typhoid fever as a distinct fever, attended by peculiar diseased changes in the bowels, it may be sufficient to say that at the time when this discovery was made, namely, the beginning of the present century, the anatomy of diseases had been only partially and imperfectly cultivated, and the exact characters of many internal diseases now familiar to us were yet unknown; and that no good writer has doubted the previous existence of typhoid fever, although the descriptions of it left by the early physicians are vague and indistinct.

The supposed resemblance between the intestinal disease of the fever and the eruption of small-pox has no real existence. The former affects, almost exclusively, certain oval patches of glandular structure situated at certain spots along the interior of one portion of the bowels. The small-pox eruption appears as small distinct pimples, which may form on any part of the surface of the skin. These pimples, when the disease reaches its height, contain "matter," and are called pustules, and such pustules are often seen even on the interior of the mouth, throat, and windpipe. The disease in the bowels in typhoid fever, on the other hand, never presents pustules containing matter. Moreover, the general symptoms, the course, and the duration of the one disease are unmistakably different from those of the other disease.

Small-pox, again, is a highly contagious disease; and the only known source of the virus producing it is the bodies of persons already suffering from the disease. Typhoid fever is only in a slight degree infectious, and the miasma which gives rise to it is developed in the atmosphere.

Lastly, the essential difference between the two diseases, and their independence the one of the other, is clearly shown by the fact that in localities of limited extent, one of them often prevails with severity without the other appearing; while even in London, though both are at all times present to a greater or less extent, they attain respectively their highest degrees of prevalence very generally at different times.

EXPERIENCE of the MEDICAL OFFICERS of certain SCHOOLS in which VACCINATION is GENERAL.

1. In CHRIST'S HOSPITAL, HERTFORD; by R. D. J. EVANS, M.D.

The time I have been medical officer of Christ's Hospital, Hertford, is 16 years; and my observations extend over the whole of that period.

The average number of boys in the hospital at Hertford has been 436, of whom 152 were between 10 and 12 years of age, and 284 between 7 and 10. The average number of girls has been 69, and as they remain in the hospital until 15 years of age, there is a slight difference in the proportion of their ages.

The number of deaths in the 61 years has been 61 (of whom five were girls) from causes as under—

Scarlet fever (but not one since August 1844). -	9
Measles - - - - - -	9
Low fever - - - - -	22
Whooping cough - - - -	3
Inflammation of the bowels - - -	5
Inflammation of the lungs - - -	1
Disease of brain - - - - -	4
Disease of the heart - - - -	1
General debility - - - - -	2
Rheumatic affection - - - -	1
Paralysis - - - - - -	1
St. Vitus's dance - - - -	1
During absence; cause not known - -	2

The boys are draughted four times a year to London, about 50 each time, and new boys are admitted every month to replace those advanced to the London school, so that the average time boys are kept at Hertford is about 2¼ years. All boys received are examined by the medical officer, and so are all those sent to London.

The average of boys in the infirmary is 22, and of boys absent with their friends on account of their health 13; but there are in general convalescent children who return after an absence of five or six weeks.

The average of girls in the infirmary is three and of absentees one.

As it is a positive rule that no child shall be kept at the well wards with sickness or ailment of any description, many of those taken into the infirmary are for trivial causes, and are seldom retained there more than a week or 10 days, and many are sent to attend the schools from the infirmary.

2. In MARLBOROUGH COLLEGE, WILTS; by WALTER FERGUS, M.D.

Of 1,346 pupils of whom I have been able to obtain the particulars, all had been vaccinated excepting two. One of these boys, born in 1833, had been inoculated

with small-pox, and the other was the son of a gentleman who, having doubt about the efficacy of vaccination, had the operation performed on every alternate child, leaving one half of his children unvaccinated. He made no remonstrance when he heard that I had supplied his omission in the case of his son.

5·72 per cent. of the total number had been vaccinated twice or oftener. In two or three instances the operation was said to have been done frequently.

3·26 per cent. had small-pox after vaccination; one had small-pox in infancy without vaccination; two had been inoculated with small-pox after vaccination without any effect.

The general health of the pupils of this college has been remarkably good, especially since the drainage has been completed and due attention paid to sanitary precautions.

The average yearly number of pupils resident in the college during the eight years that I have been medical officer has been 414; these, with about 60 adult persons, constitute the community under my charge. The number of pupils out of school each day on account of sickness, including illnesses and injuries of sometimes extremely trivial character, has varied from 2·75 to 5·05 per cent., the higher number being caused by the presence of epidemics, such as scarlatina, or measles, which necessitate the prolonged stay in the sick house of each patient affected by them. During non-epidemic years the average number is 3·07 per cent., and in epidemic years 4·32 per cent., making a general average of almost 3·7 per cent. daily out of school during the eight years. Owing to the imperfection of the records I have found it impossible to extend my inquiries beyond that time.

During this period of eight years there have been four deaths among the pupils, and one death among the adults. The cause of death in two cases was pneumonia. One boy had inflammation of both lungs, to which was added an attack of mild scarlatina. The other death from pneumonia occurred during convalescence from a rather severe attack of scarlatina, in a boy who had a year previously nearly lost his life by pneumonia. The third death was caused by a malignant pustule on the face terminating fatally in four days, by effusion on the brain; this was in a boy who had very recently entered the college. The fourth death was the result of irritation of the brain accompanied in the end by pneumonia.

The death in the adult was caused by irritation of the kidney, accompanied by albuminuria and incipient phthisis; three brothers who had lived in Devonshire had died nearly at the same age (35) of similar affection.

The diseases which have been epidemic in the college are scarlatina, measles, and mumps.

In 1849 one solitary case of scarlatina occurred, and the disease spread no further.

In 1852, from February to June, there were 46 cases of scarlatina, all of which terminated favourably, excepting the two who died of pneumonia mentioned above.

In April and May 1853, scarlatina returned to a small extent. There were 11 cases, all terminating favourably.

In 1855, from March to June, there were 63 cases of scarlatina, all of which recovered. Since then there has been no return of the disease. In 1855 the cases were generally of a more severe character than they were in 1852; but there was less tendency to affection of the kidneys in 1855, and the recoveries were in general more rapid and more satisfactory than they had been in 1853. Belladonna was given in both of the great epidemics; but it seemed to have not the slightest effect either in checking the disease or in modifying its course.

Measles has only once visited the college during the eight years. In August and September 1855, it swept through the school so rapidly, that in little more than three weeks there were 97 cases; some of them alarming from the presence of laryngitis. But they all recovered satisfactorily. Typhus has never occurred. One boy brought it with him from an infected locality; but in the college it was limited to himself, and he recovered after a long and dangerous illness.

The age of the pupils varies on admission from 8 to 16 years; the large majority being between the ages of 10 and 14; the pupils remain till they are 18 or 19, at which ages there are few left.

The principal diseases in non-epidemic years are such as might be expected in such a population, and consist chiefly of disorders of the respiratory and digestive apparatus, which, in many instances, by receiving prompt attention, are prevented from assuming a more grave character.

In the college we have frequently as it were resisted the incursion of diseases which have been epidemic around us. Small-pox, scarlatina, and measles, have all been prevalent in severe and fatal forms, while the college has remained intact. I have only known one case in which a boy was removed, on account of the climate disagreeing with him; he was a native of a marshy district, and was unable to bear the bracing air of this place. App. No. 1.

3. In the Welch Charity School, Gray's Inn Road; by Walter Griffith, Esq., F.R.C.S.

After a medical experience of more than 40 years, my confidence in the protection against small-pox which vaccination affords is increased rather than diminished. During that period, I have not seen a case in which the vaccine lymph has been a vehicle of any other constitutional infection. My experience is based, not merely upon private practice, but upon the number of children in the Welch School, to which establishment I have been the medical attendant for 27 years. To that institution I admit no child that does not exhibit the evidence of vaccination having been properly performed, or having had small-pox. In the year 1849, a case of small-pox occurring, the whole of the children were re-vaccinated, and nearly all came under the vaccine influence in a modified form. In 11 cases, the pustular eruption was more marked, having the character of genuine cow-pox. During the last eight years (a fair specimen of the preceding 20), 11 deaths have occurred from the following causes; five from consumption, two heart disease, two brain disease, one whooping cough, one accident (fractured skull). The number of children 200; average age, between 11 and 12.

[*Additional particulars by Dr. Griffith, Assistant Physician-Accoucheur to St. Thomas's Hospital.* The school was instituted for the children of Welsh parents, born within 10 miles of the Royal Exchange. When full, the school contains 200 children; 130 boys, and 70 girls; but the number varies somewhat, owing to removals. The usual length of stay is from 8 to 14. None are admitted after 10 years of age. The average age is 11¼. Before admission, the children are carefully examined, both as to general health and as to previous existence of small-pox or vaccination. If crippled, or out of health, which rarely happens, they are rejected. If there be no sufficient mark of vaccination or small-pox, then admission is postponed until the former has been successfully practised. I believe that during the last 25 years no case of insusceptibility to the vaccine virus has occurred.

On 19th June 1849, and following days, *all* the children were re-vaccinated. This was considered advisable, in consequence of one of the girls having been attacked with small-pox, in a modified form. It had, apparently, been contracted about 10 days before its discovery, while the girl, being at home for a few hours on the usual holiday, had associated with children suffering from the complaint. She was of course at once removed from the school; and no other case has since occurred. She quickly recovered; and, I am informed, shows no pits or other trace of disease.

The subjoined Tables show the number of previous cicatrices, and the result of re-vaccination. All were inoculated in six places; most of them from infants. Their average age was 11¼.

Girls:—

Previous marks		Re-vacc. vesicles	
	8 in 1		6 in 23
	7 „ 1		5 „ 13
	6 „ 5		4 „ 9
	5 „ 6		3 „ 4
	4 „ 12		2 „ 8
	3 „ 9		1 „ 6
	2 „ 30		0 „ 2
	1 „ 10		III „ 1
Small-pox previously	1		
Do. at the time	1	Total	65
Total	65, of these 2 took thoroughly.		

Boys:—

Previous marks		Re-vacc. vesicles	
	8 in 1		6 in 39
	7 „ 3		5 „ 24
	6 „ 13		4 „ 16
	5 „ 13		3 „ 13
	4 „ 16		2 „ 4
	3 „ 18		1 „ 5
	2 „ 24		0 „ 4
	1 „ 19	III, and not vacc.	2
Small-pox previously	5	Total	112
Total	112, of these 9 took fully.		

The 5 small-pox cases had respectively on re-vaccination 4, 3, 2, 2, 0, vesicles.

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Total number 178; of which 11 took fully; 157 modified; 6 failed; 4 not vaccinated.

The following points have struck me:—

The almost invariable susceptibility to the irritation of the vaccine virus. About one-fourth failed on the first attempt, a few on the second, but only six (four boys and two girls) on the third and last trial. Eleven succeeded perfectly, as shown by the pocks, their stages and duration, also by re-inoculation, and subsequent pitting. In the others, where it was modified by previously successful vaccination, the eruption ran a rapid course, but did not pass beyond the vesicular stage. In some, even this point was hardly arrived at; in others, there was a more or less distinct central depression. None but the preceding 11 maturated, or were attended with fever.

The almost invariable absence of pitting in the modified forms, the only trace being a temporary stain. Five boys were at the time suffering from eczemal eruptions on the face or scalp. In these the pocks ran at first through the same stage as the modified form, but healed badly, taking on the appearance of the previous eruption. A similar effect followed in seven other cases, doubtless from the same constitutional tendency. The children who had suffered from small-pox appeared equally susceptible with the others. Of the six, two failed after first, one after second, and one after third attempt.

The bastard vesicle, tried in four cases, was apparently equally powerful with the well-formed one.]

4. In the Orphan Working School, Haverstock Hill; by Hetman C. Harris, Esq., F.R.C.S.

I hand you herewith a copy of the statement of our deaths and removals from sickness, at the Orphan Working School, Haverstock Hill. I have been surgeon-apothecary to that institution over 18 years; for 11 years at the City Road Asylum; and for seven years at the asylum at Haverstock Hill. The general state of health at both localities has been most satisfactory. The children, before being admitted as candidates for election, are medically examined and approved; and again before final admission after their election. All must have been vaccinated successfully; and where the marks of prior vaccination are feeble and nearly effaced, I take some opportunity while in the school to test success by a re-vaccination. I have thus tested, in the 18 years, 47 children, and never yet got one case to run its proper course; consequently, I have never *successfully* re-vaccinated any of our children. All appear to be protected, so far as vaccination protects, from small-pox. But twice in the 18 years, occurring simultaneously with visitations of chicken-pox, three cases of modified small-pox, very mild indeed, have occurred. One case only was ill enough to be removed temporarily to the Small-pox Hospital, and that was in the year 1853. We have infirmaries within the building, and treat therein all illnesses but small-pox and scarlet fever: the latter, from its extreme contagiousness, is sent to the Fever Hospital.

Our children have all lost one or both of their parents; and 85 per cent. are made orphans by reason of phthisis in the parent or parents. Mild forms of strumous opththalmia, and eruptions of eczema, herpes, and impetigo, are our most numerous classes of medical cases; and it is always from among those children who will not take any vegetable matters in their diet beyond potato that the most numerous and troublesome forms of these specified skin diseases are manifested. We have not many of them ever in any given year; but the same child, or children, suffer from similar skin eruptions, year after year. Very rarely any fresh case occurs in a child; the same old faces repeat over and over again. I ascribe the few cases of strumous ophthalmia which occur, mild as they generally are, to the high, cold, exposed position of Haverstock Hill, and to the north aspect of our playgrounds, where our children play with bare heads summer and winter. But still, for the descendants of phthisical parents, our children have but little illness from any forms of strumous disease.

Our numbers in the City Road Asylum used to vary between 70 and 100; nearly between 85 and 90 up to 1840. After that year, the numbers rose to over 100; and in 1846, to over 140. Since we removed to Haverstock Hill our numbers have ranged between 250 and 270. Children are eligible between 7 and 14 years of age; but must be admitted before 11 years of age. I have passed my medical and surgical superintendence over more than 1,000 children, among whom I have never seen any ill effects due to vaccination. All have been carefully vaccinated; and I have never obtained a successful re-vaccination from among them. Only three cases of modified small-pox have occurred in 18 years, notwithstanding that traces of that infection have, lightly perhaps, but epidemically, visited the metropolis within the same period. All three cases were very mild, and all recovered very early and well.

I have the honour to be also surgeon-apothecary to the Boys' Mission Home, Mornington Crescent. In that asylum, now five years established, the children are of the ages between 7 and 14 years. All are the sons of missionaries in various stations. Many come from Africa, many from the Indies, East and West; some from parts of Eastern Asia; and some from stations in the Isles of the Pacific. Nearly half of the scholars at that school have a mixed blood, from parentage through native races; of course, oftenest on the maternal side. All, before admission into that school, must have been successfully vaccinated; and I have seen above 100 children at that school, which enlarges my experiences in quite a different channel. From the admixed blood and race of many of these children, I have no reason to doubt the efficacy of vaccination; and I will answer for its propriety, seeing that I have in no one instance known any ailment, affection, or disease attributable to it in the least degree.

My experience of the accidental eruptions which annoy the public, and vex the surgeon, is most derived from my position as public vaccinator for a district of the poor and very populous parish of St. Luke, Middlesex, which district comprises nearly one quarter of the parish, or about 14,000 souls; and in which the children of the parochial workhouse, and of the Lying-in Hospital, in the City Road, are both comprised. I have been a district vaccinator ever since the first Vaccination Act was passed. Within that period I have vaccinated above 2,300 children, and have very, very rarely had any complaints from others, or seen cause to suspect vaccination to be the cause of eruptions, or any other kind of diseases. It seems to me even to be absurd to take the trouble of refuting such idle talk as we sometimes hear. I do believe that the grossest exaggeration prevails in respect to ascribing the spread of eruptions to vaccination. A few cases are multiplied by gossip into numbers; and one particular is made an occasion of asserting generalities; at least, under very ample experience, such is my own sure conviction.

The most certain source of humours, eruptions, skin affections, &c. following vaccination, is the practice of mothers postponing it under any and every pretext, until, as they fancy, their infant is old enough to bear it, by which time, first dentition is actively progressing, and in unhealthy, ill-fed, ill-lodged children, eruptions known well as "tooth-rashes" (various forms of eczema, herpes, impetigo, and porrigo), are pretty frequently present. If you vaccinate at this time these eruptions are not turned into any other disease by vaccination, but they are made worse and more protracted. On the other hand, some parents come so early for vaccination to be performed that you cannot yet determine whether from suckling, a crop of Crusta Lactea, or "milk scall," will not trouble their infants. If you vaccinate these thus early some will break out at that particular time, hastened probably by the irritation of the vaccine vesicles; and vaccination will be charged with the whole disease.

Vaccination again gets discredit from the fact that no preparatory medicines are administered before it is performed, and none, except in private practice, are given after it has succeeded. The price of the "contract vaccination" precludes the furnishing of any medicines into the bargain, which is already a poor one. Besides, medical men have grown to speak slightingly of this necessity; and the public now believe that no preparation is required, and no after medicine is needed, in any case; except, perhaps, the nurse's favourite dose of "a drop of castor oil."

Allow me to suggest that if the operation of vaccination be performed between the third and fourth month, preparing the recipient by a few doses of alterative medicine, and altering faulty diet either through the mother's milk or the feeding pot, both before, at, and after the time of vaccination, taking the matter from a healthy arm between the eighth and ninth days, avoiding visible skin affections as sources of supply, even when most pressed for lymph (for better use none, than take it from an impetiginous arm), and avoiding as sources of supply all children able to walk, who come

heated and flushed with exertion before you (for matter taken thence will produce, besides its own production, suppurative inflammation in the axillary, and perhaps also in the cervical superficial glands and abscesses), avoiding also notoriously strumous sources of lymph; and then, using these precautions, tie down the opponents to vaccination to specific points of charge against it (not try to follow and refute loose rambling gossip), and but few evils will follow from vaccination, either in actual practice, or in their wild morbific fancies.

I warmly advise all friends to the practice of vaccination to use but ordinary care and circumspection in its performance, and then no evils will detract from its merits; and no medical man can declare with truth that vaccination is not still, and has not been for more than half a century, the greatest blessing that medical science and art have conferred on mankind.

I think I should add that the present vaccine vesicles are hardly equal to those obtained 30, 20, and 15 years ago. But I do not believe that this detracts from the efficacy of vaccination.

In the 36 cases above referred to, the illnesses which occasioned death or removal were as follows:—

Phthisis, 10; scarlatina, 4; acute inflammations, 5; nervous diseases, 2; fever, 1; disease of bones or joints, 4; incontinence of urine, 4; internal strangulation, 2; strumous and glandular affections, 4.

5. In the London Orphan Asylum; by D. de B. Hovell, Esq., F.R.C.S.

No evidence has come before me of vaccination deteriorating the health. In assertions to the contrary due allowance is not made, in my opinion, for the difference between the "post" and the "propter hoc." I have no reason to think that vaccination predisposes to typhus, phthisis, glandular swelling, or cutaneous eruptions, or the propagation of hereditary diseases. Of course, due care must be taken that the lymph is taken from a healthy child, and not after the expiration of seven days, or, rather, 168 hours; this last is an important point. After the areola has once commenced, the matter becomes less effectual and more irritating. Also the same lymph will affect different children differently.

I have had medical charge of the London Orphan Asylum for six years; that is to say, of 400 children, from 8 to 15 years of age; and from 200 to 300 other children, from birth to 15 years, for a period of 14 or 15 years. Many children of the Orphan Asylum are necessarily delicate. Obviously, the prevailing disease among them is struma, in its various forms. Scarlet fever, typhus fever, measles, mumps, &c. have at different times prevailed among them, but never under circumstances indicating any connexion with vaccination. I have twice re-vaccinated almost the entire school, with a view to test prior vaccination, and secure immunity from virulent or unmodified small-pox. Now, if vaccination had the effect of producing disease, surely some evidence would have shown itself after these re-vaccinations; but, on the contrary, the health of the children has manifestly improved, under improved ventilation, diet, hygiene, &c. The total number of deaths in 6 years has been 16; from phthisis six, from tubercular disease four, from pneumonia one, from peritonitis one, from scarlet fever one.

The other children I allude to are those of the Hackney Union, who have been as closely vaccinated, or rather re-vaccinated, and they are very healthy.

Whether secondary or tertiary syphilis be communicable by vaccination, I have had no evidence. I believe, however, that secondary symptoms are capable of being thus communicated. Much depends on the state of the health of the child vaccinated. The same lymph will produce a normal vesicle in one child, and one attended by severe inflammation and eruption in another.

I am decidedly of opinion that not only is the power of the lymph impaired when taken after 168 hours, or after the areola begins to show itself, but also that the protective power of the lymph is maintained, and even improved, by being taken on the seventh or even the sixth day. The cause of this is obvious; when the areola forms, the lymph becomes more or less purulent in its character.

6. In the Royal Freemasons' School for Female Children, Wandsworth; by Thomas S. Howell, Esq.

My professional services to the Royal Freemasons' School for Female Children have extended over the last four years, since their removal from the Westminster-road. Most of the cases that have come under my care since their residence here had been more or less under medical treatment previously. Feeling that this short period would not assist you much, I have availed myself of the kind services of the secretary (Mr. Crewe), who has given me a statement of the deaths, &c. since his appointment in 1842 up to the present time.

There are 65 children in the school aged from 7 to 15. No child is eligible for election unless previously vaccinated.

I have no reason to connect the illness or diseases of any of the children with vaccination. And, though glandular swellings did form the principal cases requiring treatment, yet, since their residence here, those cases have all done well, which makes me believe that the locality was in fault. And, further, I have always found that their parents were unsound, and that one or both had died early in life.

Cutaneous eruptions are very rare. We have had but one case (*lepra vulgaris*) in four years; the child's relations were suffering from the disease. Only one child had been removed in my time, for an old-standing hip disease. The secretary's paper will give you the information you ask on the subject of deaths.*

During the present secretary's appointment (lasting 14 years), 292 children have been admitted into the school; and, during that time, two cases of small-pox have occurred. The cases did well. There have been four deaths in the last four years; one of scrofula, one of cholera (in 1854), one of phthisis, and one of effusion on the brain.

* Return of the number of children who have died in the school in the 15 years 1842-56:

Description of the Fatal Diseases.	——
Consumption	12
Scrofula	5
Effusion on brain	3
Cholera	2
Heart disease	2
Fever	1
Total	25

7. In the Infant Orphan Asylum; by R. L. Pinching, Esq., Surgeon to the Asylum.

Statistics of the Population and Deaths during 28¾ years (from January 1828 to October 1856, inclusive) from a Return prepared by the Secretary.

Year.	Children under Care.	Deaths.	Year.	Children under Care.	Deaths.
1828	20	1	1843	227	9
1829	37	1	1844	241	8
1830	53	—	1845	264	3
1831	69	2	1846	291	7
1832	74	—	1847	337	9
1833	85	5	1848	358	4
1834	84	10	1849	381	15
1835	89	2	1850	451	19
1836	105	—	1851	432	7
1837	129	3	1852	438	18
1838	146	—	1853	441	5
1839	168	6	1854	426	5
1840	187	7	1855	438	16
1841	204	5	1856 (October 28)	458	Nil.
1842	227	12	Years (28¾)	6,800	179
			Per annum	237·9	6·2

Mortality at the rate of 26 per 1,000 per annum.

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Children are received in this institution from the age of three months to that of seven years. The total number hitherto admitted is 1,554; so that the average stay of each ($\frac{8562}{1554}$) has been about 4½ years. Taking the aggregate strength for the 28½ years, deaths have occurred at the rate of 2·6 per cent. per annum. Of the 179 deaths, 82 were by measles, hooping cough, and scarlatina; 24 by complaints of the nervous system, besides four by teething; 23 by consumption; 18 by inflammation of lungs, air passages and bowels; five by heart disease; three by fever—typhus, bilious, or gastric; two by spinal disease; and two by scrofula.

8. In Christ's Hospital, London; by Thomas Stone, Esq., F.R.C.S.

The children of this hospital are eligible from England, Scotland, and Ireland. They belong to various classes of society, and are never admitted without previous vaccination. So far, therefore, they present a fair field for an investigation of this nature. I furnish you, on the accompanying paper, with a list of the diseases and deaths that have occurred in the London establishment during the last six years, with the number of children within its walls in each year.

The average number of children admitted for the six years amounts to 885½; the deaths, from all causes, including accidents, within and without the walls, to 31; or at the average rate of about 5½ in 1,000 annually.

In analysing this table it will be perceived that the greatest number of deaths took place from an epidemic disease, viz. scarlet fever; then phthisis pulmonalis and mesenteric disease; next cerebral inflammation; next, rheumatic heart affection, &c.

I cannot conceive it possible that vaccination could have in any way influenced the above described mortality, as it is evident that some of these affections are hereditary, and others the result of accident, exposure to cold, &c.

My experience and observations at Christ's Hospital extend over a period of more than 21 years; and I affirm that the example of the last six years is correctly illustrative of the whole of that time. I would further distinctly state, in answer to your questions, that I have never seen the slightest evidence of the transmission of hereditary and infectious diseases by the practice of vaccination; and in this vast field, I should surely have witnessed some such effect (syphilis, for instance) if such ever occurred.

The causes of death appear as follows:—Scarlatina, nine; consumption, mesenteric and spinal disease, eight; cerebral inflammation and hydrocephalus, four; rheumatism, two; dropsy, two; small-pox, one; other complaints and accidents, five.

Deaths in Christ's Hospital, London, from 1750 to 1850.

Year.	Total Deaths.	Deaths from Small-pox.	Year.	Total Deaths.	Deaths from Small-pox.	Year.	Total Deaths.	Deaths from Small-pox.	Year.	Total Deaths.	Deaths from Small-pox.
1751	5	—	1776	4	—	1801	3	—	1826	3	—
1752	5	1	1777	10	—	1802	2	—	1827	4	—
1753	—	—	1778	5	—	1803	5	—	1828	6	—
1754	3	1	1779	5	—	1804	5	—	1829	9	—
1755	4	2	1780	8	—	1805	11	—	1830	4	—
1756	1	1	1781	4	—	1806	3	—	1831	1	—
1757	6	0	1782	2	—	1807	6	—	1832	5	—
1758	5	2	1783	2	—	1808	4	—	1833	8	—
1759	5	2	1784	6	—	1809	5	—	1834	3	—
1760	6	—	1785	6	1	1810	3	—	1835	6	—
1761	7	4	1786	6	—	1811	6	—	1836	2	—
1762	5	1	1787	9	1	1812	7	—	1837	5	—
1763	4	—	1788	4	—	1813	5	—	1838	1	—
1764	10	2	1789	4	—	1814	2	—	1839	3	—
1765	3	—	1790	9	2	1815	8	—	1840	6	—
1766	7	2	1791	1	—	1816	6	—	1841	5	—
1767	5	—	1792	5	—	1817	5	—	1842	4	—
1768	11	1	1793	5	—	1818	4	—	1843	—	—
1769	9	—	1794	9	2	1819	3	—	1844	10	—
1770	5	1	1795	5	1	1820	4	1	1845	4	—
1771	6	—	1796	2	1	1821	3	—	1846	5	—
1772	4	1	1797	8	—	1822	5	—	1847	2	—
1773	1	—	1798	5	—	1823	5	—	1848	7	—
1774	5	1	1799	6	—	1824	4	—	1849	6	—
1775	4	—	1800	8	1	1825	7	—	1850	5	—
			Total from 1751 to 1800	364	31				Total from 1831 to 1850	235	1
			Rate per centum per annum	·96	·11				Rate per centum per annum	·59	·0025

Note.—Our chief clerk, Mr. Trollope, informs me that the average number of boys in Christ's Hospital, London, from 1759 to 1800, would be about 550 per annum; and that the average number from 1800 to 1850 would be about 800; so that the good effects of the blessing of vaccination are still more extraordinary. There does not seem to have been any rule at Christ's Hospital before the time of the introduction of vaccination requiring the previous inoculation of a boy prior to his admission. The only manner in which I can account for the *small* mortality occurring, when variola did prevail, is by supposing that many of the children might have already had the disease naturally or by inoculation, and by the fact that directly a child fell ill with the disease he was immediately removed to an isolated building, and the spread of the disease was thereby prevented. The age of admission into the hospital is from 7 to 10 years, and throughout the whole of the period has been subject to little variation. There has always been a preponderance of older boys in London, and younger boys at Hertford, and since the year 1837 all boys upon admission have been sent to Hertford without exception. There have consequently been very few boys in London under 10 or 11 years of age, whilst the number at Hertford exceeding that age has been equally few. With a few exceptions, the boys quit the school on attaining 15 years of age.—T. S.

(K.)

NATIONAL AND OFFICIAL EXPERIENCE OF VACCINATION.

DENMARK.

1. KINGDOM.

In reply to sundry questions bearing upon the influence of vaccination, submitted by Her Britannic Majesty's Government, the Board of Health begs to state as follows:—

I. Vaccination must be regarded as the best means that has hitherto been discovered for the preservation from small-pox. Experience proves that but a comparative small number of those vaccinated take the disease, and even then it is generally found to be of a milder form (varioloid), so that the mortality from small-pox, which previous to the introduction of vaccination amounted to 50 per cent of those affected, has since the introduction of vaccination fallen to a very low amount, say from 1 to 5 per cent. during the various epidemics. It must be observed that our experience confirms the opinion, that the anti-variolous powers of the vaccine virus are wearing out, or perhaps, even entirely disappearing, after a limited number of years, as during the epidemics of later years, small-pox attacked a comparative greater number (and in a more violent degree) of those who had been vaccinated from 10 to 15 years ago, than of those vaccinated within a more recent period. This assertion is corroborated by the fact, that while re-vaccination, generally speaking, is unsuccessful, or, at any rate, only produces imperfect (spurious) pustules, in those vaccinated a few years ago, the reverse is the case with those who have been vaccinated from 10 to 15 years ago. As an instance, we may quote that on the 11th November this year, 28 boys of from 14 to 15 years of age were vaccinated in the vaccination establishment of this town, and out of these, who had all been vaccinated in the first biennium, 24 had the vaccine vesicles fully developed, and only four had spurious ones.

II. Our experience has not demonstrated that vaccinated individuals, in becoming less susceptible of small-pox, should become more susceptible of typhus, other contagious diseases, scrofulosis, phthisis, or that their system should in any shape be acted upon in any mischievous degree. Experience furnishes us even with a negative proof of the reverse. At the commencement of the present century vaccination was ordained by law and introduced into the Feröe Islands, as it was in the rest of Denmark, yet among the population of these islands, amounting to 8,000, diseases such as scrofulosis, phthisis tuberculosa, syphilis, and febris intermittens are quite unknown.

III. The experience which we have acquired in this country does not lead to the supposition that lymph taken from true vaccine can be the means of communicating any scrofulous or constitutional contagion. As for syphilis, particular attention has always been paid in not taking lymph from an individual suffering or suspected of suffering from that disease. During the 50 years that have elapsed since the introduction into Denmark of vaccination, only two syphilitic cases have occurred that appeared questionable—one after vaccination, and one after revaccination. Such cases may, as in other countries, have given rise to the notion that they originated in vaccination, but they are few and far between, and not supported by facts.

IV. It is well known that vaccination has been ordained by law in this country, so that no child can be admitted into a school, or present itself for confirmation, unless a certificate of having been vaccinated be produced, and experience has proved the efficacy of the law. The repeated vaccination (or re-vaccination) is also enjoined for soldiers and sailors in the Navy, and experience has likewise shown the successful results of this law, inasmuch as these two classes of individuals during several variolous epidemics have almost entirely escaped the contagion.

COPENHAGEN.

Year.	Population.	Mortality.	Excess of Deaths over Births.	Excess of Births over Deaths.	Died of Small-pox.	Remarks.
1750	60,000	4,317	1,571	—	1,457	The population is by calculation.
1751	—	2,798	17	—	80	
1752	—	2,594	2	—	113	
1753	—	2,845	300	—	53	150 carried off by the measles this year.
1754	—	2,542	—	221	9	Inoculation first introduced into Denmark. (Countess Bernstoff, by Dr. Argent, of London.)
1755	—	3,821	1,152	—	1,117	Two inoculation hospitals erected, each for six persons.
1756	—	2,792	139	—	125	
1757	—	3,700	1,100	—	13	Measles and dysentery prevailed this year.
1758	—	4,761	2,354	—	13	Likewise very fatal. 420 carried off by the measles.
1759	—	4,355	2,296	—	079	Scarlet fever showed itself epidemically for the first time, and carried off 1,000.
1760	—	3,228	746	—	118	Christian VII., then Crown Prince, inoculated. The inoculation hospitals closed for want of applicants.
1761	—	2,593	123	—	4	
1762	—	4,512	2,223	—	7	
1763	—	5,034	2,707	—	167	Measles and Typhoid fevers prevailed.
1764	—	3,675	1,028	—	480	
1765	—	2,973	432	—	138	
1766	—	3,923	1,286	—	42	Dysentery prevailed.
1767	—	3,361	404	—	6	
1768	—	2,912	—	49	27	
1769	70,495	4,434	1,525	—	1,219	First census taken.
1770	—	3,770	809	—	22	An inoculation establishment erected outside the city for 48 persons; 16 payers and 32 poor.
1771	—	3,144	487	—	8	
1772	—	4,209	1,695	—	22	Measles prevailed severely.
1773	—	3,229	455	—	190	
1774	—	2,273	—	647	116	
1775	—	3,220	311	—	276	
1776	—	2,825	56	—	86	
1777	—	2,804	—	202	7	Scarlet fever very virulent.
1778	—	2,884	—	44	278	
1779	—	3,159	138	—	283	
1780	—	2,673	—	362	98	
1781	—	3,741	756	—	174	148 died of the measles, which prevailed this year.
1782	—	4,122	1,422	—	332	
1783	—	2,917	—	118	123	The inoculation establishment outside the town closed, and its property transferred to the lying-in hospital.
1784	—	3,004	—	220	77	
1785	—	3,762	171	—	427	
1786	—	4,001	867	—	193	Typhus. Small-pox epidemic at Elsinore. (*See* De Meza's Acta Med. Hav. vol. iii.)
1787	—	3,484	419	—	136	Scarlet fever prevailed.
1788	—	3,733	675	—	185	

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Year.	Population.	Mortality.	Excess of Deaths over Births.	Excess of Births over Deaths.	Died of Small-pox.	Remarks.
1789	—	3,849	670	—	323	
1790	—	2,313	—	1,179	140	
1791	—	3,649	290	—	297	Measles.
1792	—	2,645	—	878	155	
1793	70,495	2,433	—	851	139	
1794	—	3,123	—	146	452	
1795	—	3,524	475	—	248	Scarlet fever.
	83,604	3,045	18	—	357	
1797	—	3,278	2	—	423	
1798	—	3,717	306	—	386	
1799	—	3,001	194	—	54	
1800	—	3,689	398	—	35	Scarlet fever.
1801	91,631	4,542	—	1,357	486	Vaccination first introduced. A Royal Commission of Vaccination appointed.
1802	—	3,262	—	353	73	Vaccination establishment erected at Copenhagen.
1803	—	3,442	—	237	5	The Commission of Vaccination recognise the protective powers of Vaccination.
1804	—	3,688	145	—	13	
1805	—	3,585	—	265	5	
1806	—	3,529	—	361	5	
1807	—	4,207	597	—	2	Bombardment of Copenhagen by the English.
1808	—	4,606	1,120	—	46	
1809	—	3,872	647	—	5	
1810	—	2,975	—	810	4	Decree ordering vaccination was promulgated this year.
1811	100,975	3,694	154	—	—	
1812	—	3,410	101	—	—	
1813	—	3,764	493	—	—	
1814	—	3,711	458	—	—	
1815	—	3,409	216	—	—	
1816	—	2,956	—	169	—	
1817	—	2,907	—	152	—	
1818	—	2,554	—	398	—	
1819	—	2,319	—	862	—	
1820	—	2,576	—	501	—	
1821	—	3,459	—	94	—	
1822	—	3,345	—	842	—	
1823	—	2,852	—	542	—	
1824	—	3,212	—	515	41	
1825	—	3,280	—	260	12	The Vaccination Commission abolished, and vaccination placed under the control of the Board of Health.
1826	—	3,588	—	9	29	
1827	—	3,410	30	—	4	
1828	—	3,547	—	687	1	
1829	—	3,899	431	—	29	Small-pox epidemic.
1830	—	3,794	449	—	3	
1831	—	3,678	86	—	—	
1832	—	3,389	—	18	3	
1833	—	3,741	—	146	19	Re-vaccination becomes general in May month. Quarantine for small-pox abolished.
1834	119,292	3,293	—	335	26	
1835	—	3,862	6	—	434	
1836	119,591	2,848	—	789	81	Re-vaccination ordered for the Army.
1837	—	3,369	—	234	1	
1838	—	3,462	—	97	2	
1839	—	3,108	—	513	—	
1840	—	3,054	—	487	2	
1841	—	3,327	—	119	—	
1842	—	3,404	—	297	35	
1843	—	3,498	—	263	111	
1844	—	3,622	—	373	83	Re-vaccination ordered for the Navy.
1845	126,787	3,515	—	625	7	
1846	—	4,126	92	—	—	
1847	—	3,642	—	468	—	
1848	—	3,521	—	941	2	
1849	—	4,044	—	213	7	
1850	129,676	3,563	—	1,083	—	

Until 1808, the mortality is stated according to Callisen (see his "Physical and Medical Observations on Copenhagen"); until 1820, according to the statistical returns; after 1820 and till 1850, according to the tables of mortality drawn up by the police; and afterwards, by the city physician, and transmitted to the Board of Health. There is a not inconsiderable discrepancy, particularly in earlier years, between these tables and the lists drawn up by the Church authorities, on which the details of the statistical tables in a great measure are based.

2. Duchies of Holstein and Lauenburg.

In reply to the first question—

"Does experience prove that any great majority of successfully vaccinated persons have escaped the small-pox, and that they have almost completely been protected from the fatal effects of this disease?"

Vaccination has been practised in the Duchy of Holstein since the commencement of the present century, but has only been made compulsory by Government since 1811. From that time, nevertheless, till within the last years, some sporadical cases have occurred in the rural districts, whereas the disease has assumed a more virulent character in populous places, such as Kiel, Rendsburg, &c., where the mortality of the infected amounted to from 7 to 12 per cent. From a minute investigation of the facts of the case it appears (and the Holsteinic Board of Health concur in the same view) that it would be premature, in the absence of any further evidence than these experimental trials, to answer the question in the negative.

It has been found that the small-pox disease during times of epidemic has almost always been introduced by contagion, either of persons or infected objects, and then mostly spread by contagion, and that there is at such periods a certain predisposition to such disease. Although it is a well-established fact that individuals vaccinated, as well as unvaccinated, have taken the disease, yet there is a material difference in the course of the disease and its effects, inasmuch as the vaccinated, almost without exception, catch the disease in the modified form of milder small-pox, while the mortality of the unvaccinated shows a much more fatal result. In the year 1852–3, for instance, there were in the hospital at Kiel 218 patients suffering from the disease, out of which 152 were vaccinated and 66 not vaccinated; and while the disease swept away 21 (about 32 per cent.) of the latter, only nine (6 per cent.) of the former fell victims to it. Now, taking into consideration that out of the nine cases of death among those vaccinated, eight were not the effects of the small-pox solely, but arose from a complication with other diseases, such as tubercular disease in the kidneys, dyscrasie from heavy drinking, and typhus, the causes of death of the vaccinated and unvaccinated individuals will be in a proportion of 32 to 72. The protection which vaccination affords from the fatal effects of small-pox seems thus, from the above numbers, to be established beyond a doubt.

The fact that even vaccinated persons may in some cases be infected with the genuine, and not the modified small-pox, loses much of its importance by a circumstance which experience has demonstrated does not

admit of any contradiction, namely, that even individuals who have gone through the genuine small-pox, and who bear the marks unmistakeably upon them, may catch the disease *de novo*.

It seems thus that not merely the small-pox disease, but also vaccination, in the course of time, lose their anti-variolous powers. The physicians of Holstein have not arrived at any unanimous conviction as to its durability. The prevailing opinion of physicians on the subject is, that vaccination loses its protective powers after a lapse of from 10 to 15 years, more especially if the different stages of puberty should fall within such periods.

The first question must therefore be answered in the affirmative, as far as experience goes in the Duchy of Holstein.

During the epidemic of 1841 in the Duchy of Lauenburg more than 100 individuals took the disease; and of these three, who had not been vaccinated, all died; while out of those who had gone through that operation only one died, as far as could be ascertained, and this individual had, moreover, been sickly for a long time previous.

In reply to the second question—

"Does experience furnish any grounds for supposing that vaccinated persons, whilst less susceptible of small-pox, are more exposed to typhoid fevers or other diseases, for instance, scrofula or consumption; or that vaccination has exercised any noxious influence upon the state of their health?"

In the absence of statistical information on this subject, the solution of this question can only be sought for in data which experience has brought to light. There is, however, a general conviction that no connexion is traceable of the vaccine with the above diseases, and that no increase of the latter has taken place consequent upon the introduction of the former.

In reply to the third question—

"Does experience afford any reason for assuming that syphilitic, scrofulous, or other infectious diseases can be transferred to the vaccinated person through the lymph taken from one of Jenner's genuine vesicles, or that any medical man of standing, with the object of vaccinating, can inoculate any other disease without his knowledge?"

This question must be answered in the negative, as the experience which has been gained in the Duchies of Holstein and Lauenburg does not furnish sufficient grounds for answering it otherwise.

It must be observed that if importance be attached to the expressions in the question, "Jenner's genuine "vesicles," and "medical practitioner of standing," the question must be answered unconditionally in the negative.

The observation which has been made by experienced medical men that cutaneous eruptions, pustules, and other symptoms of scrofula on the head or other parts of the body, and which generally make their appearance after vaccination, must be considered as evidence to the contrary, cannot be admitted by the Board of Health, as, on the one hand, there has always been some symptoms of dyscrasie in all such cases, and, on the other hand, the sudden appearance of scrofulous symptoms in fever, and more especially exanthematous fevers, is no rare occurrence.

Taken from this point of view, we are warranted in asserting that the above-mentioned acute and febrile diseases do not afford sufficient proof of the origin of scrofula in the above-mentioned cases; whereas it is more likely that they have formed a germ by which a latent and concealed indisposition has been developed, and the outward symptoms of the disease been produced.

In reply to the fourth question—

"Does experience warrant us, independently of special grounds in certain cases, in recommending the practice of vaccination as a general measure?"

This question has been decided in the affirmative, as being based upon the results of experience, which we have explained in replying to the preceding three questions. The country physician for the Duchy of Lauenburg makes the observation, that it is only by early vaccination that the numbers of the unvaccinated can be kept so low that the latter, in cases of small-pox epidemics, may be protected by vaccination, and further bounds be set to the spread of the disease. Medical men of experience and practice, who have had an opportunity of watching the operation upon the general state of health, have, without any exception, come to the conclusion that general vaccination at an early period ought to be strongly recommended, and that the attempts which have lately been made in various quarters to represent it as useless, and even dangerous, ought to be counteracted for the sake of science and humanity.

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3. Extract from an Explanatory Paper accompanying the Official Answers from Denmark.

There can be no doubt that the small-pox was known in Denmark at an early period of the middle ages, and probably even previous to that time, although the history of this or any other country makes no mention of its first appearance. One thing, however, is certain, and that is, that Denmark, like other countries, suffered through a long succession of years, and especially during the century on which the question now turns (the 18th), from the dreadful ravages of this disease, and that she has, in a full measure, borne her share in the 45,000,000 who fell victims to the scourge; this being the number of lives, it is calculated, which Europe lost from the disease, in the course of one century only, out of 160,000,000.

The population of Denmark was in 1769 - - - -	814,238
The population of Denmark was in 1801 - - - -	925,680
The population of Denmark was in 1834 - - - -	1,223,797
The population of Denmark was in 1840 - - - -	1,283,027
The population of Denmark was in 1845 - - - -	1,350,327
The population of Denmark was in 1850 - - - -	1,407,747

Of great epidemics in Denmark, history mentions:—that of 1592 (*see* History of Christian IV., by Stange, vol. i. p. 62); that of 1656 (described by Th. Bartholin, in Cista Medica, p. 590); that of 1716 (*see* Botticher's Morborum Malignorum Descriptio, p. 19); and perhaps several others; but we search in vain for statistical returns exhibiting the number of individuals cut off by these epidemics. The disease raged year by year in the towns as well as in the country, and although it attained a frightful height every fourth and seventh year, attended with typhoid fevers, scarlet fever, and especially measles, yet our annalists did not feel themselves called upon to make any returns of an occurrence so common as this; the merits of the science of statistics, as applied to sanitary purposes, were at that time too little appreciated. In the face of such melancholy considerations it is satisfactory to be enabled to report that this disease, since the universal introduction of vaccination (1810), has not only lost its worst sting, but that the disease has not shown itself in Denmark for more than 15 years. In the years 1824 and 1834, and in the years following and preceding these periods, small-pox appeared in the provinces as well as in Copenhagen, but it was not of a nature to excite any uneasiness.

The annals of Iceland report, that small-pox raged in that country:—(1) in the years 1241 and 1242; (2) in 1257 and 1258 (very severely, carrying off several thousand individuals); (3) in 1291 (likewise); (4) in 1310–11 (1,600 are said to have died of the disease); (5) in 1347–48 (very severely); (6) in 1379–80; (7) in 1430–32 (very severely, the loss of lives is stated to have reached 8,000); (8) in 1462–63 (about 1,600 died); (9) in 1472 (not very fatally); (10) in 1511 (very severely); (11) in 1555–56 (very severely, 2,650 are said to have perished); (12) in 1574 (likewise severely); (13) in 1590–91 (700 died); (14) in 1616 (the disease was brought by an English vessel, raged severely, and carried off several thousand individuals); (15) in 1635–36 (somewhat milder in form than the last); (16) in 1655 and 1658 (brought by an English vessel to Westfjord); (17) in 1670 and 1672 (tolerably mild); (18) in 1707 (the great epidemic: the disease is said to have been brought into the country by some wearing apparel belonging to an Icelandic student who fled from Copenhagen for fear of the small-pox, took that disease on board the vessel, died and was buried in Norway (*see* Stephenson's Iceland in the 18th century). Of the then population of Iceland, somewhat exceeding 50,000, this disease carried off, according to reports, 18,000. In that country, where the parishes are so thinly populated, there were churches in the churchyards of which 30, 34, to 40 individuals were interred in one day. It was no unusual occurrence that persons having once

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gone through the disease, and bearing the marks upon them, were attacked again and died. (19) in 1785, 1786, and 1787 (1,425 died); this was the last time the disease occurred in that island during the last century.

Since the introduction of vaccination, small-pox has only once occurred in Iceland, namely, in 1839, when it was brought to the northern division of the island. It was very mild, and was prevented from spreading to the southern division by measures of isolation. Several individuals were seized with the disease who had had it in 1785. Of the population of the town of Reikavick and its environs, amounting to from 1,200 to 1,300, of whom the greater part were vaccinated, only 15 died. At a fishing cove, however, where only a few had been vaccinated, 40 died out of a population of about 600. The disease continued to prevail in 1840. The population of Iceland, which, in the 12th and 13th centuries, is said to have been 120,000, was 46,201 in 1769, and 57,094 in 1840.

Small-pox was first brought to Greenland, in the year 1734, by a vessel from Denmark. Nearly two-thirds of the whole population of that country (which at that time was from 6,000 to 7,000) were swept away by this disease. Of 200 families living within a circle of from two to three miles from the Danish settlement into which the small-pox was brought, not 30 remained alive. Since the introduction of vaccination no fresh cases have occurred in that part of the realm.

The Board of Health, being unable to furnish any details as to small-pox and its mortality in the kingdom outside of the capital, as well as in the colonies of Iceland and Greenland, hopes to give more satisfactory information in respect of Copenhagen. This it has embodied in the annexed lists, extending over a period of 100 years (from 1751 to 1850), and exhibiting the fluctuations of the population, the annual mortality, the proportion of deaths to births, the number of individuals that have annually died of small-pox, the prevalence of other kinds of disease at such periods, and the adoption of measures calculated to exercise any influence upon the greater or lesser severity of the small-pox.

The immense number of lives which Denmark has lost from small-pox; the little confidence reposed by the people in the system of inoculation introduced into Denmark in 1754, despite of all the exertion of the Government and private individuals, and although it evidently diminished the severity of the disease, and many had escaped it—Callisen states that, out of 900 whom he inoculated, none died—the trifling influence which this method generally exercised upon the mortality, coupled with the objection which might with propriety be raised against it, namely, that it retained the contagion; all these circumstances naturally combined to direct public attention to the discovery of Jenner in 1798, that vaccination with cow-pox protected the human body from small-pox, and the news was received with enthusiasm in the capital. Herholdt, Scheil, E. Viborg, and Rafn endeavoured to disseminate a knowledge of this discovery by written notices, and 34 of the most respectable physicians of Copenhagen formed themselves into a society to collect and investigate all grounds and arguments in favour, and in disfavour, of this anti-variolous agent as proposed by Jenner. A commission, composed of medical men (Claskow, Guldbrand, Callisen, Winslov, and Viborg), was, at the same time, appointed by the Government, having the same object in view, and being instructed to recommend the adoption of means calculated to further a case of so much importance as this. After the lapse of but few years, the private commission, as well as that appointed by the Government, although many of the members had from the commencement entertained a doubt as to the doctrine of Jenner, arrived unanimously at the firm and irrefutable conviction that vaccine virus was a preservative from small-pox. Through the perseverance and zeal of the Royal Commission vaccination was speedily introduced into all the provinces of Denmark, and the practice ordained by legal enactments, so that Denmark certainly deserves the encomium of having in this respect taken precedence of all other countries.

The district physicians, and the country physicians (in Copenhagen, the city physician), are charged with the superintendence of the gradual progress of vaccination, under the control of the Board of Health, to which all returns on vaccination are to be transmitted. Denmark Proper is divided into nine sanitary districts, having 71 district physicians, besides seven town physicians. At Copenhagen, a vaccination establishment has been erected, in which any applicant may be gratuitously vaccinated. The district physician makes an annual circuit in his district for the purpose of vaccinating in the towns such persons as may choose to apply. In travelling, they make arrangements so as to return to each town on the day on which they may judge of the success of the vaccination. The physician has free conveyance on such circuits, and receives 24/ (*i.e.*, 7*d.*) for every individual successfully vaccinated, which expenses are paid by the district. With the view of constantly preserving the lymph fresh, the district physicians are permitted to request the attendance of children living in their district and receiving public instruction, training, or succour. The vaccinators are bound to deliver to every person who has successfully gone through vaccination, a certificate, according to a certain form, and to inscribe the names of those whose vaccination is found to be genuine in a register authorised for that purpose. None can be admitted into any educationary establishment (with the exception, however, of ragged schools), nor be bound apprentice to any trade or profession, nor be received as an inmate into any of the establishments for the poor, nor receive relief therefrom, nor be married or admitted to confirmation, unless he or she has been vaccinated, or has had the small-pox. Soldiers and sailors belonging to the navy are subject to the same regulation. Should any contagion make its appearance in the villages, every person living in such village, and who has not been vaccinated, nor had the small-pox, shall, without exception, submit to vaccination. In respect to the towns, this enactment is confined to the inmates of that or those houses in which the contagion shows itself. All inoculation with small-pox is strictly prohibited. Since 1820, permission to vaccinate must not be granted to any but medical men, with the exception of Iceland, the Feröe Islands, and Greenland, where the local circumstances are of such a nature as to necessitate the practice by non-medical men.

In Iceland, which has one country physician and eight district physicians, it is enacted that every clergyman, after having received the necessary instruction of the country or district physician, shall be vaccinator *ex officio* in his parish, and keep a register of those vaccinated. Should his parish be very extensive, he may call in the aid of one or two efficient persons known to the district physician to act as assistant vaccinators. All matters bearing on vaccination are under the control of the district physician, whose duty it is to watch its progress, to provide for a proper supply of vaccine matter from Copenhagen in proper time, provided it cannot be collected on the spot; to receive the reports of the vaccinators, and to forward them to the country physician for transmission to the Board of Health at Copenhagen. The lower classes are strictly enjoined to appear for purposes of vaccination at such time and at such place as the vaccinator of the district may decide upon. The expense of vaccination, and especially the payment of 12/ (4½*d.*) for each individual successfully vaccinated, inclusive of the certificate, are paid out of the public purse.

The operation which these measures have had on the extension of vaccination, may be gathered from the following lists, showing the number of those vaccinated in the Kingdom and in Iceland from 1802 till 1850.

THE KINGDOM.

Year.	Number of those Vaccinated.	Births.	Year.	Number of those Vaccinated.	Births.
1802	4,570	31,575	1815	24,530	35,861
1803	7,699	32,617	1816	26,755	32,225
1804	4,609	32,691	1817	26,385	32,553
1805	16,304	32,901	1818	27,910	32,255
1806	14,989	30,610	1819	26,695	32,377
1807	5,227	31,754	1820	28,544	30,653
1808	25,421	31,487	1821	21,193	32,714
1809	8,012	30,324	1822	28,962	34,755
1810	32,050	31,566	1823	29,439	34,599
1811	26,170	31,978	1824	38,334	33,723
1812	21,806	31,269	1825	39,279	34,249
1813	21,251	30,686	1826	28,775	33,826
1814	21,806	32,055	1827	28,419	36,354

Year.	Number of those Vaccinated.	Births.	Year.	Number of those Vaccinated.	Births.
1828	24,856	38,794	1840	—	41,033
1829	29,039	37,803	1841	—	—
1830	31,075	37,204	1842	27,866	41,295
1831	—	38,432	1843	31,008	41,386
1832	—	34,947	1844	30,238	42,586
1833	—	41,165	1845	32,350	43,195
1834	—	42,425	1846	31,843	44,060
1835	—	41,032	1847	30,330	44,153
1836	—	39,751	1848	29,073	44,703
1837	—	39,485	1849	39,937	45,637
1838	25,000	39,509	1850	—	—
1839	23,989	38,722			

ICELAND.

Year.	Number of those Vaccinated.	Births.	Year.	Number of those Vaccinated.	Births.
1804	1	—	1828	371	2,081
1805	15	—	1829	452	2,268
1806	402	—	1830	1,256	2,434
1807	130	—	1831	—	2,609
1808	—	—	1832	—	2,516
1809	—	—	1833	—	—
1810	38	—	1834	—	2,552
1811	129	—	1835	—	2,138
1812	—	—	1836	—	2,333
1813	630	—	1837	—	1,952
1814			1838	481	1,911*
1815	—	915	1839	1,451	1,890†
1816	57	1,244	1840	—	2,077
1817	1,250	—	1841	—	2,185
1818	979	—	1842	278	2,169
1819	474	1,326	1843	110	2,006
1820	635	1,569	1844	406	1,983
1821	391	1,629	1845	749	2,107
1822	125	1,637	1846	—	2,163‡
1823	—	—	1847	—	1,978
1824	—	—	1848	652	2,195§
1825	2,153	—	1849	1,214	2,217
1826	1,528	—	1850	—	—
1827	635	1,888			

* 647 were vaccinated.
† 1,891 were vaccinated.
‡ Vaccination could not be practised on account of prevailing diseases, especially measles. In 1846 the deaths exceeded the births by 1,166.
§ The Report on Vaccination is not complete.

Upon a comparison of the number vaccinated in the Kingdom with that of the births, it appears that the provisions relating to vaccination are carried into effect tolerably efficiently, for if we deduct from the births those born in the Sleswick districts in Jutland—the returns of which are transmitted to Kiel—the not inconsiderable number of still-born children, and the still more considerable number of children that die before they attain the proper age for being vaccinated, and if we further add the number of those omitted in consequence of the non-transmission of the returns (sometimes for entire provinces), the difference will not be great.

The small-pox epidemics of 1824 and 1835 tended to prove that vaccination afforded immunity from small-pox only for a limited time, and re-vaccination became therefore general among the enlightened classes. The Government has since ordained that all soldiers, as well as sailors belonging to the Navy, shall undergo re-vaccination, and that the same rule shall extend to all sailors proceeding to Greenland in the trading vessels of the Royal Greenlandic Society, and to all children in schools under the superintendence of the Poor Law Guardians, previous to their leaving school for the purpose of being confirmed.

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SWEDEN AND NORWAY.

1. SWEDEN.

I. Experience has shown, in Sweden, that successful vaccination confers on persons subject to its influence a very large exemption from attacks of small-pox, at least for several years (the time to be fixed by further experience). In vaccinated persons affected by small-pox, its decursus (course) is in most cases modified, mild, and without danger to life and future health. In the relatively few cases where the opportunity (susceptibility) for small-pox continues totally unchecked by previous apparently successful vaccination, this course of operation of course does not confer security against death by that disease.

II. The experience of Sweden has given no reason whatever for the belief or suspicion that vaccinated persons, in being rendered less susceptible of small-pox, become more susceptible of typhoid fever, or of any other infective disease, or of scrofula and phthisis, or that their health is in any other way disadvantageously affected.

III. No positive fact, authorising the belief or suspicion that lymph from a true Jennerian vesicle may be the vehicle of syphilitic or other constitutional infection, has been reported to the Swedish General Board of Health; but the law concerning vaccination prescribes, as a due precaution in this respect, that vaccine matter must never be taken from persons who, after careful examination, are not found to be exempt from syphilis and other constitutional disease, or from children whose parents are known or suspected to be, or have been, infected with any such disease. That a duly educated medical practitioner ever should inoculate, by mistake, some other disease instead of the proposed vaccination, is not admissible.

IV. The law in Sweden concerning vaccination prescribes, as a general rule, that children should be vaccinated before the age of two years. When small-pox is epidemic, vaccination ought to take place even in the first months of life. Re-vaccination, generally *recommended* at the age of 15 years, is *prescribed* for recruits of the army and navy. Experience has justified all those prescripts.*

* The above answers from the Royal Swedish General Board of Health are stated by the Board to be founded, not only on the official Reports which the Board during a period of 40 years (1817–1856) has received from all the vaccinators in the kingdom, but also on opinions now given by the Medical Society of Sweden, and by several medical men especially competent in the subject. They may consequently be justly considered as the true results of Swedish experience in vaccination. The Board also transmit from the Register Office of the kingdom a summary account of the population, births, and deaths in Sweden, during the last 107 years; distinguishing those due to small-pox. (*See next page.*) This document alone gives decisive answers to the first two and most important questions considered; and the Board believe they need no comment to prove, beyond doubt, the great influence of vaccination in Sweden as an invaluable although not absolute preventive against one of the most destructive diseases that ever afflicted mankind.

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SMALL-POX Death Rates for the Kingdom of SWEDEN for the 107 years, 1749–1855.—Calculated by Mr. Haile from facts officially communicated.

Year.	†Small-pox Deaths per Million of Living Population.	Year.	Small-pox Deaths per Million of Living Population.	Year.	Small-pox Deaths per Million of Living Population.
1749	2,543	1785	2,361	1821	14
1750	3,494	1786	311	1822	4
1751	3,106	1787	823	1823	15
1752	3,714	1788	2,534	1824	226
1753	4,395	1789	3,137	1825	449
1754	3,735	1790	2,734	1826	223
1755	2,546	1791	1,421	1827	212
1756	4,226	1792	878	1828	90
1757	5,475	1793	942	1829	19
1758	3,783	1794	1,757	1830	36
1759	2,074	1795	2,955	1831	211
1760	1,885	1796	1,863	1832	213
1761	3,902	1797	751	1833	387
1762	4,879	1798	585	1834	352
1763	6,011	1799	1,609	1835	147
1764	2,335	1800	5,126	1836	45
1765	2,387	1801	2,563	1837	117
1766	2,065	1802	644	1838	583
1767	2,102	1803	611	1839	621
1768	5,314	1804	605	1840	207
1769	5,069	1805	449	1841	75
1770	2,581	1806	613	1842	18
1771	2,152	1807	884	1843	3
1772	2,674	1808	757	1844	2
1773	5,979	1809	1,067	1845	2
1774	1,020	1810	347	1846	0‖
1775	651	1811	291	1847	4
1776	737	1812	167	1848	21
1777	943	1813	225	1849	99
1778	3,178	1814	126	1850	395
1779	7,196	1815	191	1851	707
1780	1,593	1816	277	1852	433
1781	699	1817	96	1853	78
1782	1,165	1818	120	1854	57
1783	1,832	1819	63	1855	11
1784	5,810	1820	55		

† N.B.—From 1749 to 1773, the mortality from measles is included in the small-pox death-rate.

POPULATION, Births, and Deaths in SWEDEN (Finland excepted) during Half a Century before and Half a Century after the Establishment of Vaccination, extracted from the original Reports of the Clergy to the Royal General Registry Office.

YEAR.	Population at the end of the Year.	Born Alive during the Year.	Mortality during the Year.		
			Total.	From Small-pox. *See* Note (*).	From Typhus and Typhoid Fever.
1749	—	59,483	49,516	*4,453	3,948
1750	—	64,511	47,622	*6,180	3,581
1751	1,785,727	69,291	46,992	*5,546	3,398
1752	—	64,973	49,467	*10,302	2,857
1753	—	66,097	43,905	*8,000	3,126
1754	1,837,314	68,795	48,645	*6,802	3,505
1755	—	70,008	51,699	*4,705	3,609
1756	—	67,987	52,062	*7,858	4,320
1757	1,870,372	61,675	55,829	*10,241	5,502
1758	—	63,202	60,527	*7,104	5,566
1759	—	63,865	49,162	*3,910	5,413
1760	1,893,248	68,384	46,721	*3,568	5,339
1761	—	67,324	49,143	*5,731	4,753
1762	—	68,268	59,994	*9,389	6,022
1763	1,940,011	68,231	64,180	*11,662	8,342
1764	—	67,988	53,304	*4,562	7,350
1765	—	65,872	54,566	*4,697	6,120
1766	1,981,600	67,061	49,726	*4,602	5,445
1767	—	70,744	51,272	*4,189	5,132
1768	—	67,719	54,751	*10,650	4,654
1769	2,015,127	66,954	54,991	*10,215	4,499
1770	—	67,172	53,071	*5,215	4,535
1771	—	65,988	56,827	*4,362	5,983
1772	2,032,516	58,972	76,362	*5,435	12,846
1773	—	51,164	105,139	*12,139	20,137
1774	—	68,520	44,463	2,065	4,947
1775	2,020,847	71,642	49,949	1,275	4,920
1776	—	66,869	45,692	1,503	5,358
1777	—	67,689	51,096	1,943	4,439
1778	—	71,901	55,018	6,097	4,337
1779	—	76,387	59,325	15,102	3,959
1780	2,118,281	75,122	45,731	3,374	3,394
1781	—	71,130	54,333	1,485	4,157
1782	—	68,488	58,247	2,482	5,046
1783	—	64,969	60,213	3,915	5,464
1784	—	67,695	63,795	12,453	6,494
1785	2,149,773	67,497	60,770	5,077	6,785
1786	—	70,935	55,955	671	6,989
1787	—	68,328	51,981	1,771	6,509
1788	—	74,019	57,329	5,462	5,858
1789	—	70,127	69,583	6,764	14,226
1790	2,158,132	66,710	63,589	5,893	11,408
1791	—	71,613	55,946	3,101	3,259
1792	—	81,063	52,958	1,939	4,226
1793	—	77,033	54,370	2,103	4,533
1794	—	76,429	53,377	3,964	4,476
1795	2,281,137	72,947	63,619	6,740	5,010
1796	—	70,446	56,474	4,593	3,835
1797	—	80,374	55,036	1,733	4,141
1798	—	78,593	53,862	1,357	4,737
1799	—	75,274	59,192	3,756	4,928
1800	2,347,303	67,555	73,928	12,632	5,872
1801	—	70,629	61,317	6,057	5,594
1802	—	74,264	56,035	1,533	5,634

NOTE (*).—1. From 1749 to 1773 the above-mentioned mortality from small-pox (variola) embraces the mortality from measles (morbilli) also, because the notices about these two diseases have been given under the same title in the formularies; from 1774 only small-pox.

2. To "typhus and typhoid fever" are referred—from 1749 to 1773, the diseases called in the formularies *febris continua, causus, febris petechialis, contagiosa*; from 1774 to 1801, *febris continua, causus, febris septica et petechialis*; from 1802 to 1811, *febres continuæ et septicæ, scarlatina, miliaria*; from 1812 to 1820, *febres cujuscunque generis*; from 1821 to 1830, *febres nervosæ, septicæ, remittentes, et intermittentes*. Of all the other diseases specified in the formularies *no one* can be referred to the denomination "typhoid fever."

3. The average ratio of mortality in Sweden has been calculated as follows:—1751–60, *one* in 37·0; 1761–1770, *one* in 37·4; 1771–1780, *one* in 38·1; 1781–1790, *one* in 37·2; 1791–1800, *one* in 40·8; 1801–1810, *one* in 37·7; 1811–1820, *one* in 40·1; 1821–1830, *one* in 44·1; 1831–1840, *one* in 44·5; 1841–1850, *one* in 49·6.

Year.	Population at the end of the Year.	Born Alive during the Year.	Mortality during the Year.		
			Total.	From Small-pox.	From Typhus and Typhoid Fever.
1803	—	74,644	56,577	1,464	6,265
1804	—	76,443	59,584	1,460	6,869
1805	2,427,408	76,552	56,693	1,099	6,023
1806	—	74,581	65,728	1,482	7,179
1807	—	75,842	62,318	2,129	8,065
1808	—	73,963	82,311	1,814	12,527
1809	—	64,300	93,532	2,404	21,171
1810	2,377,851	78,916	75,697	824	9,193
1811	—	84,862	69,246	698	7,430
1812	—	81,079	73,695	404	8,058
1813	—	72,021	66,266	547	6,261
1814	—	75,837	69,959	308	5,555
1815	2,465,066	85,239	57,829	472	5,325
1816	—	87,644	56,225	690	4,590
1817	—	83,821	60,863	242	5,789
1818	—	85,714	61,745	305	6,359
1819	—	84,250	69,881	161	7,210
1820	2,584,690	84,841	62,930	143	5,877
1821	—	92,072	66,416	37	5,853
1822	—	94,309	59,290	11	5,141
1823	2,687,457	98,259	56,067	39	4,106
1824	—	93,577	56,256	618	3,903
1825	2,771,252	100,315	56,465	1,243	3,962
1826	2,805,350	97,125	63,027	625	5,294
1827	2,828,568	88,138	64,920	600	7,871
1828	2,848,062	95,354	75,860	257	9,847
1829	2,864,831	99,488	82,719	53	9,264
1830	2,888,082	94,626	69,251	104	7,353
1831	2,901,061	88,253	75,274	612	
1832	2,922,845	89,862	68,078	622	
1833	2,959,257	100,309	63,947	1,145	
1834	2,983,144	100,231	76,294	1,049	
1835	3,025,439	98,144	55,738	445	
1836	3,061,533	96,857	60,763	138	
1837	3,089,538	94,616	75,611	361	
1838	3,096,794	90,565	74,309	1,805	
1839	3,115,169	91,363	72,988	1,934	
1840	3,138,887	98,160	63,555	650	
1841	3,173,349	95,734	61,279	237	
1842	3,207,141	100,976	67,177	58	
1843	3,237,180	99,154	69,115	9	
1844	3,275,864	104,693	66,009	6	
1845	3,316,536	103,660	62,074	6	

The causes of death from disease not longer specified except the Small-pox.

Year.	Population at the end of the Year.	Born Alive during the Year.	Mortality during the Year.		
			Total.	From Small-pox.	From Typhus and Typhoid Fever.
1846	3,343,556	99,703	72,083	2	
1847	3,363,330	99,179	79,435	13	
1848	3,399,341	102,524	66,513	71	
1849	3,443,803	112,304	67,842	341	
1850	3,482,541	110,399	68,514	1,376	
1851	3,516,889	111,065	72,566	2,488	
1852	3,541,399	108,305	80,099	1,534	
1853	3,562,462	111,407	84,047	279	
1854	3,606,987	120,107	70,846	204	
1855	3,639,332	115,072	77,734	41	

The causes of death from disease not longer specified except the Small-pox.

2. Norway.

I. The Committee must answer this question affirmatively on the whole, but feel it their duty to remark, that, during periods of intercurrent epidemic small-pox, some few fatal cases have occurred among persons who have been vaccinated. Our experience dates from 1811, when vaccination was made obligatory in this country by law. The Committee do not, however, venture to affirm that vaccination has always been performed here in the most satisfactory manner possible, as an effective vaccination ought usually to be accompanied by fever. The intensity of the matter and the number of punctures should probably be specially considered.

II. As almost all persons in Norway are vaccinated, and as we are without data for an exact comparison with a previous time, the Committee are not able to answer the question as to typhoid fever and other infective diseases. With respect to scrofula and phthisis, there are certainly some medical men of opinion that these diseases have of late become more prevalent; but, as regards this being attributable to vaccination, we have no experience to warrant an opinion.

III. The Committee do not venture to assert, with positive facts in view, that other diseases are transmitted by vaccination, but they cannot avoid remarking that there are in Norway enlightened medical men who conceive that they have proofs of such transmission having taken place.

IV. Experience has taught us that in the great majority of cases vaccination may be performed without danger in the earliest infancy; but the experience of the Committee, as well as that of several other medical men, has also shown, on many occasions, that infants, after vaccination, do not unfrequently become sickly in various ways. As it hardly ever happens that the first case of epidemic small-pox occurs in a child, the Committee (particularly on account of the difficulty of control), in their proposal for a new law on vaccination have not hesitated to recommend deferring it until school time begins.

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APPENDIX II.

(Papers handed in by Mr. William Ogle, M.D., 3rd and 10th July 1889.)

ENGLAND AND WALES.

Table A.

Deaths from Small-pox per million living, 1838–42 and 1847–87.

Year.	Deaths.	Year.	Deaths.	Year.	Deaths.	Year.	Deaths.
1838	1,064	1851	389	1864	367	1877	178
1839	580	1852	401	1865	303	1878	79
1840	661	1853	171	1866	141	1879	25
1841	460	1854	151	1867	116	1880	29
1842	168	1855	134	1868	93	1881	124
1843	?	1856	119	1869	70	1882	51
1844	?	1857	204	1870	116	1883	39
1845	?	1858	332	1871	1,015	1884	87
1846	?	1859	195	1872	824	1885	107
1847	246	1860	138	1873	161	1886	13
1848	397	1861	66	1874	91	1887	21
1849	264	1862	80	1875	40	—	—
1850	202	1863	289	1876	103	—	—

N.B.—The above figures include deaths from chicken-pox.

Table B.

Mean Annual Deaths from Small-pox, at successive life-periods, per million living at each such life-period, 1847–53, 1854–71, and 1872–87.

Period.	All ages.	0–5.	5–10.	10–15.	15–25.	25–45.	45 and upwards.
(1.) Vaccination optional, 1847–53.*	305	1,617	337	94	109	66	22
(2.) Vaccination obligatory, but not efficiently enforced, 1854–71.	223	817	248	88	163	131	52
(3.) Vaccination obligatory, but more efficiently enforced by vaccination officers, 1872–87.	114	242	120	69	122	107	47

* In this table the period of optional vaccination begins with 1847, not with 1838, because the deaths were not abstracted in combination with ages until 1847.

Table C.

Mean Annual Deaths from Fever, at successive life-periods, per million living at each such life-period, 1847–53, 1854–71, and 1872–87.

Period.	All ages.	0–5.	5–10.	10–15.	15–25.	25–45.	45 and upwards.
1847–53	1,139	1,512	1,118	911	1,103	910	1,388
1854–71	870	1,297	933	713	807	636	972
1872–87	367	426	379	344	431	327	323

Table D.

Number of Deaths, and Vaccinational Condition, of those being over 3 months but under 10 years of age who died from Small-pox in England and Wales, 1881–87.

Vaccinational Condition.	Deaths, 1881–87.
Vaccinated - - - -	145
Unvaccinated - - - -	1,427
No statement - - - -	1,402
Total - - -	2,974

Note.—The unvaccinated are 90·8 per cent. of those as to whose vaccinational condition there was information, and 48·0 per cent. of the whole.

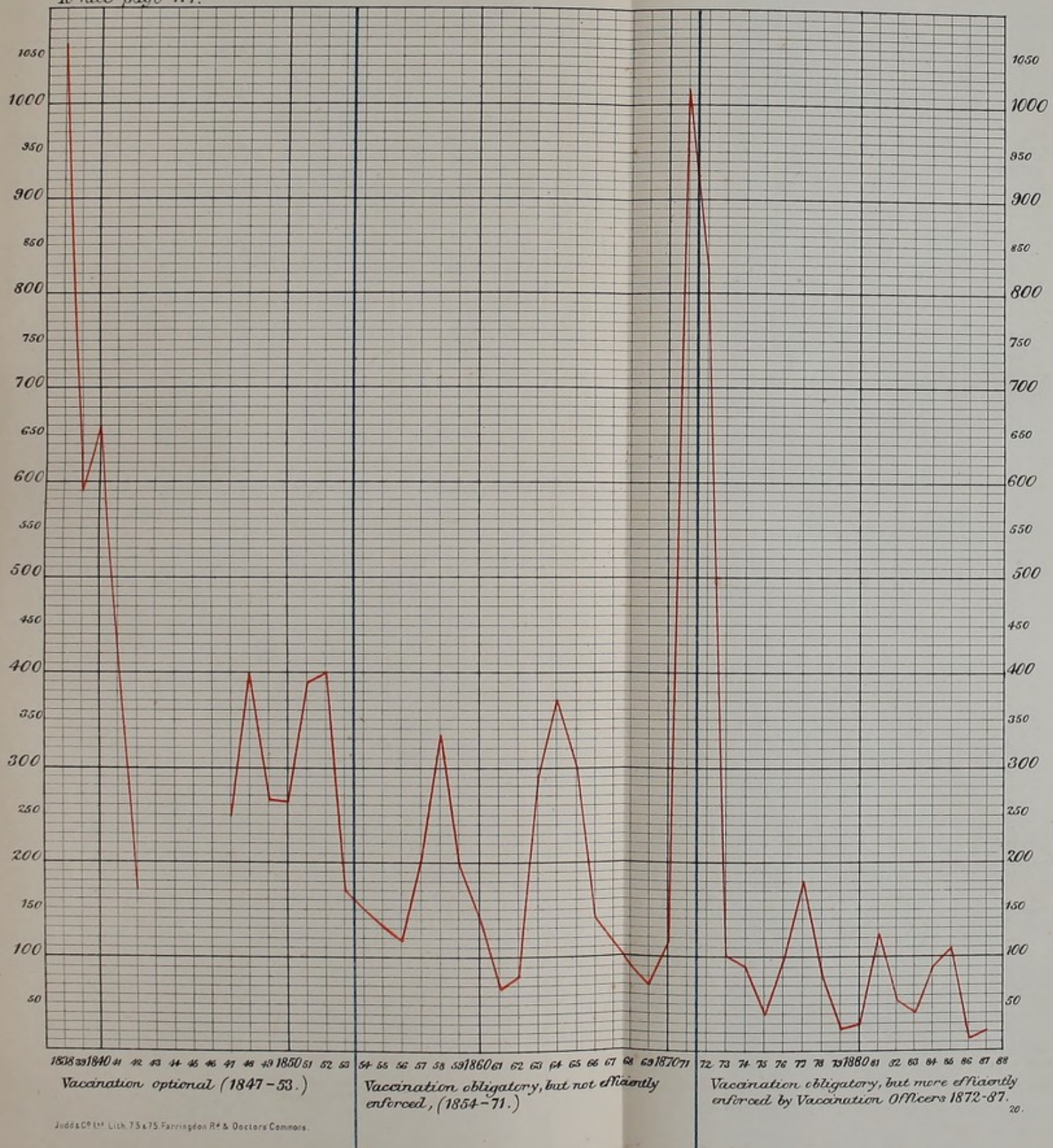
Table E.

Proportion of Deaths under and over 15 years of age, per 1,000 deaths from Small-pox in Vaccinated and Unvaccinated Persons respectively, 1881–87 (excluding deaths under three months).

Age.	Unvaccinated.	Vaccinated.
Three months and under 15 years -	597	126
Fifteen years and upwards - -	403	874
	1,000	1,000

THE RATES IN TABLE A IN FORM OF A DIAGRAM.

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Table F.

Small-pox in Twenty of the largest English Towns in the 4 years 1870–73.

Twenty large English Towns.	Deaths from Small-pox.					Annual Rate per 1,000.				
	1870.	1871.	1872.	1873.	Aggregate, 1870-73.	1870.	1871.	1872.	1873.	Four years, 1870-73.
London	958	7,876	1,781	115	10,730	0·30	2·42	0·54	0·03	0·82
Brighton	40	64	4	—	108	0·45	0·71	0·04	—	0·30
Portsmouth	1	30	508	48	596	0·01	0·34	4·42	0·41	1·30
Norwich	—	245	317	1	563	—	3·05	3·91	0·01	1·74
Plymouth	—	38	208	2	248	—	0·84	3·00	0·03	0·97
Bristol	3	45	209	9	266	0·02	0·25	1·13	0·05	0·36
Wolverhampton	—	284	180	2	466	—	4·16	2·61	0·03	1·70
Birmingham	3	61	298	122	484	0·01	0·18	0·85	0·34	0·35
Leicester	—	11	313	2	326	—	0·12	3·20	0·02	0·84
Nottingham	—	144	205	—	349	—	1·63	2·27	—	0·98
Liverpool	174	1,919	50	10	2,153	0·36	3·89	0·10	0·02	1·09
Manchester	53	267	75	20	415	0·15	0·76	0·22	0·06	0·30
Salford	34	227	41	4	306	0·28	1·81	0·32	0·03	0·61
Oldham	27	52	26	1	106	0·34	0·63	0·30	0·01	0·32
Bradford	9	5	32	21	67	0·06	0·03	0·21	0·13	0·11
Leeds	9	43	268	112	432	0·04	0·17	1·01	0·41	0·41
Sheffield	7	406	601	5	1,019	0·03	1·69	2·46	0·02	1·05
Hull	1	57	216	26	30	0·01	0·47	1·73	0·20	0·09
Sunderland	1	850	54	1	906	0·01	8·65	0·54	0·01	2·30
Newcastle-on-Tyne	6	695	133	4	840	0·05	5·41	1·04	0·03	1·63

Table G.

Deaths from Small-pox and Chicken-pox.

—	Small-pox.	Chicken-pox.	—	Small-pox.	Chicken-pox.
1838	16,268		1863	5,891	73
1839	9,131		1864	7,624	69
1840	10,434		1865	6,361	50
1841	6,368		1866	2,977	52
1842	2,715		1867	2,467	46
1843	—		1868	1,994	58
1844	—		1869	1,482	83
1845	—		1870	2,547	73
1846	—		1871	23,062	64
1847	4,227		1872	19,022	72
1848	6,903		1873	2,303	61
1849	4,644		1874	2,084	78
1850	4,665		1875	851	101
1851	6,997		1876	2,469	109
1852	7,320		1877	4,235	110
1853	3,151		1878	1,864	106
1854	2,808		1879	542	89
1855	2,474	51	1880	651	63
1856	2,222	55	1881	3,008	133
1857	3,882	54	1882	1,317	122
1858	6,420	40	1883	957	99
1859	3,800	48	1884	2,234	129
1860	2,713	36	1885	2,827	109
1861	1,200	30	1886	275	93
1862	1,579	49	1887	506	87

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APPENDIX III.

(Papers handed in by Mr. R. Thorne Thorne, M.B., F.R.C.P., 10th and 17th July 1889.)

Table A.

Comparison for the Epidemic, 1871–72, of the share of total small-pox mortality borne by children 0–5 years in certain groups of small-pox towns of several countries having differing Vaccination Laws.

Country.	Population.	Small-pox Death-rate per 100,000.	Small-pox Deaths 0–5, per cent. of Total Small-pox Deaths.	—
Holland (eight chief towns, 1871–72)	633,080	1,009	60·7	No general vaccination law; indirect compulsion at school age.
Prussia (Berlin and Leipsic, 1870–72)	971,895	772	46·6	Law as to vaccination of infants nominal; practically no compulsion until school age: no penalty unless small-pox followed neglect.
England (London, 1871–72)	3,254,260	297	36·7	Imperfect, but improving, machinery of law, requiring vaccinations at three months of age in towns.
17 Unions, most nearly corresponding to 17 chief towns, 1871–72.	2,446,353	312	34·3	
Scotland (chief towns, eight, 1871–72)	1,683,750	223	23·7	More efficient law operating at six months of age, and achieving annually, since 1st January 1864, vaccination of 96·5 per cent. of births.

Table B.

Statistical Evidence of the different degrees in which Persons vaccinated in different ways will be safe against Death by Small-pox, if they should afterwards contract this Disease.

The Table is founded (A) on information given in the 36th volume of the Medico-Chirurgical Society's Transactions, by Mr. Marson, Surgeon of the Small-pox Hospital, as the result of his observations made during 16 years, 1836–51, in 3,094 cases of post-vaccinal Small-pox; (B) on data derived from Mr. Marson's evidence before the Vaccination Committee of 1871, based on a further experience of 10,661 such cases, and covering the 16 years 1852–67.

Cases of Small-pox classified according to the Vaccination Marks borne by each Patient respectively.	Per-centage of Deaths in each Class respectively; Uncorrected.*		Per-centage of Deaths in each Class respectively; Corrected.*	
	1836-51.	1852-67.	1836-51.	1852-67.
1. Stated to have been vaccinated, but having no cicatrix	25·5	40·3	21·7	39·4
2. Having one vaccine cicatrix	9·2	14·8	7·6	13·8
3. Having two vaccine cicatrices	6·0	8·7	4·3	7·7
4. Having three vaccine cicatrices	3·6	3·7	1·8	3·0
5. Having four or more vaccine cicatrices	1·1	1·9	0·7	0·9
Unvaccinated	37·5	35·7	35·5	34·9

* The terms *uncorrected* and *corrected* are used to signify the inclusion or exclusion of those fatal cases of small-pox in which the patient suffered some other disease superadded to the small-pox.

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Table C.

ENGLAND AND WALES.

Table showing for each of the several Registration Divisions, after enactment of Compulsory Vaccination and antecedent to the Epidemic of 1871, decline in Small-pox Mortality among the Infant Populations, and decline or stability of Small-pox Mortality among Populations above Infancy.

Divisions.	Period.	Annual Small-pox Death-rate per 100,000 at each Age.	
		0-5.	5+.
London	1851-60	130	13
	1861-70	116	14
South-eastern	1851-60	56	8
	1861-70	35	7
South Midland	1851-60	62	9
	1861-70	39	7
Eastern	1851-60	47	5
	1861-70	27	6
South-western	1851-60	95	9
	1861-70	37	4
West Midland	1851-60	123	10
	1861-70	64	7
North Midland	1851-60	69	6
	1861-70	39	4
North-western	1851-60	113	5
	1861-70	62	8
York	1851-60	116	8
	1861-70	107	10
Northern	1851-60	117	10
	1861-70	78	11
Welsh	1851-60	164	17
	1861-70	54	9

Table D.

Analysis of Dr. Gayton's 10,403 Small-Pox Cases. Issued in 1885.

Fatality per cent. of Attacks.

Not Vaccinated.	At Ages.	1 Scar.		2 or 3 Scars.		4 or more Scars.		Vaccination nominal.*
		Good.	Imperfect.	Good.	Imperfect.	Good.	Imperfect.	
56·5	0-5	0·0	17·0	0·0	11·1	0·0	6·6	39·8
35·2	5-10	2·5	7·4	1·0	5·5	0·0	1·5	19·3
23·3	10-15	1·9	5·8	1·1	3·1	0·0	1·0	19·6
42·1	15-20	2·3	8·9	2·1	6·4	0·9	1·2	19·0
49·8	20-30	4·8	18·0	2·8	11·5	6·7	7·0	32·1
40·7	30-40	8·1	18·8	13·5	13·0	0·0	1·9	35·7
43·0	40+	1·4	19·6	13·0	18·7	0·0	1·8	33·5

Not Vaccinated.	At Ages.	Good.	Imperfect.	Vaccination Nominal.*
56·5	0-5	0·0	11·5	39·8
35·2	5-10	0·9	5·0	19·3
23·3	10-15	1·1	3·4	19·6
42·1	15-20	1·9	6·3	19·0
49·8	20-30	3·9	13·1	32·1
40·7	30-40	9·5	14·8	35·
43·0	40+	12·5	19·1	33·5

* Nominal = said to have been vaccinated, but no marks visible.

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Table E.

ENGLAND AND WALES.

Table showing for each of the several Registration Divisions, and during successive decennia, the general decline since Compulsory Vaccination, and during its completer enforcement, in Small-pox Mortality among the Infant Population, and the fluctuations of Small-pox Mortality among the Populations above Infancy.

Divisions.	Period.	Annual Small-pox Death-rates per 100,000 at each Age.	
		0–5.	5+.
London	1851-60	130	13
	1861-70	116	14
	1871-80	113	34
	1881-88	37	16
South-eastern	1851-60	56	8
	1861-70	35	7
	1871-80	20	10
	1881-88	11	6
South Midland	1851-60	62	9
	1861-70	39	7
	1871-80	21	11
	1881-88	5	3
Eastern	1851-60	47	5
	1861-70	27	6
	1871-80	28	17
	1881-88	18	11
South-western	1851-60	95	9
	1861-70	37	4
	1871-80	27	10
	1881-88	1	1
West Midland	1851-60	123	10
	1861-70	64	7
	1871-80	54	20
	1881-88	6	4
North Midland	1851-60	69	6
	1861-70	39	4
	1871-80	39	14
	1881-88	3	2
North-western	1851-60	113	5
	1861-70	62	8
	1871-80	40	17
	1881-88	4	3
York	1851-60	116	8
	1861-70	107	10
	1871-80	41	13
	1881-88	7	5
Northern	1851-60	117	10
	1861-70	78	11
	1871-80	108	37
	1881-88	10	6
Welsh	1851-60	164	17
	1861-70	54	9
	1871-80	47	20
	1881-88	1	1

Table F.

LONDON.

Table showing, since Compulsory Vaccination and during its completer enforcement, the general decline in Small-pox Mortality among the Infant Population, and the fluctuations of Small-pox Mortality among the Population above Infancy.

Five Year Periods (for most part).	Annual Small-pox Death-rates per 100,000 at each Age.	
	0–5.	5+.
1843-46	213	15
1847-49	244	16
1850-54	150	12
1855-59	101	11½
1860-64	115	15
1865-69	118	13½
1870-74	192	46
1875-79	62½	24
1880-84	45	19
1885-88	10	5

(Papers handed in by Mr. R. Thorne-Thorne, M.B., F.R.C.P., on the 24th July 1889.) App. No. 3.

TABLE E (*a*).

ENGLAND AND WALES.

TABLE showing for each of the several Registration Divisions, and during successive decennia, the continuous fall, since Compulsory Vaccination and during its completer enforcement, of the share of Total Small-pox Mortality borne by Children; with the general decline in Small-pox Mortality among the Infant Population; and the fluctuations of Small-pox Mortality among the Populations above Infancy.

Divisions.	Period.	Small-pox Deaths 0-5 Years per cent of total Small-pox Deaths.	Annual Small-pox Death-rates per 100,000 at each Age.			If the ratio observed in 1851-60 of the *all-age* rate to each rate at specified ages had remained unaltered through subsequent periods, the death-rates at the specified ages would have been,—	
			0-5.	5+.	All Ages.	At Ages Under 5 Years.	At Ages Over 5 Years.
(*a*)	(*b*)		(*c*)	(*d*)	(*e*)	(*f*)	(*g*)
London	1851-60	59	130	13	28	130	13
	1861-70	54	116	14	28	130 instead of 116	13 instead of 14
	1871-80	34	113	34	44	202 „ 113	21 „ 34
	1881-88	25	37	16	18	83 „ 37	8½ „ 16
South-eastern	1851-60	52	56	8	14	56	8
	1861-70	43	35	7	11	44 instead of 35	6 instead of 7
	1871-80	23	20	10	11	44 „ 20	6 „ 10
	1881-88	21	11	6	6	24 „ 11	3¾ „ 6
South Midland	1851-60	51	62	9	16	62	9
	1861-70	45	39	7	11	43 instead of 39	6 instead of 7
	1871-80	23	21	11	12	47 „ 21	7 „ 11
	1881-88	18	5	3	3	11 „ 5	2 „ 3
Eastern	1851-60	57	47	5	11	47	5
	1861-70	40	27	6	9	39 instead of 27	4 instead of 6
	1871-80	21	28	17	18	77 „ 28	8 „ 17
	1881-88	22	18	11	12	52 „ 18	5½ „ 11
South-western	1851-60	62	95	9	20	95	9
	1861-70	55	37	4	9	42 instead of 37	4 instead of 4
	1871-80	27	27	10	13	61 „ 27	6 „ 10
	1881-88	21	1	1	1	4 „ 1	½ „ 1
West Midland	1851-60	65	133	10	26	123	10
	1861-70	58	64	7	15	70 instead of 64	6 instead of 7
	1871-80	30	54	20	25	117 „ 54	10 „ 20
	1881-88	22	6	4	4	19 „ 6	2 „ 4
North Midland	1851-60	62	69	6	15	69	6
	1861-70	57	39	4	9	41 instead of 39	4 instead of 4
	1871-80	31	39	14	17	78 „ 39	7 „ 14
	1881-88	20	3	2	2	9 „ 3	1 „ 2
North-western	1851-60	80	113	5	20	113	5
	1861-70	55	62	8	16	89 instead of 62	4 instead of 8
	1871-80	28	40	17	20	113 „ 40	5 „ 17
	1881-88	19	4	3	3	17 „ 4	1 „ 3
York	1851-60	69	116	8	23	116	8
	1861-70	62	107	10	24	120 instead of 107	8 instead of 10
	1871-80	33	41	13	17	85 „ 41	6 „ 13
	1881-88	20	7	5	5	25 „ 7	2 „ 5
Northern	1851-60	60	117	10	25	117	10
	1861-70	55	78	11	27	127 instead of 78	11 instead of 11
	1871-80	33	108	37	47	221 „ 108	19 „ 37
	1881-88	22	10	6	6	28 „ 10	2½ „ 6
Welsh	1851-60	59	164	17	37	164	17
	1861-70	47	54	9	15	66 instead of 54	7 instead of 9
	1871-80	27	47	20	24	106 „ 47	10 „ 20
	1881-88	21	1	1	1	4½ „ 1	½ „ 1

App. No. 3.

TABLE F(*a*).

LONDON.

TABLE showing the nearly continuous fall, since Compulsory Vaccination and during its completer enforcement, of the share of Total Small-pox Mortality borne by Children; with the general decline in Small-pox Mortality among the Infant Population; and the fluctuations of Small-pox Mortality among the Population above Infancy.

Five Year Periods (for most part).	Annual Small-pox Death-rates per 100,000 at each Age.		$\frac{x}{y}$	Small-pox Deaths 0-5 Years per cent. of Small-pox Deaths at All Ages.	Annual Small-pox Death-rates per 100,000 at All Ages.	If the ratio observed in 1843-46 of the *all-age* rate to each rate at *specified ages* had remained unaltered through subsequent periods, the death-rates at the specified ages would have been,—	
	x 0-5.	y 5+.				At Ages Under 5 Years.	At Ages Over 5 Years.
1843-46 - - -	213	15	14·2	67	42	213	15
1847-49 - - -	244	16	15·2	69	46	230 instead of 244	16 instead of 16
1850-54 - - -	150	12	12·5	65	30	150 „ 150	11 „ 12
1855-59 - - -	101	11¼	8·6	56	23½	117½ „ 101	8½ „ 11¼
1860-64 - - -	115	15	7·6	53	28	140 „ 115	10 „ 15
1865-69 - - -	118	13½	8·5	58	28	140 „ 118	10 „ 13½
1870-74 - - -	192	46	4·2	38	65	330 „ 192	23½ „ 46
1875-79 - - -	62½	24	2·6	28	29	145 „ 62½	10½ „ 24
1880-84 - - -	45	19	2·3	26	24	120 „ 45	8½ „ 19
1885-88 - - -	10	5	2·0	24	9	45 „ 10	3 „ 5

DIAGRAM *Handed in by Mr R. Thorne Thorne, M.B., F.R.C.P., on the 17th July 1883.*

DIAGRAM *Showing for England and Wales (a) the average annual death-rate per million living at all ages during the three decennia 1851-60, 1861-70, 1871-80, and during the seven years 1881-7 from Smallpox, Measles, Scarlet Fever, and Whooping Cough; (b) in each instance the share of the all age mortality borne by children under five years of age.*

N.B. *The heights of the several columns with the figures at the head signify the death-rates at all ages. The portions more deeply shaded, and the figures in these portions, indicate the share of children under five in the all age mortality.*

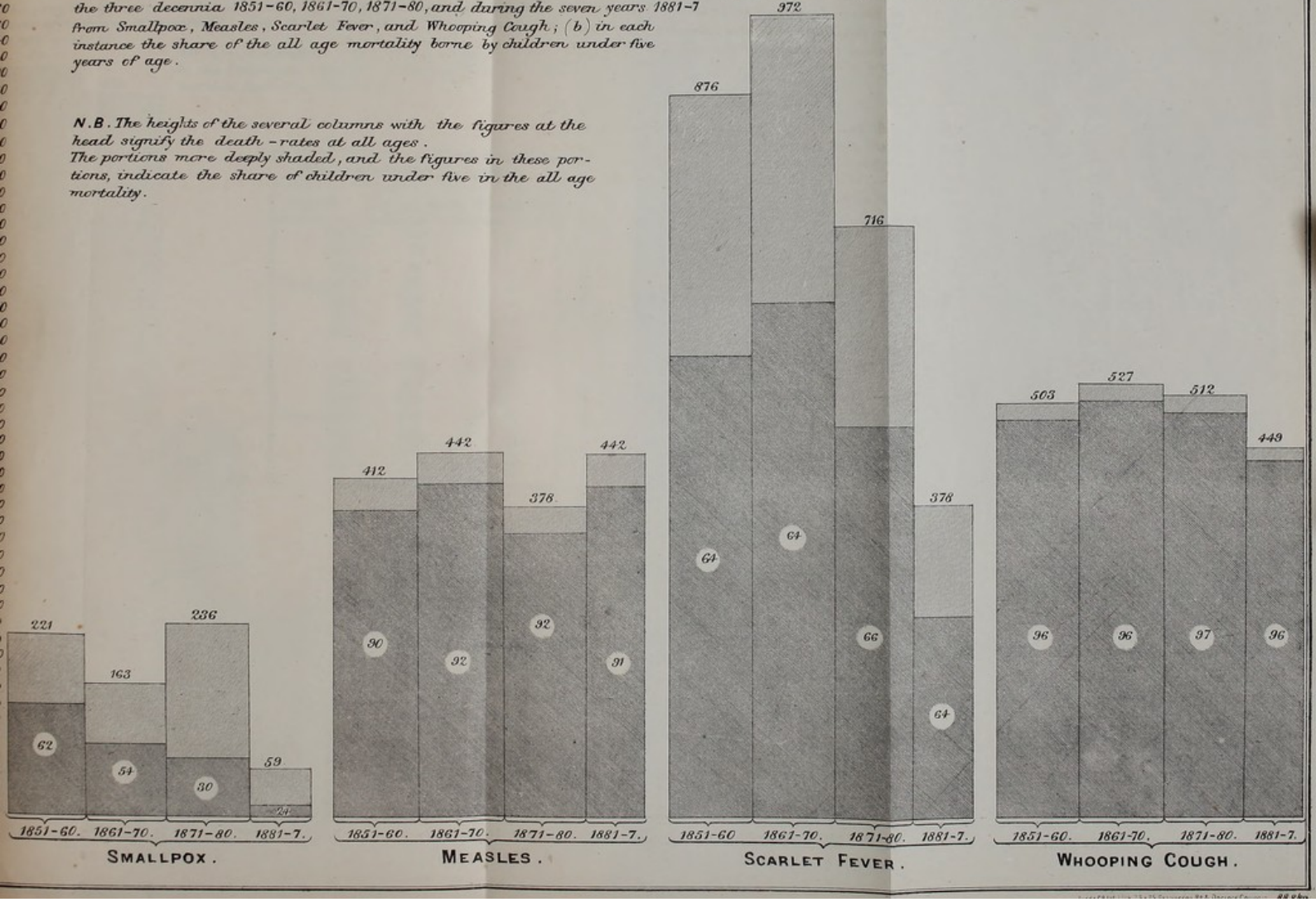
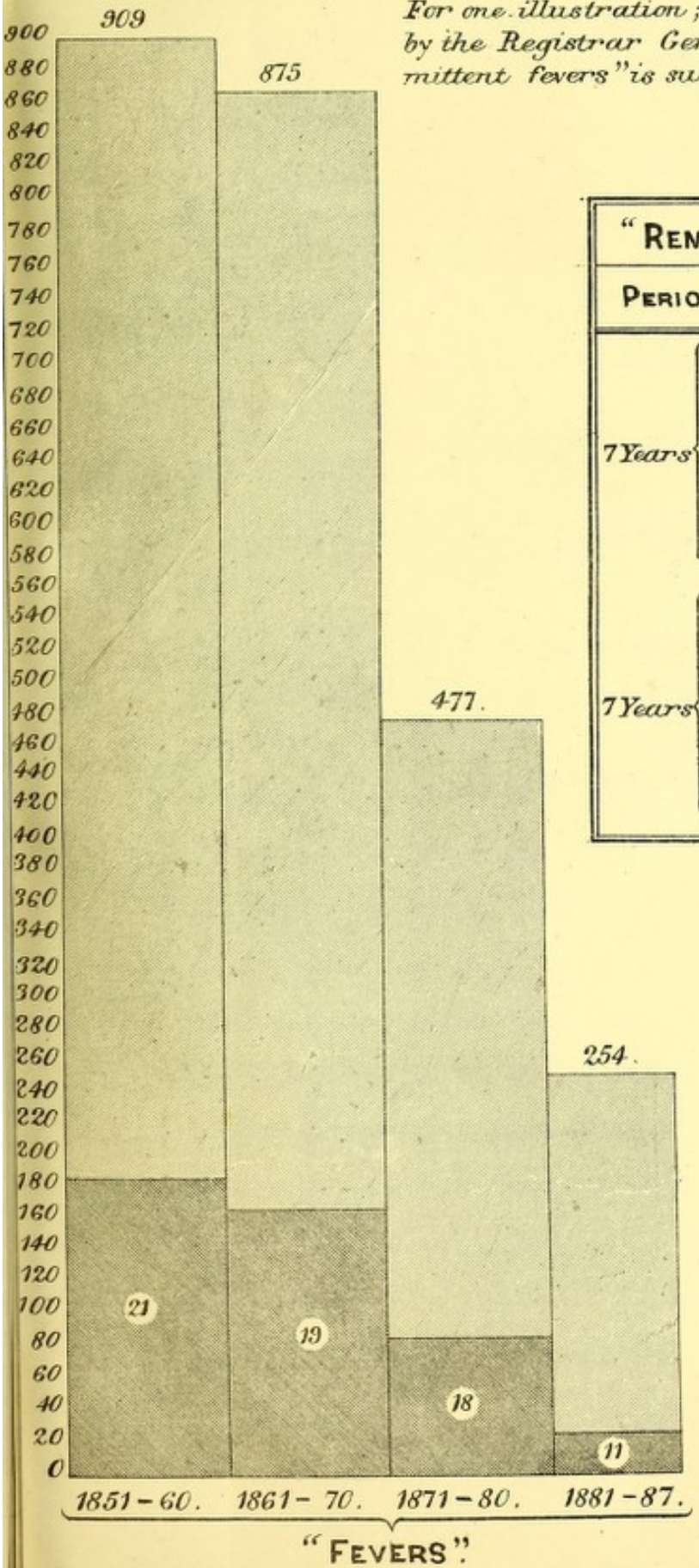


DIAGRAM Handed in by M.r Thorne Thorne, M.B, F.R.C.P., on the 24th July 1889.

Rates of death from causes described as "Fevers," but which are presumably not the same class of causes in the several periods.
To accompany diagram relating to Small-pox, Measles, Scarlet Fever, and Whooping Cough; and to illustrate the fallacy of dealing with death-rates and shares of mortality, when the definition of "Fevers," as a group, is not constant.

For one illustration;- the actual mortality placed by the Registrar General to the account of "Remittent fevers" is subjoined.



"REMITTENT FEVER" DEATHS.			
PERIOD.		AT ALL AGES.	AT AGES 0-5
7 Years	1874	79	—
	1875	70	1
	1876	48	—
	1877	81	—
	1878	90	—
	1879	82	—
	1880	76	—
7 Years	1881	239	154
	1882	246	152
	1883	194	132
	1884	177	109
	1885	138	87
	1886	127	72
	1887	93	59

The deaths at ages under five ("infantile remittent "fever") would appear to have been placed with enteric fever before 1881; since 1881, they have gone along with "remittent fever" at ages over 5 into the class of Malarial diseases.

APPENDIX IV.

STATEMENT SHOWING, FOR EACH OF THE YEARS 1872 TO 1887, THE NUMBER OF DEATHS FROM SMALL-POX, AND THE NUMBER OF INFANTS VACCINATED IN—

1. England and Wales;
2. England and Wales, excluding the Metropolis;
3. The Metropolis; and
4. Each of the Counties of England and Wales.

APPENDIX IV.

App. No. 4.

(Paper referred to in the Evidence of Mr. R. Thorne Thorne, M.B.,

STATEMENT showing, for each of the years 1872 to 1887, the Number

1. England and Wales;
2. England and Wales, excluding the Metropolis;

	1872.		1873.		1874.		1875.		1876.		1877.		1878.	
	Small-pox Deaths*	Infants Vaccinated.*	Small-pox Deaths.	Infants Vaccinated.	Small-pox Deaths.	Infants Vaccinated.	Small-pox Deaths.	Infants Vaccinated.	Small-pox Deaths.	Infants Vaccinated.	Small-pox Deaths.	Infants Vaccinated.	Small-pox Deaths.	Infants Vaccinated.
ENGLAND AND WALES	*19,022* †19,094	— 638,137	*2,303* †2,364	— 704,666	*2,084* †2,162	— 727,055	*849* †950	— 722,466	— 2,408	— 763,277	— 4,278	— 766,824	— 1,856	— 760,982
Do. do. excluding Metropolis.	17,308	601,243	2,251	697,892	2,105	627,675	904	622,635	1,672	656,164	1,727	659,354	439	653,156
METROPOLIS	1,786	96,894	113	96,774	57	99,380	46	99,831	736	107,113	2,551	107,470	1,417	107,826
ENGLAND (Counties):														
Bedford	98	4,687	1	4,537	1	4,493	1	4,282	—	4,471	2	4,530	7	4,373
Berks	11	6,748	—	6,458	1	6,649	2	6,373	5	6,667	23	6,718	21	6,678
Buckingham	20	4,679	2	4,619	—	4,463	1	4,269	1	4,655	6	4,532	3	4,458
Cambridge	112	5,580	6	5,629	16	5,442	1	5,171	2	5,515	2	5,570	1	5,208
Chester	214	15,787	23	16,474	13	17,397	71	17,177	31	17,977	195	18,265	2	17,938
Cornwall	346	9,458	135	9,469	2	9,177	—	8,805	—	8,694	—	8,654	1	8,430
Cumberland	258	6,892	151	7,022	28	7,264	1	6,991	2	7,270	2	7,697	—	7,561
Derby	276	10,407	12	10,769	3	11,614	1	11,469	7	12,166	22	12,404	—	12,347
Devon	524	16,045	44	15,915	8	15,736	1	15,413	1	16,027	8	16,242	6	16,115
Dorset	49	5,058	1	4,846	—	4,715	2	4,714	—	4,927	2	4,786	—	4,996
Durham	1,416	28,058	147	29,894	98	31,790	40	29,843	3	30,639	17	30,638	18	29,450
Essex	239	13,350	14	12,731	5	14,052	1	14,220	8	14,933	253	15,255	129	15,360
Gloucester	277	13,688	119	13,840	172	14,061	98	13,810	34	14,732	3	14,508	4	14,354
Hereford	31	3,116	4	2,899	6	2,895	1	2,959	—	2,918	1	2,976	—	3,068
Hertford	80	6,496	2	6,408	—	6,354	—	6,107	2	6,580	49	6,622	19	6,481
Huntingdon	6	1,791	1	1,677	2	1,596	—	1,531	1	1,596	1	1,539	4	1,552
Kent (extra Metropolitan).	361	18,906	29	18,313	20	18,981	16	18,526	39	19,843	71	19,736	83	19,971
Lancaster	750	99,805	172	99,417	200	104,187	201	105,300	1,372	110,968	818	112,067	9	111,554
Leicester	599	8,324	10	8,724	3	8,965	1	8,766	—	9,612	7	9,597	1	9,389
Lincoln	180	11,855	47	11,589	3	11,842	3	11,385	—	12,373	5	12,382	2	12,616
Middlesex (extra Metropolitan).	60	6,480	8	6,711	5	7,283	—	7,009	16	8,055	57	8,331	38	8,629
Monmouth	580	6,561	13	7,322	8	7,945	—	7,966	1	8,109	2	8,042	1	7,644
Norfolk	541	11,122	65	11,306	1	11,329	—	11,131	2	11,692	1	11,666	7	11,791
Northampton	474	7,450	11	7,724	3	7,623	—	7,250	2	8,018	4	8,067	7	7,959
Northumberland	362	12,616	8	13,405	4	13,741	6	13,832	1	14,464	3	14,192	—	13,561
Nottingham	792	10,487	25	11,168	—	11,905	1	11,830	2	13,122	14	13,051	—	13,067
Oxford	28	4,831	7	4,869	5	4,793	4	4,510	1	4,898	3	5,023	1	4,968
Rutland	6	619	—	630	—	598	—	526	—	615	—	712	1	626
Salop	94	7,550	17	7,457	3	7,349	1	7,270	11	7,644	13	7,428	1	7,345
Somerset	182	13,005	7	13,019	13	13,058	5	12,765	6	13,539	1	13,375	—	13,368
Southampton	611	14,859	55	14,565	3	14,636	2	14,712	4	15,302	8	15,431	7	15,761
Stafford	2,458	26,540	261	27,377	71	28,434	24	27,704	8	29,205	2	29,449	1	28,905
Suffolk	296	10,060	3	9,710	4	9,859	—	9,533	1	9,898	15	10,106	11	9,955
Surrey (extra Metropolitan).	47	9,569	7	10,265	2	10,533	9	10,684	17	11,555	50	11,579	14	11,643
Sussex	20	11,210	—	11,327	3	11,674	5	11,298	10	11,997	15	12,157	6	12,271
Warwick	464	20,434	145	20,488	803	20,877	224	20,534	11	21,809	12	22,537	7	22,469
Westmorland	4	1,890	1	1,802	—	1,928	—	1,758	5	1,828	—	1,751	—	1,878
Wilts	41	6,873	7	6,933	2	6,793	—	6,757	—	6,985	3	6,985	1	7,104
Worcester	514	15,934	83	16,104	44	16,514	17	15,858	—	17,298	1	16,632	2	16,671
York, East Riding	378	9,187	67	9,487	4	9,714	2	9,765	2	10,445	2	10,548	1	10,422
York, North Riding	213	7,078	11	7,141	—	7,313	2	9,422	5	10,793	—	10,612	2	10,230
York, West Riding	1,852	60,705	345	60,912	461	62,591	158	63,262	34	65,568	17	66,502	11	65,650
WALES:														
Anglesey	1	789	1	789	2	725	—	818	1	842	—	877	1	866
Brecknock	114	1,513	4	1,562	2	1,612	—	1,635	—	1,678	—	1,602	—	1,490
Cardigan	23	1,381	2	1,875	4	1,857	—	1,904	—	1,960	—	1,992	1	1,900
Carmarthen	80	3,717	1	3,892	5	3,825	—	3,962	2	3,992	2	3,947	—	3,833
Carnarvon	15	3,009	—	2,857	4	3,038	—	2,876	13	3,083	—	3,379	1	3,361
Denbigh	17	2,275	1	2,317	—	2,468	—	2,449	2	2,522	3	2,433	—	2,480
Flint	47	2,438	—	2,384	1	2,637	—	2,633	2	2,623	2	2,587	—	2,554
Glamorgan	1,234	14,534	137	15,297	65	16,835	2	17,022	5	17,426	9	16,936	7	16,186
Merioneth	3	1,477	7	1,740	—	1,859	—	1,772	—	1,769	1	1,985	—	1,928
Montgomery	3	1,718	1	1,739	1	2,044	—	1,910	—	2,117	—	2,039	—	2,060
Pembroke	10	2,255	1	2,152	1	2,109	—	2,142	—	2,304	—	2,177	—	2,258
Radnor	6	486	—	494	—	459	—	467	—	444	—	446	—	521
Rates of the totals in first line to a million of population of England and Wales at all ages	824	30,227	98	30,163	88	30,646	35	30,046	99	31,320	173	31,046	74	30,399

* As regards the years 1872, 1873, 1874, and 1875 the small-pox deaths shown in Roman type include deaths from chicken-pox which were not then deaths alone. Since 1875, the deaths from chicken-pox are not included.

† The figures contained in the first column for each year have been taken from the Registrar-General's Annual Reports, and those in the second purposes are not invariably conterminous.

APPENDIX IV.

F.R.C.P., on the 24th July 1889: *see* Questions 946–956.)

App. No. 4.

of Deaths from Small-pox,† and the Number of Infants Vaccinated in—

3. The Metropolis; and
4. Each of the Counties of England and Wales.

1879.		1880.		1881.		1882.		1883.		1884.		1885.		1886.		1887.	
Small-pox Deaths	Infants Vaccinated.	Small-pox Deaths	Infants Vaccinated.	Small-pox Deaths	Infants Vaccinated.	Small-pox Deaths	Infants Vaccinated.	Small-pox Deaths	Infants Vaccinated.	Small-pox Deaths	Infants Vaccinated.	Small-pox Deaths	Infants Vaccinated.	Small-pox Deaths.	Infants Vaccinated.	Small-pox Deaths.	Infants Vaccinated.
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	The Returns for 1887 are not yet complete.
536	756,835	648	750,203	3,698	765,162	1,317	763,525	957	762,080	2,234	764,975	2,827	757,714	275	754,059	506	
86	647,155	177	638,553	731	651,601	887	650,662	821	648,768	1,336	651,661	1,913	646,665	270	643,854	409	
450	109,680	471	111,650	2,367	113,561	430	112,863	136	113,312	898	113,314	914	111,049	5	110,205	7	
—	4,277	—	4,222	1	4,113	19	4,238	1	4,296	12	4,239	4	4,138	—	3,919	—	
—	7,040	3	6,853	27	6,987	7	6,968	—	6,894	3	6,967	3	6,729	8	6,752	—	
—	4,551	2	4,233	7	4,358	5	4,331	3	4,410	6	4,352	4	4,371	2	4,324	4	
1	5,201	—	5,074	6	5,265	3	4,803	1	5,122	3	5,115	3	5,181	2	5,004	—	
—	18,064	—	17,646	1	17,962	3	17,959	2	17,665	17	17,979	3	17,892	10	17,980	1	
—	8,282	—	8,040	—	8,207	1	8,338	—	8,080	1	8,362	5	7,946	—	7,929	—	
—	7,635	1	7,479	3	7,756	1	7,724	1	7,708	3	7,684	4	7,693	—	7,556	—	
—	11,820	—	11,817	4	11,809	8	11,634	4	11,215	6	11,083	1	11,648	—	11,850	5	
—	16,156	—	15,983	5	16,076	1	16,131	5	15,628	7	15,975	8	15,542	3	15,511	—	
—	4,895	—	4,906	—	4,885	—	4,854	—	4,722	1	4,742	—	4,664	5	4,733	—	
—	28,193	1	27,586	5	29,613	45	29,032	177	30,471	207	31,367	83	29,917	53	30,077	2	
9	15,687	10	16,076	133	16,614	62	16,878	12	17,415	306	17,913	698	18,454	9	19,197	3	
—	14,677	5	14,334	3	14,447	4	14,432	2	14,089	1	13,893	14	13,898	15	13,629	38	
—	2,904	—	2,924	—	2,871	1	2,818	1	2,757	—	2,763	—	2,896	—	2,724	—	
2	6,679	3	6,434	8	6,626	6	6,455	—	6,580	5	6,449	2	6,408	1	6,439	—	
1	1,483	1	1,380	1	1,365	—	1,304	1	1,383	—	1,327	—	1,306	—	1,332	—	
6	20,156	13	20,012	46	20,461	20	20,206	8	20,368	281	20,342	537	20,448	34	20,294	7	
4	109,826	38	107,991	195	109,223	168	110,138	50	109,626	115	109,572	154	109,371	41	108,152	22	
—	9,110	—	8,909	2	8,756	7	8,427	13	7,813	—	7,560	—	7,569	—	6,558	—	
—	12,589	—	12,448	11	12,513	20	12,440	7	12,300	1	12,262	7	12,319	1	12,031	14	
9	9,151	5	9,753	72	10,209	15	10,863	4	10,987	42	11,391	69	11,535	9	12,153	1	
2	7,101	—	7,026	2	7,151	7	7,356	—	7,510	2	8,105	35	7,630	—	7,771	1	
—	11,644	—	11,888	17	12,010	1	11,907	1	11,891	4	11,904	4	11,936	—	11,919	1	
2	7,863	1	7,854	6	8,136	10	7,845	1	8,102	2	7,728	12	7,890	2	7,211	1	
—	13,958	1	13,065	11	13,310	94	13,260	87	13,411	17	14,106	12	14,107	—	14,173	—	
—	12,665	—	12,844	8	13,759	57	13,957	3	14,384	2	14,326	5	14,731	2	14,241	2	
1	4,859	—	4,886	6	4,912	1	4,697	1	4,817	—	4,801	7	4,660	5	4,729	1	
—	655	—	614	3	595	1	575	—	645	—	535	—	599	—	542	—	
1	7,020	—	6,820	1	6,979	—	6,938	2	6,660	1	6,779	9	6,544	1	6,676	—	
21	13,604	57	13,218	1	13,519	3	13,352	1	12,889	11	12,952	43	12,690	3	12,794	—	
3	15,787	1	15,698	6	16,118	—	15,903	2	16,248	3	16,542	8	16,849	12	16,455	7	
—	28,441	4	27,857	4	28,392	142	28,569	235	28,848	64	28,984	29	28,233	4	28,139	10	
3	10,099	5	9,945	3	10,128	12	9,939	—	9,985	7	9,981	10	9,781	5	9,926	—	
7	11,999	4	12,083	26	12,498	43	12,809	2	12,777	14	12,693	61	12,881	4	12,901	—	
—	12,758	1	13,059	43	13,317	18	13,199	5	13,062	6	13,007	21	12,557	17	12,557	2	
4	22,221	2	21,900	9	21,954	19	21,896	127	21,794	73	21,584	14	21,125	1	20,873	2	
—	1,777	—	1,840	1	1,756	—	1,735	—	1,826	—	1,740	2	1,738	—	1,688	—	
1	7,042	1	6,838	7	6,911	—	6,842	—	6,735	3	6,878	2	6,688	—	6,506	—	
—	16,532	1	16,117	2	16,796	1	16,362	21	16,718	28	16,787	2	16,565	1	16,353	1	
—	10,521	—	10,285	4	10,523	16	10,419	11	10,341	19	10,460	12	10,356	1	10,229	3	
—	9,939	—	9,779	5	10,192	—	10,262	2	10,341	7	10,406	8	10,001	5	9,901	18	
4	63,633	14	62,520	26	62,838	60	62,326	22	61,377	39	60,759	23	59,956	7	59,898	334	
4	864	—	879	—	841	—	881	—	793	—	839	—	819	—	826	—	
—	1,512	—	1,403	—	1,411	1	1,484	—	1,422	—	1,414	1	1,437	1	1,388	—	
—	1,944	—	1,845	—	1,784	—	1,797	—	1,670	—	1,695	—	1,653	—	1,563	1	
1	3,870	—	3,796	—	3,823	1	3,765	—	3,707	—	3,662	—	3,668	—	3,740	—	
—	3,377	—	3,221	—	3,284	1	3,037	—	3,089	—	3,020	—	3,093	2	2,905	—	
—	2,379	—	2,394	6	2,360	—	2,358	—	2,310	1	2,252	—	2,240	—	2,246	—	
—	2,505	—	2,478	—	2,414	—	2,417	—	2,292	—	2,295	—	2,220	—	2,114	1	
—	16,206	2	15,846	4	17,120	1	17,505	4	17,446	10	18,392	7	19,211	1	19,306	17	
—	1,945	—	1,831	—	1,838	1	1,841	—	1,718	—	1,669	—	1,667	—	1,615	—	
—	1,960	—	1,858	—	1,916	1	1,876	2	1,821	6	1,827	2	1,733	2	1,783	—	
—	2,280	1	2,267	—	2,225	—	2,259	—	2,161	—	2,161	—	2,171	1	2,153	—	
—	485	—	479	—	497	—	439	—	449	—	428	—	442	—	439	—	
21	29,839	25	29,175	119	29,369	50	28,996	36	28,467	82	28,194	103	27,554	10	27,056	18	

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Statement by Dr. Seaton to the Select Committee of 1871 on the Vaccination Act (1867), as to the number of Unions which at that time had appointed Vaccination Officers under the Act of 1867, 621.

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For many years medical officer of the Privy Council, 1–5. Health business transferred from the Privy Council to the Local Government Board in 1871, 6, 7. Examined before the Committee of the House of Commons on the Vaccination Act (1867) which sat in 1871, 11. Hands in copy of paper submitted to that Committee (see Appendix I.), 13. In the year 1717 Lady Mary Wortley Montagu first drew attention to the practice of small-pox inoculation, 16. The practice had prevailed in the East from time immemorial, 17. Inoculation was very prevalent among the wealthy during the latter half of the last century, 18. Vaccination practically dates from the beginning of the present century, and was practised to some extent before there was any legislation on the subject, 19, 20. From early in the present century to about the year 1840 there was an annual grant of, at first, 6,000*l.* and then 2,000*l.* to the National Vaccine Establishment for the supply of lymph to the whole country, but vaccination under that grant was only practised in London, 21, 22. Among the poorer classes vaccination was at first assisted by charity, then, in 1840, came the law instituting vaccination out of the rates, 24. Vaccination was largely taken advantage of when it was not compulsory, 25, 26. Vaccination made compulsory in 1853, at the instigation of the Epidemiological Society, 28. An important change in the law was made in 1871 by which defaulters under the Vaccination Act could be more efficiently detected, 31–34. For vaccination statistics, the periods from the years prior to 1840, from 1840 to 1853, from 1853 to 1871, and from 1871 to the present time, might be taken, 36. Down to a comparatively recent period there were no satisfactory death statistics in this country, only the London Bills of Mortality and the parish registers in the provinces, 37–44. The classification of causes of deaths has greatly altered of recent years, so that more deaths are put down to specific diseases and fewer recorded as due to old age, 45–49. Vaccination has largely diminished the prevalence of small-pox, 50–54. Statistics of foreign countries quoted showing the benefit of vaccination, 55–59. Statistics quoted showing the protective results of vaccination in this country, 60–67. The effects of vaccination wear off in time in most cases; but a vaccinated person is unquestionably better off than one unvaccinated, as regards susceptibility to small-pox, 68–71. The amount of protection afforded by vaccination greatly depends on the completeness of the operation, 72–75. The completeness of vaccination can be determined by the character of the scars which should not be less than five in number, 76–81. There was an epidemic of small-pox all over Europe from 1870–1873, and England suffered largely, 83–85. Three statistical periods quoted, viz., 1847–1853, optional vaccination; 1854–1871, obligatory but not strictly enforced vaccination; and 1872–1880, the stricter period. The decline of the small-pox death-rate for all ages is, 305, 223, and 156 respectively per million living, 86–90. Deaths of children, under five years of age, from small-pox, during six years before the compulsory law was in force, were 227 per million living; but during a period of six years after the law was enforced, the deaths were only 21 per million, 91, 92. Numbers unvaccinated in this country are relatively insignificant, 93. There is a certain proportion of inefficient cases of vaccination among those returned as vaccinated, 94. There has been an immense improvement in the quality of vaccination during the past 30 years, 95. There has been an increase in the proportion of deaths of adults during that period, and a decrease in the deaths of children, 96. Successful vaccination is shown by five typical cicatrices on the arm, which offers protection up to puberty, about which time it is very desirable that re-vaccination should take place, 97–100. Re-vaccination almost compulsory in Germany, and splendid results are obtained, 101–103. Infant vaccination rarely entirely dies out, 104, 105. The efficacy of vaccination is in proportion to the number and size of the scars, 106, 107. The physiological changes at puberty do not affect vaccination, 109. Re-vaccination should take place at about 10 to 12 years of age, 110. Vaccinators generally agree as to certain characters of the marks indicating successful vaccination, 111, 112. Except on matters of detail, he would not wish to modify the opinions expressed in his paper of 1857, 117–121. As to whether cow-pox was derived from horse-grease or not, 123–126. Jenner at first expected vaccination to protect for a life-time, 127–129. There was much opposition by the public to the reception of vaccination, 130. Inoculation considered dangerous, and

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known a case of spontaneous cow-pox, 323. Does not know of any statistics to show how nurses in small-pox hospitals fared before the introduction of vaccination, 324–326; but there is no reason to suppose that nurses then possessed an immunity because they were nurses, 327. States that the absolute origin of cow-pox is involved in obscurity, 328–330. Is unable to say whether, since the Vaccination Act of 1871, the per-centage of successful vaccinations to birth has increased as compared with the period between 1867 and 1871, 331–337.

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VACCINATION COMMISSION.

SECOND REPORT

OF THE

ROYAL COMMISSION

APPOINTED TO INQUIRE INTO THE SUBJECT OF

VACCINATION;

WITH

MINUTES OF EVIDENCE AND APPENDICES.

Presented to both Houses of Parliament by Command of Her Majesty.



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1890.

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ROYAL COMMISSION.

VICTORIA R.

Victoria, by the Grace of God of the United Kingdom of Great Britain and Ireland Queen, Defender of the Faith,

To Our right trusty and well-beloved Councillor, Farrer, Baron Herschell, Our trusty and well-beloved: Sir James Paget, Baronet, Fellow of the Royal College of Surgeons, Sir Charles Dalrymple, Baronet, Sir William Guyer Hunter, Knight Commander of Our Most Distinguished Order of Saint Michael and Saint George, Fellow of the Royal College of Physicians, Sir Edwin Henry Galsworthy, Knight, William Scovell Savory, Esquire, President of the Royal College of Surgeons, Charles Bradlaugh Esquire, John Syer Bristowe, Esquire, Fellow of the Royal College of Physicians, William Job Collins, Esquire, Fellow of the Royal College of Surgeons, John Stratford Dugdale, Esquire, one of Our Counsel learned in the Law, Michael Foster, Esquire, Master of Arts, Professor of Physiology in Our University of Cambridge, Jonathan Hutchinson, Esquire, Fellow of the Royal College of Surgeons, James Allanson Picton, Esquire, Samuel Whitbread, Esquire, and Frederick Meadows White, Esquire, one of Our Counsel learned in the Law, greeting!

Whereas We have deemed it expedient that a Commission should forthwith issue to inquire and report as to—

(1.) The effect of vaccination in reducing the prevalence of, and mortality from, small-pox.

(2.) What means, other than vaccination, can be used for diminishing the prevalence of small-pox; and how far such means could be relied on in place of vaccination.

(3.) The objections made to vaccination on the ground of injurious effects alleged to result therefrom; and the nature and extent of any injurious effects which do, in fact, so result.

(4.) Whether any, and, if so, what means should be adopted for preventing or lessening the ill effects, if any, resulting from vaccination; and whether, and, if so, by what means, vaccination with animal vaccine should be further facilitated as a part of public vaccination.

(5.) Whether any alterations should be made in the arrangements and proceedings for securing the performance of vaccination, and, in particular, in the provisions of the Vaccination Acts with respect to prosecutions for non-compliance with the Law.

Now know ye, that We, reposing great trust and confidence in your knowledge and ability, have authorised and appointed, and do by these presents authorise and appoint, you, the said Farrer, Baron Herschell; Sir James Paget; Sir Charles Dalrymple; Sir William Guyer Hunter; Sir Edwin Henry Galsworthy; William Scovell Savory; Charles Bradlaugh; John Syer Bristowe; William Job Collins; John Stratford Dugdale; Michael Foster; Jonathan Hutchinson; James Allanson Picton; Samuel Whitbread; and Frederick Meadows White; to be Our Commissioners for the purposes of the said inquiry.

o 60238. Wt. 5851.

And for the better effecting the purposes of this Our Commission We do by these presents give and grant unto you, or any five or more of you, full power to call before you such persons as you shall judge likely to afford you any information upon the subject of this Our Commission; and also to call for, have access to, and examine all such books, documents, registers, and records as may afford you the fullest information on the subject; and to inquire of and concerning the premises by all other lawful ways and means whatsoever.

And We do further by these presents authorise and empower you, or any five or more of you, to visit and personally inspect such places as you may deem expedient for the more effectual carrying out of the purposes aforesaid.

And We do by these presents will and ordain that this Our Commission shall continue in full force and virtue; and that you, Our said Commissioners, or any five or more of you, may, from time to time, proceed in the execution thereof, and of every matter and thing therein contained, although the same be not continued from time to time by adjournment.

And We do further ordain that you, or any five or more of you, have liberty to report your proceedings under this Our Commission from time to time, if you shall judge it expedient so to do.

And Our further Will and Pleasure is that you do with as little delay as possible report to Us, under your hands and seals, or under the hands and seals of any five or more of you, your opinion upon the several matters herein submitted for your consideration.

Given at Our Court at St. James's the Twenty-ninth day of May one thousand eight hundred and eighty-nine; in the Fifty-second year of Our Reign.

By Her Majesty's Command.

HENRY MATTHEWS.

SECOND REPORT.

TO THE QUEEN'S MOST EXCELLENT MAJESTY.

MAY IT PLEASE YOUR MAJESTY,

WE, the undersigned Commissioners appointed to inquire into the subject of vaccination, desire humbly to submit to Your Majesty a further Report of our proceedings.

Between the date of our First Report and the 19th of February last we have held twenty meetings and examined forty-three witnesses, notes of whose evidence, with other information relating thereto, are appended.

All which we humbly submit for Your Majesty's gracious consideration.

(Signed) HERSCHELL.
JAMES PAGET.
CHARLES DALRYMPLE.
W. GUYER HUNTER.
EDWIN H. GALSWORTHY.
WM. S. SAVORY.
CH. BRADLAUGH.
J. S. BRISTOWE.
W. J. COLLINS.
M. FOSTER.
JONATHAN HUTCHINSON.
J. ALLANSON PICTON.
SAM. WHITBREAD.
FREDERICK MEADOWS WHITE.
JOHN S. DUGDALE.

29th May 1890.

BRET INCE,
Secretary.

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MINUTES OF EVIDENCE

TAKEN BEFORE THE

ROYAL COMMISSION

ON

VACCINATION.

At 8, Richmond Terrace, Whitehall, London, S.W.

Seventh Day.

Wednesday, 9th October 1889.

PRESENT:

THE RIGHT HON. THE LORD HERSCHELL IN THE CHAIR.

Sir JAMES PAGET, Bart.
Sir CHARLES DALRYMPLE, Bart., M.P.
Sir W. GUYER HUNTER, K.C.M.G., M.P.
Sir EDWIN HENRY GALSWORTHY.
Mr. WILLIAM SCOVELL SAVORY
Mr. CHARLES BRADLAUGH, M.P.

Dr. JOHN SYER BRISTOWE.
Dr. WILLIAM JOB COLLINS.
Professor MICHAEL FOSTER.
Mr. JONATHAN HUTCHINSON.
Mr. J. ALLANSON PICTON, M.P.
Mr. F. MEADOWS WHITE, Q.C.

Mr. BRET INCE, *Secretary.*

Surgeon-General JOHN PINKERTON, M.D., examined.

Surgeon-Gen. John Pinkerton, M.D.

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1226. (*Chairman.*) You are a surgeon-general in the service of the Government of India?—I am.

1227. Have you had some experience, in the course of your service in India, of the effects of vaccination as preventive of small-pox?—Yes, I was for 13 years in the Vaccination Department, about six years as superintendent of vaccination in Scinde, and about seven years as superintendent-general for the whole of the Bombay Presidency.

1228. You went to Scinde, I believe, in the year 1863?—Yes, in March 1863.

1229. At that time did you observe whether small-pox had made considerable ravages in the population?—Yes, nearly the whole population were marked with small-pox, young and old; except the very young, the youths and the old people were all marked.

1230. Was there also blindness?—Yes, a considerable amount of it, and the blindness from small-pox gave a word to the Scindi language, *kanu*, which means blindness in one eye. It was so common that the language had a distinctive word for it; and I know no other language which has.

1231. During the time of your stay there, and subsequently, was vaccination largely practised?—So far as my memory serves me, vaccination was begun by the Bombay Government as far back as 1848, very shortly after Scinde was taken; but it was not pushed at all until after 1857, the reason being that the bulk of the population was Mussulman, and habitually practised inoculation for small-pox on the wrist. After the vaccination had been slowly introduced for probably some eight or nine years, my predecessor, Dr. Martin, began to push it; I succeeded him in 1863, and shortly after I took charge of the Scinde circle the number of vaccinators was greatly increased, so that it covered the whole area. Then we said that inoculation must stop; from that time vaccination has been freely and gladly accepted by the Scindis.

1232. Have you observed any change in the appearance of the population as regards their showing signs of having been infected with small-pox?—Yes; I went back to Scinde as deputy surgeon-general in 1882, and I remained till 1888. I went all over the province then again,—at least, I went to the principal places in the province,—and then I observed that the younger population was quite unmarked by small-pox, just the same as the people in England here, and very many fewer had lost an eye. Many had lost both eyes, and lameness of the arm and lameness of the leg were quite common from small-pox when I went to Scinde in 1863, and it was quite uncommon when I left, in fact, so uncommon that I do not remember seeing a single case in the last five or six years that I was there.

1233. Do you remember about the year 1866 a village in the Hyderabad collectorate in Scinde being visited by the vaccinator?—Yes.

1234. On that occasion were the Mussulman children vaccinated?—Every one that was not protected was vaccinated.

1235. I believe the Hindus refused to have their children vaccinated?—Perhaps to say that they refused is to use too strong a word; they were not vaccinated,

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and I think probably the reason was not that they refused vaccination but that they did not want it to-day or to-morrow, they wanted the vaccinator to come later. The vaccinator could not do that very well because he must go on with his lymph.

1236. However, the result was that owing to unwillingness they were not vaccinated?—The Hindus were not vaccinated.

1237. Was there afterwards an epidemic of small-pox in that village?—Yes, some six or eight months afterwards small-pox came to that village, and every one of the unvaccinated Hindu children without exception got small-pox; and a very large proportion of them died, I think nearly 30 per cent. died, speaking merely from memory, but I remember distinctly that it was above what we considered the average, viz., 25 per cent.

1238. What happened in the case of the Mussulman children?—Not one single one of the Mussulman children got it.

1239. According to your experience generally did a large proportion, or a considerable proportion, of unprotected persons die when attacked by small-pox?—My impression is that, all over, at least 25 per cent. died. On this occasion in this village in the Hyderabad zillah rather more than 25 per cent. died.

1240. But your general experience would be that of the unprotected persons 25 per cent. would die?—Yes.

1241. (*Professor Michael Foster.*) 25 per cent. of the cases attacked?—Yes; that is to say, out of 100 attacks you would have 25 deaths.

1242. (*Chairman.*) In the 10 years preceding 1869-70 can you tell us how many deaths there were from small-pox in the Bombay army?—15.

1243. Was that the total number in 10 years?—It was.

1244. The Sepoys are all vaccinated on enlistment, are they not?—They are all vaccinated if they are not protected.

1245. Do you mean if they have not vaccination marks?—If they have not had small-pox or have not vaccination marks. The reason that I select that year is that I took the figures out myself for each 10 years, and went over the thing carefully; I think that it was for my report of 1868 or 1869 that I took them out. The Bombay army is vaccinated by Government order; every man who is unprotected must be vaccinated.

1246. (*Sir Guyer Hunter.*) Is the word "*mata*" used in India as a general word for small-pox and for vaccination now, or simply for small-pox?—It is used distinctively for small-pox, but it is very often used for vaccination. Occasionally it is called "engrazi mata," that is English small-pox. I think that is dropping out, but I have heard that term used frequently years ago. "*Mata*" is the distinctive word for small-pox.

1247. You mentioned in regard to the number of deaths from small-pox that there were 15 in the period 1859-68; was that in the native army only?—In the Bombay native army only.

1248. (*Chairman.*) Can you give us the number of the Bombay native army?—It was then, I think, about 35,000; under 40,000.

1249. (*Sir Guyer Hunter.*) You mentioned, as one of the results of small-pox in Scinde, lameness; what was the lameness due to?—It is due to disease of the hip joint very often, or disease of the elbow joint or disease of the shoulder joint.

1250. As the result of abscess?—Yes, I think so; the result of blood poisoning from small-pox. That lameness was very frequent.

1251. Do you know the relative proportion of Mussulmans to Hindus in Scinde?—At the time I am speaking of it was about six to one, I think; one Hindu to six Mussulmans. I believe the proportion is less to-day.

1252. The Hindus had no objection to vaccination; it was simply their habit and temperament that caused them to be dilatory in bringing their children to be vaccinated?—Yes; they had no objection to it.

1253. In Scinde did you perform arm-to-arm vaccination?—Almost invariably arm-to-arm vaccination. Occasionally, of course, when we had to carry lymph a long way we took it in tubes and started it with one child and then went on from arm to arm.

1254. Where did you get the tubes from?—From the medical stores.

1255. Can you give us any facts with reference to the relative necessity of re-vaccination after a certain lapse of time, after a few years?—I do not think I can give you any facts, but from all I know I am quite of opinion that re-vaccination is desirable, if not absolutely necessary. After the great epidemic that we had in Bombay in 1872 we pushed re-vaccination in the city of Bombay because of the number of cases that had occurred, and since then we have never had any bad epidemic of small-pox in the city of Bombay. In 1872, I do not quite remember the number of escapes in Bombay, but I think it was nearly one fifth; that is to say, until compulsory vaccination was introduced the residuum unvaccinated in Bombay was about one fifth for the year. The consequence was that in a very few years we got an epidemic. Our bad epidemic was in 1872, and after that we got compulsory vaccination and re-vaccination, and since then we have had no epidemics.

1256. When was vaccination from the heifer introduced into Bombay?—In 1869.

1257. Was it introduced into the Presidency towns first?—Yes.

1258. And all the vaccinations in Bombay are done entirely from the heifer?—Entirely, and nothing else. There may be exceptions of medical men having lymph sent from England for themselves, but Bombay you may say is all vaccinated from the heifer or the bull calf direct, and not by means of tubes.

1259. You take it from the belly as well as from the udders?—Yes.

1260 Do you find that it answers as well as the arm-to-arm vaccination?—At first we were very doubtful about that in Bombay, but the thing that we were most sorry about was that the per-centage of success from heifer vaccination was at first with us only 82 or thereabouts, while we got from arm-to-arm vaccination about 95 known and probably about 98 really; but after we got more skilled in the use of heifer lymph we approached more nearly to the success which attended the use of humanised lymph, probably to about 93 known and 95 actually. We could not tell because we always lost sight of a few cases; but I think we actually realised 92 or 93, and the number was probably about 95.

1261. (*Dr. Collins.*) Is that per-centage as regards cases, or as regards insertions?—As regards cases, not insertions. The insertion success with calf lymph is never so good as with human lymph.

1262. (*Sir Guyer Hunter.*) What were the reasons which caused you to introduce vaccination from the heifer into Bombay?—One reason, and the main reason, was that the people in Bombay have a very strong objection to giving the lymph from the arms of their children. That was the real reason, because all castes, Christians, Hindus, Mussulmans, and everybody have a strong objection to allowing the vesicles to be broken. That was a great difficulty, because with arm-to-arm vaccination, of course, we could not get on without breaking the vesicles.

1263. Would a Hindu object to the lymph being taken from his child's arm to vaccinate another Hindu or to vaccinate a Mussulman?—It did not matter; it was not any religious scruple, it was simply that he did not like the child to have the pain of it or the trouble of it.

1264. It was not a religious scruple at all?—No, not at all, or a social one either.

1265. Your experience leads you to infer that the natives of India have great faith in the efficacy of vaccination as a preventive of small-pox?—Undoubtedly. In Bombay they demanded compulsory vaccination. I was at the head of the department and had suggested it, but I do not think that I had officially recommended it. After the epidemic of 1872 the Bombay Association (I forget the exact title of it) asked myself and Surgeon-Major Lumsden, now Surgeon-General Lumsden, to write a report for them, giving them all the information that we could regarding vaccination and its benefits. We did so, and immediately after they got these reports they asked the Government to introduce an Act for compulsory vaccination, and that Act I drew up.

1266. (*Chairman.*) You mean that the natives made this demand?—Yes, it came from the natives.

1267. (*Sir Guyer Hunter.*) It came spontaneously from the natives themselves?—Yes, and the same with the

Karachi people; they also demanded it, and they got an Act more recently.

1268. (*Chairman.*) Then is the compulsory area confined to the town of Bombay?—Yes, to Bombay island, Bombay city.

1269. Is there no compulsory law elsewhere in the Bombay Presidency than at Karachi?—Not in the Bombay Presidency; it is voluntary elsewhere.

1270. (*Professor Michael Foster.*) When you speak of introducing and pushing vaccination, you mean simply that you encouraged it?—That was re-vaccination.

1271. (*Chairman.*) But you said that you pushed it when you went down to Scinde in 1863?—Yes.

1272. (*Professor Michael Foster.*) You mean that you were more zealous in your endeavours to get people vaccinated?—We were, too, but we had more vaccinators and spread them more over the province. I think at first in Scinde there were only two or three native vaccinators, and those men went with the superintendent wherever he went, and he was also Conservator of Forests as well as Superintendent of Vaccination. In fact, this was just the beginning to let the people know about vaccination. In a few years, I think seven years afterwards, they increased the number of vaccinators to 13, and then a year or two after I joined they increased them to about 30, which gave one to about each *taluk* in the whole province.

1273. You said that when the vaccination became more general the inoculation was stopped; it was stopped voluntarily, I suppose?—No, it was not stopped voluntarily. The people did not want it, but we were troubled in Scinde by inoculators coming over the frontier into our territory and spreading small-pox. I do not think that they were compulsorily stopped then. The commissioner issued a special order to the collectors to prevent these men from inoculating with small-pox on account of the spread of it.

1274. There was compulsory vaccination instead of inoculation?—There was, but the people did not want it. It was these men who came in from across the frontier mostly, our old inoculators who had been in Scinde.

1275. Across which frontier?—From Beluchistan. They were some of the old inoculators who had belonged to Scinde before we introduced vaccination, but they soon died out, and they are all dead now I suppose.

1276. You do not know what was the mortality from small-pox in the Bombay army subsequently to the decade 1859–69?—No; but I have looked up the figures for some individual years, and I think in one year there was only one death, and in another year there was no death; but I cannot give you the exact years.

1277. The epidemic of 1872 would fall in the decade after the one you mentioned?—Yes.

1278. During that decade there was no epidemic?—I do not think that the army suffered particularly in the year 1872.

1279. During the decade you mentioned, 1859–69, there was no epidemic?—I fancy there was, I cannot be certain; but I do not think that in any 10 years previous to that they ever went without an epidemic of small-pox.

1280. Do you know what was the primary origin of the heifer lymph?—Yes, it came from M. Warlomont in Brussels.

1281. It was the Brussels lymph?—Yes, it was brought out by Surgeon-Major Blanc.

1282. (*Chairman.*) Was the 1872 epidemic a general epidemic in the Presidency, or was it only an epidemic in Bombay island?—It was general all over the Presidency, particularly in the Deccan; it was not very bad in Scinde, but it was very bad in the Deccan.

1283. (*Mr. Meadows White.*) Are there any statistics preserved in the Bombay Presidency Public Department of Vaccination?—Yes, they are published every year; they are now published conjointly with the sanitary report. Formerly, when I was at the head of the department, it was a separate report.

1284. What form do the statistics take; do they show the average number of deaths to attacks?—I think they are only statistics as to the number vaccinated and the number that die of small-pox. There are no returns, I think, which would show the number of attacks of small-pox.

1285. (*Mr. Bradlaugh.*) There are some returns with reference to vaccination, are there not, embodied and issued each year in the book on the Material and Physical Progress of India?—Yes.

1286. Are they made up from more detailed returns?—Yes, they are made up from individual reports.

1287. (*Mr. Meadows White.*) In case the Chairman or the other members of the Commission should think it worth while to get those returns, I should like to know from you whether they are published in any useful form?—I do not think they are. You can get the number of deaths from small-pox and the number of vaccinations, but I am quite certain that you could not get the number of attacks of small-pox.

1288. (*Chairman.*) You could not see, therefore, what proportion the deaths bore to the attacks?—No. I give you my opinion simply from my own observation.

1289. (*Mr. Meadows White.*) You could get the percentage of deaths from small-pox before and after the different arrangements as to vaccination?—Our village returns are very imperfect, and I do not think that you could rely upon them up to within the last 26 years. Previously to that time the village registers, in regard to deaths, would be utterly useless.

1290. Have you in your experience come across any ill-effects from vaccination?—Nothing beyond sores following, perhaps, the vesicle being broken.

1291. No constitutional effects?—No, none. You refer to syphilis, I imagine.

1292. Syphilis or erysipelas, or any other disease?—I have heard of one case of erysipelas following vaccination.

1293–4. And your experience has been very wide in India?—Yes, I have had a very large experience there.

1295. (*Sir Guyer Hunter.*) Did you ever see a case of syphilis as the result of vaccination?—No, never, and we take a great deal of pains to ascertain.

1296. There was a question, was there not, in reference to some prominent native official whose child was said to have suffered from syphilis as the effect of vaccination; do you know anything about that case?—Yes, that was inquired into when I was at home in 1871–73, by Dr. Turnbull, who was acting superintendent general for me. The result of that inquiry was that one vaccinifer supplied the lymph to vaccinate 17 children. Dr. Turnbull, by order of the Government, made an investigation, and he saw the vaccinifer some two or three months after the vaccination, and it was perfectly free of syphilis, and the father and mother were perfectly free of syphilis; and he saw 13 of the vaccinated children besides the one you speak of; that is, 14 out of 17 were known, and none of the 13 showed any signs of syphilis.

1297. (*Mr. Picton.*) Will you oblige me with a little more information as to the existence of compulsory vaccination in India; in Bombay, for instance, is it only in the city of Bombay that vaccination is compulsory?—The city. The city, I should say, means the island of Bombay.

1298. But the Presidency of Bombay is not under compulsory vaccination?—No, except Karachi; Karachi and Bombay are the only two places in which vaccination is compulsory.

1299. Can you tell us whether there is a compulsory law in any other part of India?—I am not quite certain. In the year 1879 the Government of India sent me a draft Act to revise for some place on the other side of India, but where it was I cannot remember; and I think that Act was carried out, but I forget whether it was in Calcutta, or Simla, or where it was.

1300. I gather that in Scinde vaccination has been successful in almost abolishing small-pox?—Yes, it has.

1301 Without compulsion?—Without compulsion. Karachi is in Scinde, you know, and there is compulsion there.

1302. But that does not extend very far?—No; it has a population of about 80,000.

1303. Vaccination began as far back as 1848 in Scinde, did it not?—Yes. It began in Bombay in 1802.

1304. Was it continually increasing from that time?—Yes, I think so gradually. For many years the Government did not do more than just protect their own stations.

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1305. But still it had been extending since 1802?—Yes.

1306. And when was the compulsory law passed in the city of Bombay?—I think it was about the year 1875; it was after the epidemic of 1872.

1307. But in Bombay the voluntary vaccination was apparently not so successful in putting down small-pox?—No, it is much more difficult to put it down in a populous city. Bombay has a population of 800,000, I think, now, and it is almost impossible to get at the people.

1308. Then do you think that vaccination was more completely carried out, even in the lower parts of the province, than in the city?—Undoubtedly; very much more completely.

1309. You told us, I think, that there were 30 vaccinators in Scinde?—I think that is the number.

1310. Can you tell us what is the population?—It is rather over two millions now. In 1863 it was estimated at about a million and a half.

1311. You told us that in Scinde vaccination was begun as far back as 1848, but that it was not pushed until after the year 1857. Can you give us any means of comparing the number vaccinated between the years 1848 and 1857, and after 1857, when you say that the practice of vaccination was more pushed than it had been? Are you aware of any tables which show the extent to which vaccination was pushed?—You will find it in the Bombay annual reports. Previously to 1857 there were only a few thousands vaccinated every year, perhaps not so many even as that. After 1857 I am afraid to trust my memory as to the number, but the book which you have before you will show it.

1312. Was small-pox continually recurrent in the 10 years from 1848 to 1857?—I cannot say positively. At that time there was a good deal of inoculation, but I think small-pox was probably never absent from Scinde during those years.

1313. Were there any sanitary measures other than vaccination taken during those 10 years?—No.

1314. Were there no sanitary reforms introduced?—Not that I know of; I think not.

1315. You mentioned to the Commission a village in Hyderabad which was visited by the vaccinator, and you told us, I think, that every Mussulman child was vaccinated, but that a good many of the Hindus escaped from it. I should like to be sure of what you said as to this. I understood you to say that when an epidemic followed six months afterwards every one of the Hindu children took the disease?—The unvaccinated Hindu children took it.

1316. Every one of them?—Every one, not one single one escaped.

1317. Was that ascertained?—That was ascertained absolutely.

1318. By census?—No, not by census; I ascertained it through my vaccinators. No census would show that; but that was absolute; I got it officially.

1319. (*Sir Edwin Galsworthy.*) Can you tell the Commission how many took it?—I am sorry to say that I cannot give you the number. I was looking at my papers to try and find it, but I cannot do so.

1320. (*Mr. Picton.*) Was not that a very extraordinary occurrence?—It would be now, but I do not think it was then.

1321. And not one of the Mussulman children took the disease?—Not one of them; they were all vaccinated.

1322. Is not that an extraordinary occurrence that not one vaccinated child should take it?—I did not consider it very extraordinary. The villages in Scinde are almost entirely formed of reed huts, and the people live virtually in the open air, so that their sanitary arrangements, though they are just as nature made them, are very good. I do not think it was very extraordinary that the vaccinated Mussulmans escaped, because, as I have already stated, what with their living in the open air and the vaccination together, they were under the very best circumstances.

1323. (*Professor Michael Foster.*) Were the two populations mixed at all, or were they living entirely separate?—I am not certain about that, but I think probably they were living a little apart, probably one on one side of the town and the other on the other side of the town.

1324. (*Chairman.*) Can you tell us how long it was after the vaccination that this epidemic appeared in that village?—I think it was six or eight months.

1325. (*Sir James Paget.*) I suppose, although the Mussulmans and Hindus were living apart, there was frequent communication between them?—The probabilities are that the ones were on one side of the street and the others on the other side.

1326. But they would mingle in the middle of the street?—Yes.

1327. And, therefore, there would be plenty of opportunities for infection?—Yes.

1328. (*Mr. Picton.*) You have told us that in the Bombay army there were 15 deaths from small-pox in the 10 years 1859-1869; was the proportion of deaths to the number of cases of disease 25 per cent.?—I do not know positively; we have no return, so far as I know, of attacks; but my own impression, if you care to have it in the matter, is this: that there are always some men coming into the army who say they are protected and have had small-pox, and perhaps have a scar which they say is a small-pox scar, and escape being vaccinated; and those are the men who give us small-pox in the army, and those are the men who die of it.

1329. But the 15 deaths would mean from 60 to 100 cases of disease, would it not, taking the deaths at 25 per cent. of the attacks?—Yes, 60 cases.

1330. But you think it was not so great a proportion of deaths?—I think it would be greater, for this reason: that the army is almost entirely protected.

1331. Would that make the per-centage of deaths to cases higher?—Undoubtedly it would.

1332. (*Chairman.*) You might have cent. per cent.; you might have had no other cases but the 15 men who died?—Yes. The 15 men who died might be the 15 who were unprotected.

1333. (*Mr. Picton.*) Still the effect would be the same, that apparently the vaccination would make the small-pox more fatal. If there were only 15 cases of small-pox and the whole of the 15 died that is 100 per cent. of deaths?—Supposing that there were 35,000 men in the Bombay army, and we had 15 men who were absolutely unprotected either by small-pox or by vaccination, and that those 15 men get small-pox and die, how can that increase the number of deaths from vaccination?

1334. But you do not give us that as a statement of fact?—Yes, I do; the 15 are an absolute fact.

1335. But you do not mean that there were no more cases of disease than those?—I cannot say. We have no returns of attacks so far as I know. There would be returns of attacks in the army, but I never saw them.

1336. I suppose the army is under special sanitary regulations, is it not?—Yes, under very careful regulations.

1337. Better than those affecting the outside population?—Much better regulations than the population here.

1338. Do you think that that would have any effect in reducing the number of small-pox cases?—I suppose all sanitary precautions are more or less good, both for small-pox and everything else, but, so far as my knowledge goes, sanitation and social comfort, and everything that you can imagine to be good for man's health, has not the slightest effect in diminishing the proportion of deaths from small-pox to attacks. That is my opinion formed after many years' connexion with the matter. It is the one disease which seems to me to be absolutely untouched in regard to benefit from sanitation.

1339. (*Dr. Collins.*) Do I correctly understand that you are convinced that small-pox is progressively declining in India?—In the Bombay Presidency undoubtedly it is; we have had no bad epidemics since 1872.

1340. Is it not a fact that in the Bombay Presidency there were 13,404 deaths from small-pox in 1883?—1883 I believe was the worst year we had, but 13,000 deaths is less than half, I think, of the number of deaths that we had in 1872.

1341. But I find in the four previous years—in 1879, 1,156 deaths; in 1880, 946; in 1881, 539; in 1882, 1,630; and then in 1883, 13,404?—That is an epidemic year. The explanation is perfectly easy. All the vaccinations in the districts of the Bombay Presidency,

except the towns of Bombay and Karachi, are voluntary. There is a constant residuum of unprotected children every year that we do not get at and never will get at. In the course of a few years those accumulate, and then small-pox comes as an epidemic.

1342. That is why I asked you whether it was progressively declining?—Undoubtedly it is in the Bombay Presidency. It has a jump every year.

1343. Then the decline is not progressive?—It is progressive if you take a long series of years.

1344. I think you told us that there were means for ascertaining the proportion of vaccinations in India and also the number of small-pox deaths with tolerable accuracy?—Yes.

1345. I believe that they are to be obtained in the reports on sanitary measures in India which are published annually and presented to both Houses of Parliament?—Yes.

1346. May I take it that the information which these blue books contain would be authoritative?—I think so; so far as I know they are.

1347. I have looked through several of them, and I find that the passage which I am about to quote is a tolerably constant one in the reports from the different provinces; I should like to know your view as to the statement it contains. It is at page 142 of the 13th Report on Sanitary Measures in India, 1879-1880, miscellaneous information. "The vaccination returns "throughout India show the same fact that the "number of vaccinations does not necessarily bear a "ratio to the small-pox deaths. Small-pox in India is "related to season and also to epidemic prevalence; it "is not a disease therefore that can be controlled by "vaccination in the sense that vaccination is a specific "against it. As an endemic and epidemic disease it "must be dealt with by sanitary measures, and if "those are neglected small-pox is certain to increase "during epidemic times." Might I take it that you would endorse that statement?—No, I would not at all.

1348. (*Professor Michael Foster.*) May I ask by whom that statement is made?—That is probably quoted from some superintendent's report. There are some parts of that that I should say are correct enough; for instance, that part which speaks of the seasonable activity of small-pox.

1349. Who is responsible for that?—The Army Commission.

1350. (*Chairman.*) Who is the Army Commission?—I believe Dr. Sutherland for some years has been the Army Commission. It was recently abolished, but he was one of the chief persons in the Commission for years back.

1351. (*Dr. Bristowe.*) Is that report supposed to be drawn up by a medical man or by some layman?—It is drawn up I think in that year by Dr. Sutherland, and Dr. Frankland I think was the secretary. You will find the secretary's name at the end of the book I think.

1352. (*Dr. Collins.*) I find no name?—I thought the secretary's name was given at the end.

(*Mr. Bradlaugh.*) I think as a matter of fact these are abridgments from more detailed reports, and the names are not given.

1353. (*Dr. Collins.*) In order to show that the quotation which I have read was no exception I should like to ask your attention to this extract from the report of the Army Commission of the Punjab for 1879. There again (at page 186) it is stated, "Vaccination in the "Punjab as elsewhere in India has no power apparently "over the course of an epidemic. It may modify it and "diminish the number of fatal cases, but the whole "Indian experience points in one direction, and this is "that the severity of a small-pox epidemic is more "closely connected with sanitary defects which intensify "the activity of other epidemic diseases than is usually "imagined, and that to the general sanitary improvement of towns and villages must we look for the "mitigation of small-pox as of cholera and fever." I particularly wished to ask you whether those reports could be relied upon as authoritative, because apparently there is a strong diversity of opinion in the reports of this Commission from what you have told us to-day?—That is the opinion of some one, of whom I do not know, probably the sanitary commissioner of the Punjab.

1354. Then again in the report for the Central Provinces on page 206 I find this: "The past comparative "immunity of the population had been attributed to "efficient vaccination, and the people had accepted "this protection, but their confidence had been shaken "by the re-appearance of a severe form of this disease. "The sanitary commissioner states that he directed a "special report on the subject to be made with the "following result: During the early part of the year "there had been a good deal of chicken-pock in Sambulpur town; that when small-pox broke out later "on it attacked those who had been inoculated, vaccinated, and had previously had small-pox or chicken-pock; 301 persons who had been inoculated took the "disease; that 577 vaccinated persons were attacked "and 729 unprotected persons, or 1,607 in all." Could you give us any information with regard to that?—No, I cannot; I do not know anything about it.

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1355. You have given the Commission some information with regard to the Bombay army; I suppose the European army has the same advantages as regards vaccination as the native army?—It has more. I do not know that it had then, but at all events it has now, because every man who is admitted into the army is vaccinated again whether he has had small-pox or whether he has been vaccinated. I think that is the case in the British army.

1356. Will you tell me whether this statement on page 3 of the report for 1883-84 refers to the European or to the native troops? It says: "There was a "greater prevalence of small-pox than usual in the "Bengal army. The total cases numbered 105 against "44 in 1882, and 9 deaths against 4. The increase "mainly occurred in the Bengal group of stations, "where 86 cases were admitted into hospital, the "largest number of any year since 1870, and seven "deaths equal to a ratio of 0·21 per thousand of "strength"?—You might read the sequence to that: "The Madras and Bombay armies recorded one death "each." So far as I know, vaccination is not compulsory in the Bengal army. In Bombay it virtually is and has been compulsory for many years; I think probably for 30 years. I do not think that it has ever been compulsory in the Bengal army.

1357. (*Sir James Paget.*) And that is the part of the army in which the deaths occurred?—Yes, that is so. This paragraph, after giving these details in the Bengal army, finishes by saying: "The Madras and Bombay "armies recorded one death each."

1358. (*Dr. Collins.*) Might I repeat the question that I asked: Do these figures relate to the native or to the European army?—They relate to the native army, I think. The Bengal army means the native army usually.

1359. If you turn over the page you will see that it is headed, "European army, India"?—Yes, it is the European army.

1360. Are we to understand that that army was or was not vaccinated?—I think it must have been vaccinated.

1361. And re-vaccinated?—I think so, but I am not certain about Bengal, I am only certain about Bombay.

1362. (*Mr. Picton.*) But is it not the case with our English army that the men are always vaccinated?—I think so.

1363. (*Dr. Collins.*) I think you told the Commission that the original source of the heifer lymph was from M. Warlomont; that, I believe, was obtained from a case of spontaneous cow-pox, so called?—I believe it was, but I cannot, of course, say anything for certain about that.

1364. Have there not been experiments in India with a view to inoculate small-pox upon the cow?—Yes, I made them myself.

1365. Will you give us the results of those experiments?—I could not succeed. I tried it in conjunction with Dr. Charles, a man of some distinction in Bengal, who was superintendent-general of vaccination in Calcutta, and we failed; and it was tried in Bombay and failed there also.

1366. (*Professor Michael Foster.*) How many experiments did you make?—In Calcutta we made only two experiments. I was only there on a visit for 14 days. In Bombay I could not say how many times it was done, but it was done to my knowledge probably a dozen times.

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1367. Without success? — Without success. I am speaking of small-pox inoculation.

1368. (*Sir James Paget.*) Was it not tried more than 12 times?—I cannot say how many times it may have been done, but I am not aware of more than 12.

1369. (*Dr. Collins.*) Are you aware of any successful inoculations of the cow with small-pox in India?—I have heard and read of them, but I am personally unacquainted with them.

1370. May we or may we not take it that your impression of the nature of vaccinia is that it is small-pox of the cow?—Does your question mean, do I think that vaccinia and small-pox are the same poison?

1371. Precisely?—That is a point upon which I have never been able to come to a definite conclusion. I think it is a very doubtful point. It is a subject that I have given great attention to, but I am quite unable to say.

1372. Have you ever heard it suggested in India that leprosy has been in-vaccinated; have you ever come across any evidence which would lead you to think that such had been the case?—I have, of course, heard the rumour as a possibility, but I know of no evidence of it.

1373. Is leprosy increasing in India at the present time?—They say so, but I am not personally able to say of my own knowledge that it is so. It is undoubtedly increasing in our cities, because the lepers come in there on account of its being easier for them to get a livelihood there than elsewhere.

1374. Have you any evidence that leprosy itself is inoculable or contagious?—No, but I believe it is so.

1375. Both inoculable and contagious?—It is communicated, I believe, from one person to another sometimes, but I have no experience with regard to that; it is a mere matter of opinion on my mind. I know, for instance, a case which occurred very recently of a brigadier-general who became leprous; but how it was communicated of course I do not know.

1376. Perhaps you are aware that cases have been reported by Dr. Gairdner and others in which it was presumed that leprosy was introduced by vaccination?—I have heard of that in the Punjab.

1377. I am afraid I must ask your attention to one more passage in one of the reports on sanitary measures in India, which is of recent years, up to June 1886, volume xviii, page 203, referring to the sanitary measures of the North-West Provinces and Oudh: "The "facts already stated show conclusively that the small-"pox of 1884 was one of the most severe epidemics on "record, and by far the most severe in these provinces "since deaths were registered. We are thus brought "face to face with the fact that notwithstanding the "existence of an active vaccination service, small-pox "swept over the provinces just as if there had been none. "No doubt attacks and deaths have been prevented by "the service, but it is clear that it has been incompetent "to deal with the disease in its epidemic form, as the "following list of vaccination officials will show." Then a list of the officials is given, the total number of the staff being 785; and then the report proceeds thus: "As a matter of fact, the total vaccinations at all "ages performed by this staff amounted to less than "three times the number of deaths, and the operations "under one year of age were not one and a half times "the total deaths. These remarks are not intended to call "into question the utility of vaccination. But in pre-"sence of the facts the question is a perfectly relevant "one, namely, whether dependence can henceforth be "placed on vaccination as a protection against a small-"pox epidemic? The question of course answers itself. "In ordinary years lives are no doubt saved and lower "small-pox death rates may be co-existent with nume-"rous operations. But this and similar experience "appears to show that the remedies, if such be avail-"able, will have to be extended beyond vaccination, "and will have to deal with epidemic causes affecting "localities and their inhabitants. If sanitary work be "neglected no more dependence against small-pox "epidemics can be placed on vaccination than can be "placed on quarantine against invasions of cholera. "The true remedies lie elsewhere altogether." With these reports coming from such diverse parts of India insisting that although vaccination has largely prevailed small-pox has also prevailed epidemically, and that imperfect sanitary conditions likewise prevailed wherever small-pox was epidemi , would you be quite so confident in your assertion that vaccination alone and not sanitary measures are in some degree influential as regards small-pox outbreaks?—As I have already stated sanitation must of course be good for human beings under all circumstances; but my opinion is undoubtedly a fixed one, that sanitation has less influence upon small-pox deaths than it has upon any other zymotic disease, far less, infinitely less; in fact, so little has it that I doubt very much whether it has any, because, speaking from my experience in Scinde, where the people were living in the open air, and where you could not have better air, you had a village attacked and a very considerable number of deaths among the unprotected and no deaths among the protected at all.

1378. Can you offer any explanation as to why your evidence is so entirely contradicted by the Commissioner?—Yes, I think I could. That is written by the Sanitary Commissioner; and if you had studied as many sanitary reports as I have you would come to the conclusion that sanitation is one of the things that has been very much pressed of late years in India, and every man in the department, so far as I can see, thinks that there is nothing but sanitation, that sanitation is the panacea for everything.

1379. Then apparently you would not wish the Commission to believe that the statements contained in these blue books are so authoritative as you informed me in the first instance they were?—Yes, I do. They are opinions whatever value you choose to attach to them. The last thing that you read I attach not the slightest value to, it is an opinion which some man has evolved out of his own inner consciousness, but he must not expect other people to go with him who probably know as much about it or more than he did, whoever he was. You must not take the statements in these blue books as matters of fact altogether; many of them are simply matters of opinion.

1380. There seems to be an ample supply of figures to corroborate the facts?—If you will allow me I will give you a very clear and definite explanation of it. The North-West Provinces have been very well vaccinated for many years, but it is wholly voluntary; there is no compulsion; and there is a very large residuum of unprotected children, and that residuum year after year accumulates, and perhaps in the course of half-a-dozen years you get an epidemic of small-pox that wipes out that residuum, and the next year you have no small-pox, and the next year you have a few cases. It is a cycle.

1381. Did I correctly understand you to say that small-pox had been practically abolished in Scinde where vaccination is voluntary?—I would not say that it has been abolished, but very nearly so. I do not believe that you can ever abolish small-pox in India without compulsory vaccination. In the districts of Scinde vaccination is not compulsory, but it is only compulsory in the capital, Karachi.

1382. Is there any province that gives better results than Scinde?—I do not think there is any. So far as I know I believe Scinde gives the best results in all India.

1383. (*Mr. Bradlaugh.*) Shall I be right in assuming that Surgeon-General Dr. B. Simpson was responsible for the report out of which the extract that was read by Dr. Collins came?—I am afraid I cannot say; I should think that is probable, but I could not say.

1384. I understood you, in answer to Dr. Collins, to say that you had very naturally studied these sanitary reports a great deal?—So I have, but not in the last few years. I have been out of the sanitary department for a good many years, almost 13 years.

1385. Is Surgeon-General Dr. B. Simpson a gentleman of eminence?—Yes, I think he is. He is the Sanitary Commissioner of the Government of India.

1386. When you were in Scinde was it your duty to make any reports of a medical nature to anyone on behalf of the Government?—Yes, I wrote an annual report to the Surgeon-General.

1387. Shall I be right in assuming that since 1857 such a report with others of a similar nature would be utilised for the report on the Material Progress and Position of India in each year?—Yes, I think so. The Army Sanitary Commission did not begin, if I remember rightly, till about 1860, so that you would have no reports from it previous to that time.

1388. Would the matter as to the vaccination in Scinde, of which you have told the Commission, have

been reported by you?—Yes; I wrote an annual report every year.

1389. Do you remember reporting in 1867 or 1868 as to the case at Hyderabad?—Yes, I remember reporting it.

1390. Do you happen to know whether that report appeared in print afterwards?—I do not think it did. I have got my reports here; I found them among my papers in Glasgow. I cannot find that it was printed, and my belief in regard to that is that the reports as written were not printed *in extenso*. The Surgeon-General up to 1868 compiled a report of his own, and only put extracts of the superintendents' reports in, so that when I looked for it the other day in the printed reports I could not find it.

1391. This would be about as special a case as has come to your notice, would it not?—Yes, the most special.

1392. And in searching to refresh your memory before coming here you did not find it in any of the official reports?—No, I could not find it.

1393. Do you happen to have kept duplicates of your reports?—No, I have not.

1394. Nor do you, I suppose, happen to know where such reports would be preserved if they are not preserved in print?—I think they would probably be in my office in Bombay.

1395. I think you are going back?—Yes, I am going back this evening.

1396. Would it be troubling you too much to ask you to try and ascertain whether that actual report exists, and, if so, kindly to furnish so much of it as relates to the vaccination of the Mussulman children in Hyderabad and the non-vaccination of the Hindus, and the result of the epidemic attack some six or eight months later. I presume that it would come in either the 1867 or the 1868 report?—I think it was about that time.

1397. At any rate you will kindly search for it, and if you find it you will furnish it?—Yes. (*See Appendix I., page* 230.)

1398. Perhaps if you do not find it you will kindly let us know the result of your search?—Yes.

1399. I think I gathered that except as to Karachi and Bombay the sphere of your duties has not been such as to supply you with the knowledge whether there was actually other compulsory legislation as to vaccination in force in India?—I think there is one place somewhere on the Bengal side, but I cannot call to memory where it is.

1400. You have told us that you have not paid special attention to the sanitary reports during the last few year, and, therefore, you are not aware, I presume, that there is a compulsory Act, which has been in force in Bengal, applicable to different towns under some conditions as to which my memory does not serve me, but, I think, of application from the municipalities?—Yes; I think there is something of that kind, and it is published in the Government Gazette. That is the Act that I spoke of, that I was consulted about in the year 1879.

1401. Vaccination in Scinde at the time you were concerned with it was purely voluntary, and you had then, I think, only a small number of vaccinators?—I had 13 at first; the number was increased afterwards.

1402. Sometime afterwards?—Yes.

1403. For a long time a large proportion of the Hindus I take it escaped vaccination simply because of the limited means of carrying it out?—Yes, that must have been the case. Originally there were, I think, only three or four vaccinators.

1404. Could you tell me how long there were only three or four?—No, I could not say. In 1857 there were 11, I think, but I could not say positively.

1405. Still, until some period after 1863, the mere paucity in the number of vaccinators involved there being a large number of children who were not vaccinated?—They were not vaccinated immediately under one year old, but, probably, the great bulk of them after 1863 were vaccinated at some time or other. The way we did was this: A vaccinator went to a village and probably vaccinated the whole of the village in one day. The villages are, many of them, very small.

1406. Do you use the word "Scinde" as implying a Government district or as a geographical description?—The Province of Scinde.

1407. Would 2,000,000 be the population of that province?—It is over 2,000,000 now, but in 1863, I think, the estimate was about one million and a half.

1408. So far as you remember are there any of these annual medical reports which were printed as to Scinde which state the facts which you have been good enough to communicate to the Commission to-day?—I do not think that they would contain the whole of them. Those reports chiefly dealt with the number vaccinated, the race, and the caste, age, and sex.

1409. But there has been very special notice taken, has there not, both in this report on sanitary measures and in the special statement as to the material and social condition of India each year as to vaccination?—Yes; it is mentioned each year.

1410. Both as to each of the presidencies and each of the provinces?—I think it would probably speak of Bombay and Madras and the Lower and Upper Provinces of Bengal.

1411. I do not want to mislead you by putting a question with something else before me, but if you will look at the report for 1887 you will find that it is fuller than that?—This is first general remarks on vaccination; then Bengal, Bombay, Madras, and so on. I do not think it goes into anything about the districts. Each of those are Governments.

1412. But were there not reports from each of the presidencies and each of the provinces, and did not the question of vaccination and of the progress or otherwise of small-pox form a special feature not only in those reports on sanitary measures but also in the other reports on the material, physical, and social progress of India certainly since 1873, I mean in the reports from the local governments to the Government of India, and from the Government of India to Parliament?—Yes, it is mentioned in all these reports, but how particular it is I cannot say. I do not think it is very particular; I think the remarks are general.

1413. The bearing of my question rather was whether it had not been the habit to collect special facts bearing upon the effect of vaccination in reducing small-pox or otherwise?—In so far as the total number of vaccinated and the total number of deaths by small-pox go those facts are published; but in regard to attacks I do not think that there is any information published.

1414. Then you do not think that there is any report, so far as you remember, in which the fact that the vaccinated children escaped, and the non-vaccinated children were attacked, in the village in Hyderabad, would appear?—No, I do not think there is. I could not find any at all events.

1415. (*Dr. Collins.*) I find a specific statement here in the report for 1884 with regard to Bombay on page 11: "Small-pox accounted for 14,438 deaths, or 0·88 " per thousand of population, against 13,404, or 0·81 in " 1883. In spite of the effective vaccination service " which Bombay has had for some years, small-pox " appears to be on the increase, as is shown by the " fact that the mortality in 1884 was more than four " times as great as the average of the five preceding " years, namely, 0·21. Of the total deaths 3,723 were " registered as under one year of age, and 5,413 " between the ages of 1 and 12, about two thirds of " the mortality having thus taken place among young " children." May I take it that that is accurate?—I should think that is quite accurate.

1416. Could you tell us how far the Act of 1875 or 1876 has secured the vaccination of young children in Bombay city?—I think nearly everybody is vaccinated now in Bombay city.

1417. And in the province?—There is a large margin in the province not vaccinated, and there always will be.

1418. Do you notice any great difference as regards the per-centage of small-pox deaths under five years of age to the total deaths in the city of Bombay and in the province at large?—I could not speak positively about that; I am unable to answer that question.

1419. I see it states here that of the total deaths (in the province, I presume) 3,723 were registered as under one year of age, and 5,413 between the ages of one and twelve, about two thirds of the mortality having thus taken place among young children; can you tell us

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whether that state of things uniformly obtains throughout the province?—Yes, I think it does, because there are always a number of young children who are unprotected. It is unusual, I think, to vaccinate a child except in Bombay and Karachi outside the districts under six months of age. I think the great majority of the infants are vaccinated over six months of age. Those under one year are usually over six months, I think.

1420. (*Dr. Bristowe.*) And a good many are vaccinated later?—Yes, a great many.

1421. (*Chairman.*) I find in some of these reports that a great number were not vaccinated until after they were one year old?—The vast majority are over two years old, I should think.

1422. (*Dr. Collins.*) Do you find that small-pox in India is becoming less an infantile disease than it was?—I should think it is; but we have no figures of attacks.

1423. But as regards mortality?—As regards mortality I think it is so.

1424. That fact has not been borne in very definitely upon your mind?—It has not. You cannot get very definite information upon that subject very far back; certainly not more than 30 years.

1425. Is there any great difference between the city of Bombay and the province of Bombay as regards the mortality affecting children?—I think there are fewer in Bombay, but I could not give you any precise figures. But the age matter is not a very safe thing to go by, because the ages are not given very correctly. You must take them with a considerable amount of reservation.

1426. (*Chairman.*) What was the date of the report of the Army Sanitary Commission in the North-West Provinces that you referred to?—1884.

1427. In that report I find this statement: "It is not "difficult to see where the defects of the vaccination "are to be found, and where a remedy is to be applied "so far as it might by itself lessen liability to small-"pox; and this lies in directing the work of the service "as much as possible to the protection of infants under "the first year of life, when small-pox is most fatal and "when the protection once secured passes onwards to "after life." So that I gather from that that vaccination very often at all events took place after one year of age?—Yes.

The witness withdrew.

Mr. Arthur F. Hopkirk, M.D.

Mr. ARTHUR F. HOPKIRK, M.D. (Jena), examined.

1428. (*Chairman.*) You are, I believe, a doctor of medicine of the University of Jena?—Yes.

1429. Have you given considerable attention to the statistics relating to small-pox and vaccination in foreign countries, and especially in Germany?—I have, but only recently since I returned to England, because I found that in Germany there was very little opposition to vaccination at all. There the opposition has, practically speaking, died out.

1430. But I understand that you are prepared to give us information from your researches with reference to the statistics of small-pox and vaccination in Prussia, and the changes that have been made in the law relating to it?—I am. These statistics are taken from official sources.

1431. Will you give us that information first with regard to Prussia?—With regard to Prussia, the chief paper on the subject is by Dr. Guttstadt in the Zeitschrift des Königlichen Preussischen Statistischen Bureaus for 1873, which is a complete report, not only on the epidemic of 1870-71, but also upon all the epidemics from the end of the last century and the commencement of this; going in fact, into all the epidemics that there have been down to the end of 1872.

1432. From that report have you extracted some figures?—Yes. Dr. Guttstadt shows that where formerly at least one twelfth of mankind died from small-pox, now-a-days the mortality has been reduced to an almost incalculable fraction; practically speaking it is nothing, although, of course, in 1870 and 1871 it was very high as a natural consequence of the bad vaccination in Prussia ever since 1866. There had been a moderate amount before.

1433. Can you tell us what the changes in the vaccination laws have been in Prussia?—Yes, certainly. That is a point upon which there has been a good deal of misunderstanding in England. In 1834 a law was passed making vaccination and re-vaccination compulsory for all soldiers in the Prussian army; but there was no law making vaccination itself compulsory for the civil population of Prussia until the 8th of April 1874, a law which came into action in 1875. In 1835 there was in Prussia an ordinance passed dealing with cases of infectious diseases, which declared that should any child suffer from small-pox then, if it had not been vaccinated, its parents or guardians might be punished; but there was no law rendering it absolutely compulsory that every child should be vaccinated.

1434. It was this sort of indirect compulsion, that the parents might suffer if an unvaccinated child got small-pox?—Yes, and every German authority at the present day states that there was no real compulsion until 1874. I myself communicated with Geheimrath Koch, of the German Health Office, and he tells me that I was right in that statement, and so does my old master, Professor Fürbringer, of Berlin.

1435. (*Professor Michael Foster.*) The ordinance that you speak of was as early as 1835?—Yes.

1436. (*Chairman.*) Can you give us any information as to the extent to which vaccination prevailed during the time of that ordinance and before vaccination became compulsory?—I have a few figures, but the prevalence of vaccination varied very much indeed, because at certain periods there was a great deal of opposition, and there was also a great deal of difference in the quality of the vaccination; it is only quite recently that they have had good vaccination in Prussia. I will hand in a table and a diagram showing the mortality from small-pox in Berlin from 1758 to 1872; the diagram also shows the small-pox mortality in the Kingdoms of Prussia and Sweden from 1775 to 1871, and, for purposes of comparison, the total mortality and the mortality from cholera in Berlin and the Kingdoms of Prussia and Sweden. (*The table and diagram were handed in. See Appendix II., Table A: page* 231.) Another table which I hand in shows the proportion of vaccinations to births from 1860 to 1871 for the town of Berlin. (*See Appendix II., Table B: page* 232.) For the whole of Prussia there are no accurate statistics.

1437. This shows in the year 1860 the proportion of vaccinations to births to be 58·90 per cent. of the children born?—Yes.

1438. In the year 1861, 50·92 per cent.?—Yes.

1439. In 1862, 53·53 per cent.?—Yes.

1440. In 1863, 67·49 per cent.?—Yes.

1441. I see these per-centages include the re-vaccinations?—No, the per-centage given is that of primary vaccinations to births.

1442. There were in 1860, 10,700 vaccinations and 277 re-vaccinations, the vaccinations and re-vaccinations being 58·90 per cent. of the birth rate?—Yes.

1443. Then in 1861 there were 10,500 odd vaccinations and 963 re-vaccinations, being 50·92 per cent. of the birth rate; in 1862 there were 11,000 odd vaccinations and 536 re-vaccinations, the total being 53·53 per cent. of the birth rate; in 1863 there were 15,000 odd vaccinations and 2,000 odd re-vaccinations, the total being 67·49 per cent. of the birth rate. Then in 1864 there were 25,000 odd vaccinations and 22,000 odd re-vaccinations, being 102·12 per cent.; was that a year of epidemic?—Yes. Dr. Guttstadt in his paper explains that there was a general rush for re-vaccination then, and the medical officers who carried out the vaccination not being very skilled in performing the operation naturally it was not so well done as it should have been.

1444. Then that would show that in that year, 1864, there were more children vaccinated than there were born; that is to say, there would be included some of the unvaccinated children of previous years?—Yes.

1445. The births in 1864 were 24,000 and the vaccinations 25,000, so that it represents 102 per cent. of the birth rate?—Yes.

1446. Then the next year there were 9,000 odd vaccinations and 2,700 odd re-vaccinations, being only 36

per cent. of the birth rate?—Yes; 1865 was a year when the agitation against vaccination was in full swing.

1447. In 1866 there were 10,000 odd vaccinations and 1,000 odd re-vaccinations, being 37·90 per cent. of the birth rate; in 1867 there were 14,000 odd vaccinations and 1,000 re-vaccinations, being 52·64 per cent. of the birth rate; in 1868 there were 16,000 odd vaccinations and 1,000 odd re-vaccinations, being 56·87 per cent. of the birth rate; in 1869 there were 17,000 odd vaccinations and 1,000 odd re-vaccinations, being 57·65 per cent. of the birth rate; in 1870 there were 9,000 odd vaccinations and 4,000 odd re-vaccinations, being 29·29 per cent. of the birth rate; and in 1871 there were 37,206 vaccinations and 102,965 re-vaccinations?—Yes.

1448. That was more than the number of births, the number of births being 29,530?—Yes.

1449. That was a year of epidemic?—Yes, it was.

1450. That is for the city of Berlin?—For the city of Berlin alone.

1451. How far that would be typical of Prussia generally I suppose it is difficult to say?—It is very difficult indeed to say, because the laws of Prussia certainly at that time did make it necessary that children should be vaccinated on going to certain public schools, but then the school-masters took the word of the parents very frequently; if either the father or the mother, or even the pastor of the district, said that the child had been vaccinated that was taken as being quite sufficient and no further inquiry was made; it was not then as now-a-days, when every child on coming to school has to bring its vaccination certificate in its hand.

1452. When did that become law in Prussia?—In 1874.

1453. (*Professor Michael Foster.*) You said that became law in 1874; do you mean that in 1874 it became necessary to exhibit a certificate, or that in 1874 real compulsion began?—In 1874 both vaccination and re-vaccination were made compulsory.

1454. Was it not till 1874 that parents were expected to have their children vaccinated before going to school?—They were expected to have their children vaccinated before going to school, but I do not think there was any law before that compelling them to bring a certificate.

1455. 1874 was the date of the law to compel them to bring a certificate?—1874; the law did not come into action till 1875.

1456. But some time before that it was a regulation that children should be vaccinated before going to school?—Yes, as far as certain public institutions were concerned.

1457. Do you know when the regulation came into operation that children should be vaccinated before going to school?—No. It was certainly very early, but there was no real compulsion.

1458. Before 1836?—Quite as far back as that, 1835 or 1836, though no guarantee was demanded that the children had in reality been vaccinated, the word of the parents being given that the children had been vaccinated, it was considered enough.

1459. Still the regulation existed?—Yes; it was an indirect pressure, that was all.

1460. There was a printed regulation which ought to have been obeyed?—The printed law was only for schools where the children were educated for nothing; where the children paid there was no compulsion.

1461. In 1874 did the change in the law embrace private schools as well as public schools?—Yes.

1462. So that there was a definite change altogether?—Certainly. In 1874 re-vaccination was introduced, and every child of 12 had to produce a certificate, and children now have to stay at school in Germany till they are 14.

1463. (*Chairman.*) You have given us some statistics as regards vaccination in Berlin; have you any other statistics with regard to the death-rate from small-pox in Berlin?—Dr. Guttstadt shows that in the years 1766, 1770, 1786, and 1801 small-pox caused 23·19, 21·2, and 21·16 per cent. of all deaths. From 1802 to 1864, that is from the time of the first introduction of vaccination into Berlin, the mortality from small-pox remained very low, that is, comparatively speaking low, until the year 1864, when it reached the figure 3·43 per cent. of deaths from all causes. I have here a diagram showing the mortality from small-pox from the year 1816 to 1886 in Prussia. (*The diagram was handed in. See Appendix II., facing page* 232.)

1464. This goes down to 1886?—Yes, I have not been able to obtain any figures of a later date.

1465. What are the per-centages at the bottom of the diagram?—The mortality from small-pox per 100,000 living.

1466. I see since 1874 the highest in any one year has been 4 per 100,000?—In 1874 it was 9·52; in 1875, 3·60; in 1876, 3·14; in 1877, 0·34; in 1878, 0·71; in 1879, 1·26; in 1880, 2·60; in 1881, 3·62; in 1882, 3·64; in 1883, 4·00; in 1884, 1·5; in 1885, 1·4; and in 1886, 0·05?—Yes. The first portion of the diagram is copied from a report presented to the German Reichstag, and the last part I have taken from a recent publication, the Preussischen Statistischen Jahrbuch, which corresponds to our Registrar-General's Reports.

1467. An official report?—Yes. I now hand in another table showing that before the introduction of vaccination, small-pox was essentially a disease of early childhood; those individuals belonging to the later periods of life being protected by the attack from which they had recovered in their youth. (*See Appendix II., Table C: page* 232.) I copied these statistics from Lotz's "Pocken und Vaccination," because Lotz has taken the trouble to put all these matters together so very carefully, and then I verified them in the British Museum. I looked at the authority Lotz gave, and I found him perfectly accurate in all respects. He shows how high the mortality was amongst young children up to the age of 20 in the days before vaccination, while after the age of 20 there was scarcely anybody left to have small-pox. They had all had it; they had either died from it or been disfigured by it. Then I have another table, the figures in which I have taken from Lotz's "Pocken und Vaccination" (and which he has taken from Juncker), giving the statistics of the small-pox epidemic from December 1795 to the end of 1796 in the three towns of Rawicz, Bojanowo, and Sarnowo, all of which towns are in Posen. (*The table was handed in. See Appendix II., Table D: page* 233.) During the first year of life the average mortality was 35·9 per 100 cases of small-pox; in the second year of life, 29·0; in the third year, 19·6; in the fourth year, 16·6; in the fifth year, 13·4; in the sixth year, 12·6; in the seventh year, 12·7; in the eighth year, 5·3; in the ninth year, 9·6; in the tenth year, 10·8; and after that Juncker gives no cases of small-pox. In fact, in the whole of his three volumes I have found very few cases of small-pox amongst old people. The note to the table shows the careful way in which Juncker drew up his tables.

1468. Have you any other statistics with reference either to Berlin or Prussia to put before the Commission?—I have some statistics of the town of Chemnitz. I believe they are considered to be a model of all statistics. This is a table for the town of Chemnitz in Saxony drawn up by Dr. Max Flinzer, showing the mortality amongst the vaccinated and unvaccinated in the epidemic of 1871, and also giving the number of cases. (*The table was handed in. See Appendix II., Table E: page* 234.) Dr. Max Flinzer went very carefully through the whole town; he gives the number of houses in each street, the number of inhabitants in each house, and the number of households (because, of course, generally in Germany people live in flats, so many families in each house), the number of cases of small-pox in each house, and the number of persons who were vaccinated or unvaccinated; and finally he draws certain conclusions from the whole.

1469. (*Dr. Collins.*) Are the ages given?—Yes, showing that under 10 years not a single vaccinated child died, but that of the unvaccinated a good many. Of the 64,255 inhabitants of Chemnitz in 1870–71, 53,891, or 83·87 per cent. were vaccinated; 5,712, or 8·89 per cent. were unvaccinated, and 4,652, or 7·24 per cent., had already had the small-pox. There were 3,596 cases, of those 249, or 6·92 died, amongst those were 117 boys, 17 male adults, 111 girls, and 11 female adults. All the children who died were unvaccinated, and of the adults three males and four females were vaccinated, the remainder being unvaccinated. Of the 249 deaths, 242 were thus unvaccinated, and only seven those of vaccinated persons, the former category contributing 97·19 and the latter 2·81 per cent. of the deaths. Separating the cases of small-pox amongst the vaccinated from those amongst the unvaccinated persons, we find that of 953 cases of small-pox amongst vaccinated individuals only 0·73

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per cent. died; but that of 2,643 unvaccinated, 9·16 per cent. died. Of the 224 cases of small-pox in the town hospital, 184 had been vaccinated, 37 were unvaccinated, and 3 were doubtful. None of the vaccinated died, but 11, or 29·7 per cent., of the unvaccinated succumbed to the disease. The table at the side shows the cases of vaccinated and unvaccinated, and whether the case was severe or not, in the majority of cases amongst the vaccinated one sees that the attack was varioloid and not of variola—none of the children under 10 died who were vaccinated—that was the same in Prussia. Dr. Guttstadt shows in his paper that it was only the unvaccinated children who died; so it was in the little epidemic in 1881.

1470. (*Chairman.*) It appears from a note at the bottom of the table that attention has been called to the relation which the cases of small-pox bear to the number of households containing none but vaccinated persons?—Yes; Dr. Max Schultz calls attention to that, he shows that there was one case of small-pox to every 255 households containing none but vaccinated persons, but one to every 26 households containing both vaccinated and unvaccinated persons.

1471. Have you any other statistics with regard to Prussia?—I have here a table showing a comparison between those statistics which I have handed in just now of the three towns in Posen and the epidemic in Leipzig in 1870–71. (*The table was handed in. See Appendix II., Table F: page* 236.) That is a table showing the mortality from small-pox in the three towns Rawicz, Bojanowo, and Sacruowo from December 1795 to the end of 1796, and a comparison between those and Leipzig in 1871. I hand in another table which gives a comparison between the mortality from small-pox in those same towns in the same year and the mortality from small-pox in Lower Franconia for 1866–67, also a year of epidemic, primary vaccination being compulsory in the latter instance. (*See Appendix II., Table G: page* 237.) The figures for Rawicz, Bojanowo, and Sarnowo are taken from Lotz. Lotz took them from Juncker. Those for Lower Franconia are taken from the Zeitschrift des König: Bayr: Stat. Bureau, Jahrgang, IV., 1872.

1472. That is an official document of Bavaria?—Yes. You see there that in 1795–96 (when there was no vaccination), during the first year of life in those three towns, the inhabitants of which numbered altogether 13,329, there were 39 cases and 14 deaths, or 35·9 per cent.; from the second to the tenth year there were 1,145 cases and 182 deaths, or 15·8 per cent.; and from the tenth to the twentieth year 68 cases and 3 deaths, or 4·4 per cent.; or a total up to 20 years of life of 1,252 cases and 199 deaths, a per-centage of 15·9 deaths to cases. On the other hand, for Lower Franconia, which has about 500,000 inhabitants, in the year 1866–67, when primary vaccination was compulsory in that province, there were 1,394 cases and only 143 deaths, or 10·3 per cent. as the per-centage of deaths to cases from the first to the sixtieth year. Calculating that per 100,000 living, you get in the pre-vaccination year for those three towns a death rate of 149·2 per 100,000, and for Lower Franconia with only primary vaccination but 28·6.

1473. That was at a time of epidemic?—Yes, in in each instance, the difference being between 149·2 and 28·6.

1474. Do you know at all at what age primary vaccination is compulsory in Franconia, or was at this time, 1866?—In 1864 there were alterations in the law, according to which it was finally determined that vaccination should be compulsory in the first year.

1475. So that the law would be complied with if the vaccination was at any time within the first year?—Yes.

1476. In this table which you have put in it appears that in Lower Franconia from the age of 0 to 1 year there were 75 cases and 26 deaths, and from 2 to 10 years there were 25 cases and no deaths?—Yes, as a rule they have invariably waited as long as possible, I mean towards the conclusion of the first year, before vaccination.

1477. From 10 to 20 years of age there were 110 cases and one death?—Yes.

1478. So that, practically speaking, the whole of the deaths took place under one year of age?—Yes.

1479. Of all those between 0 and 20 there was only one that did not take place during the first year?—Yes. I have also a few notes from other authorities on the prevalence of mortality from small-pox in previous times. Bernoulli, in his Populationstik, published in 1840, says: "Great as were the ravages which the "plague often caused in Europe, small-pox carried off "more victims in the last century than the former "disease did in any other. Certainly small-pox is not "so deadly as either the plague or cholera. Fully one "third of the cases among little children terminated "fatally, but altogether only one sixth to one eighth "of the total number of cases. On the other hand, "the disease had become an endemic contagion in "Europe, which nowhere completely died out, to which "nearly all individuals were susceptible, and from "which few escaped before even their 10th year. Of "100 adults only about four or five remained unattacked. "It was calculated that two thirds of all children born "were, sooner or later, attacked by small-pox, and that, "on an average, one twelfth ($\frac{2}{3} \times \frac{1}{8}$) of all children born "succumbed to it. In former times, too, there was "greater probability of an individual dying from small-"pox than from the plague. According to the London "lists of 1708 to 1750, 8 out of every 100 deaths were "caused by small-pox. In Berlin the small-pox mor-"tality from 1783 to 1797 was one twelfth of the total. "Those who were carried off by that disease were "naturally almost all children. But, besides these, "many who did not die were rendered sickly or de-"formed for life, and diseases of the eyes and blind-"ness often ensued from small-pox." Von Niemeyer, in his well-known text-book, states that "In the pre-"vious century one tenth of mankind died from the "small-pox, and another tenth was permanently dis-"figured by that disease; but since the introduction "of vaccination the mortality from small-pox has been "reduced to a minimum." Then, in Hirsch's work, "Handbuch der Historisch-geographischen Patholo-gie," published at Stuttgart, he says that small-pox in Mexico, when introduced in 1520 by the Spanish troops, is said to have caused three and a half million deaths; and there are various quotations given by Hirsch from English authorities relating to India (Cornish, Murray, &c.) which show that in Bombay and Bengal, with a population of about 40,000,000, about 140,000 deaths were caused by small-pox between 1866 and 1869, and that in the whole of India it caused 200,000 deaths in 1875–76, and 500,000 in the two previous years. Sir William Atkin also states, in his Treatise on Medicine, that in the bazaars in India of the people you meet who are blind, in 99 cases out of 100 the blindness has been caused by small-pox.

1480. You have some statistics, I believe, relating to small-pox and vaccination in Bavaria also?—Yes, I have a table which gives the deaths from 1857 to 1869–70. (*The table was handed in. See Appendix II., Table H: page* 237.)

1481. Before we go into those statistics will you tell us the state of the law in Bavaria with regard to vaccination?—Bavaria was one of the first countries to have vaccination officially recognised—I think in 1807—but only primary vaccination, and, as far as I know, primary vaccination was not insisted on till the children were three years of age.

1482. (*Professor Michael Foster.*) What do you mean by "officially recognised"?—Absolutely necessary.

1483. (*Chairman.*) In what year was it made compulsory?—1807.

1484. (*Sir James Paget.*) But a child might remain till it was three years old without being vaccinated?—I think it could remain unvaccinated until it was three years old. I believe in 1806 in the French army there was a vaccination law—that was about the first of all—it was one of the Great Napoleon's orders.

1485. (*Chairman.*) What does this table, which you have just put in, show?—It shows the variations in the mortality from the various mycotic diseases. I have another table which shows from 1857 to 1870 the deaths from small-pox, giving the average per 10,000 according to the different governmental districts of Bavaria. I have also a table showing the deaths from small-pox in the great epidemic of 1871 and 1872, classified according to age and sex. (*The tables were handed in. See Appendix II., Tables J and K: page* 238.)

1486. That is for Bavaria?—Yes. I have calculated out the per-centages from an official table which gives the population of Bavaria according to age and sex.

1487. This table, Table K, showing the deaths from small-pox in Bavaria in 1871 and 1872, shows that in 1871 in the first year of life the deaths were 743; between 2 and 5 years the deaths were 137; between 6 and 10 years

the deaths were 48; between 11 and 20 years the deaths were 172; between 20 and 30 years the deaths were 619; between 30 and 40 years the deaths were 706; between 40 and 50 years the deaths were 838; between 50 and 60 years the deaths were 905; between 60 and 70 years the deaths were 705; between 70 and 80 years they were 184; and over 80, 13?—Yes.

1488. Then in 1872, in the first year of life, the deaths were 520; between 2 and 5 years they were 67; between 6 and 10 years they were 24; between 11 and 20 years they go up again to 57; and between 21 and 30 years the deaths were 245?—Yes. The interesting point in this table is the diminution in the death rate between 6 and 10 years, because at six years of age every child is compelled to go to school, and on entering is bound to produce its vaccination certificate; between the ages of 6 and 10 the deaths were only 24.

1489. The first year was a time of compulsion?—Yes, the first year. This was before re-vaccination was introduced, so that the increase in the later periods of life was due to the fact that people had been protected in their youth, but had neglected to protect themselves later on. There were 30,742 cases of small-pox in Bavaria in 1871; 29,429, or 95·7 per cent., were those of vaccinated persons, and 1,313, or 4·3 per cent., were those of unvaccinated persons, a fact which the anti-vaccinationist press has brought forward as a proof of the uselessness of vaccination, but which is readily explained by the circumstance that nearly the entire Bavarian population of more than one year of age is vaccinated, because every child must be presented for vaccination during the first year of its life. If during so mighty an invasion of small-pox as that which crossed into and over Germany from France in the hard times of the war of 1871 only 0·68 per cent. of the entire Bavarian population suffered from the disease, then one is thoroughly justified in assuming that this population which was only so slightly attacked was afforded some special protection; and one may well ask, How would it have been with the Bavarian population if it had not possessed this protection?

1490. Have you any statistics to show that the Bavarian population suffered less than other populations?—Yes, I can hand in a diagram which gives statistics for the Netherlands and for Prussia, which are taken from Lotz's official work "Pocken und Vaccination." The diagram also relates to Sweden, Scotland, Bavaria, and Austria. Had Bavaria suffered at the same rate that Prussia or the Netherlands did, the Bavarian loss would have been ever so much greater. (*The diagram was handed in. See Appendix II., facing page* 238.)

1491. I see in this comparison the years do not altogether tally; there is some statistical reason for that probably?—The comparison is made between the years when the epidemic struck the respective countries. I have another diagram which shows the mortality for Bavaria and the Netherlands; for Bavaria from 1870 to 1875, and for the Netherlands from 1870 to 1873; the black shows the Netherlands and the brown Bavaria, the vaccinated country. (*The diagram was handed in. See Appendix II., facing page* 238.) With regard to the epidemic of 1873 in Bavaria, I have a few more notes showing that of the 29,429 cases of small-pox amongst vaccinated persons, 25,435, or 86·4 per cent., recovered, and 3,994, or 13·6, died. Of the 1,313 cases amongst the unvaccinated, 523, or 39·8 per cent., recovered, and 790, or 60·1 per cent., died. Of the 776 cases amongst the re-vaccinated, 712, or 91·8 per cent., recovered, and 64, or 8·2, died, so that the mortality amongst the unvaccinated was 60·1 per cent.; amongst the once vaccinated it was 13·6 per cent.; and amongst the re-vaccinated it was 8·2 per cent. Recently, I believe, they have had better results still, the vaccination has been so much better.

1492. (*Mr. Meadows White.*) From what authority are those figures taken?—From Dr. Pfeiffer's "Die Vaccination," &c.

1493. (*Chairman.*) Have you any other statistics to hand in?—I have also a table which shows the mortality from small-pox in Prussia, per 100,000, in the old provinces without compulsory vaccination, and in the new provinces with compulsory vaccination, and the difference is very marked. (*The table was handed in. See Appendix II., Table L: page* 238.)

1494. (*Chairman.*) There were some provinces which had compulsory vaccination before 1871?—Yes.

1495. This is the number of deaths to each 100,000 inhabitants?—Yes, for 1871, 1872, 1873, and 1874. I have copied this from Lotz, but I have verified it in Dr. Guttstadt's work. Dr. Guttstadt is the man who wrote the official paper on the Prussian epidemic.

1496. I think you have also some information with regard to small-pox and vaccination in the German army?—Yes. Up to 1819 there was very little small-pox in the German army; after that the mortality rose considerably, and between 1825 and 1834 something like 496 deaths occurred from small-pox. Then the law of 1834-35 came into force and the deaths gradually decreased, so that between 1855 and 1864 there were but twelve. In 1866, the year of the war, I think there were only eight deaths from small-pox. Then in the war of 1870-71 the figures do not altogether agree. The official report by Dr. Engel, of the Prussian Statistical Office in Berlin, places the whole of the deaths from small-pox during the war at 249, but that really gives the deaths of the men who died from small-pox in military hospitals; but over and above that number there were a number of other deaths. There were certain civil servants of the military train who died of small-pox, making altogether 316.

1497. Did that include the German army from whatever part it came?—Yes. I have here a table where the details are given for each contingent of the German army. I have also calculated the proportion per 100,000 in different ways, according to the calculated strength, and also according to the Ordres de Bataille. (*The table was handed in. See Appendix II., Table M: page* 239.)

1498. This is for 1870-71?—Yes.

Adjourned till Friday next at 1 o'clock.

Eighth Day.

Friday, 11th October 1889.

PRESENT:

THE RIGHT HON. THE LORD HERSCHELL, IN THE CHAIR.

Sir W. GUYER HUNTER, K.C.M.G., M.P.
Sir EDWIN HENRY GALSWORTHY.
Mr. WILLIAM SCOVELL SAVORY.
Mr. CHARLES BRADLAUGH, M.P.
Dr. JOHN SYER BRISTOWE.
Dr. WILLIAM JOB COLLINS.
Professor MICHAEL FOSTER.
Mr. J. ALLANSON PICTON, M.P.
Mr. F. MEADOWS WHITE, Q.C.

Mr. BRET INCE, *Secretary.*

Mr. Arthur F. Hopkirk, M.D.

11 Oct. 1889.

Mr. ARTHUR F. HOPKIRK, M.D. (Jena), further examined.

1499. (*Chairman.*) I understand that you wish to supplement your statements made at the last meeting of the Commission on some points?—I wish to ask to be permitted to supply some omissions that I made in my previous examination. In the first place, I have a table showing the per-centages of deaths from small-pox amongst vaccinated and unvaccinated in various places and for different years. (*The table was handed in. See Appendix II., Table N: page* 240.) Then, in the second place, I should like to call attention to the small epidemic that occurred in Berlin in the year 1881; it was the only real epidemic that they have had since the passing of the vaccination law. In that epidemic there were 298 cases of small-pox with 50 deaths, or a mortality from small-pox of 4·3 per 100,000 inhabitants. It was noted at the time that the deaths from small-pox were chiefly those of children who had not yet arrived at an age at which vaccination was compulsory. This is taken from the "Berliner Klinische Wortenschrift," which takes it from the publication of the Imperial Health Office.

1500. (*Dr. Collins.*) Would you kindly tell us once again at what age vaccination is compulsory in Germany under the new law?—It is compulsory before the termination of the calendar year following the year of the birth of the child; so that the child may be nearly two years old before it is absolutely necessary that it should be vaccinated.

1501. (*Chairman.*) Vaccination is compulsory at the end of the entire year after the year of birth?—Yes, after the year of birth; a child should be vaccinated by that time. Then there is the report for the year 1886. That comes from the same Imperial Board of Health. These detailed accounts have only recently been published. This report shows that in the whole of the German Empire there were 155 deaths from small-pox, and that of those 97 were in Prussia, 7 in Bavaria, 29 in Saxony, 2 in Wurtemberg, 2 in Baden, 1 in Bremen, and 17 in Hamburg. Two thirds of those deaths fell upon districts which were on the frontier. 40 per cent. of all the deaths happened during the first year of life, and for the greater part amongst unvaccinated children. During the time from the thirteenth month of life to the end of the twelfth year only one child born in the German Empire died from small-pox in Hamburg. Altogether there were 21 deaths from small-pox, but only one of those was of a child between the end of the first year and the end of the twelfth year. That is for the year 1886. Then again, according to the calculation made by the officials at the German Health Office, putting the mortality from small-pox in the chief German towns as one, it would be in the towns of Austria 81 times as great, in the towns of Hungary 607 times as great, of Switzerland 54 times as great, of Belgium 48 times as great, and of England 19 times as great. Of course, England is the only other country having a proper law for primary vaccination. This is a table giving the per-centage of successful vaccinations:—

	1876.	1877.	1878.
Bavaria	94·6	95·2	95·1
Variations in the several provinces	92·7—96·5	92·8—96·5	93·7—96·9
Prussia	84·7	86·2	85·5
Variations in the several provinces	73·5—90·9	78·0—90·5	79·6—88·7
Berlin	39·6	56·8	66·5
Saxony	75·7	73·8	75·1
Hamburg	24·5	23·4	74·6

1502. (*Professor Michael Foster.*) What is the authority for that?—This is from the publications of the Imperial Health Office, Berlin.

1503. (*Mr. Picton.*) Have you the means of verifying these figures?—I have verified them so far as I could get the volumes out of the library in the British Museum, and from the publications kindly placed at my disposal by Dr. Buchanan of the Local Government Board.

1504. (*Mr. Bradlaugh.*) Are we to understand that you have specially referred to some particular publications of the Imperial Health Office which you have in your mind for the verification of the matters which you have just mentioned?—Yes.

1505. (*Professor Michael Foster.*) And this table is taken direct from that?—No, it is verified from that, not taken directly from it.

1506. (*Mr. Meadows White.*) Where did you take it from?—I took it from Lotz, and on every occasion when I have examined things which I have taken from Lotz I have found that they were perfectly accurate.

1507. (*Mr. Bradlaugh.*) Have you found the materials in the Official Returns from which the table was made up, or have you found an identical table or a similar table, or what?—I have found that the figures corresponded exactly. Supposing that there was a table with a great mass of material, then before you could take an average you would have had to add up so many cases. This has been done by Lotz whom I have invariably found to be perfectly accurate.

1508. I am not referring to always but to this particular case?—In this particular case he was perfectly accurate.

1509. And the figures which you have given to the Commission you have found in the official tables?—Yes.

1510. It would be easy then to put in those tables themselves?—The only thing is that, as far as I recollect, the Imperial table did not give the summary, and Lotz has made a summary.

1511. (*Mr. Meadows White.*) I understand that this author gives a summary of the official table, and that you have verified that summary by reference to the official table?—Yes.

1512. (*Chairman.*) Are those all the additional points that you wish to bring before the Commission?—With regard to vaccination in Germany, I have here the results of the vaccinations performed in the German Empire for the three years 1882, 1883, and 1884, showing the total number of children vaccinated. These are all from the tables of the Imperial Board of Health. In 1882 the number of primary vaccinations, that is to say, the number of children who were to be presented for vaccination, was 1,459,337, or 3·7 per cent. of the population. There were relieved from vaccination because they had had small-pox 681; or because they were entered in the lists as vaccinated in the previous year 116,587. There were vaccinated in the previous year and now brought up for revision 3,645. There consequently remained to be vaccinated 1,338,464. Of those there were successfully vaccinated 1,158,696; unsuccessfully 31,441; and the number of cases in which the results were unknown were 5,773. The per-centage of the successes was 95·98, against 97·3 for the year 1881. The reason for the decrease was that in Hesse all re-vaccinations were performed with animal lymph. The number of children illegally withheld from vaccination was, for the year 1882, 33,746; for 1881, 36,304;

and for 1876, 84,716. 91·4 per cent. were vaccinated with humanised lymph, and only 7·62 per cent. with animal lymph. The next figures are re-vaccinations. There were to be re-vaccinated 1,079,881; released from vaccination because they had had small-pox during the five preceding years (that is under one of the paragraphs in the law) 1,203; because they had been successfully vaccinated during the five years 9,848; making a total of 11,051. There therefore remained to be re-vaccinated 1,068,830. Of those there were vaccinated with success 898,601; unsuccessfully 119,972; and with results unknown, because the children were not brought up for inspection, 6,147.

1513. At what age is the re-vaccination?—The re-vaccination is at the twelfth year of age. That is laid down by a particular paragraph in the law.

1514. (*Mr. Meadows White.*) Is the law a long one?—There is a good deal of it. I was going to make a translation of it, but I have not yet been able to do so.

1515. (*Chairman.*) It would certainly be important to have the passage with reference to re-vaccination?—That portion of the Vaccination Law of the 8th April, 1874, is as follows: § 1. "The following are to be sub-"ject to vaccination: (1) every child before the end of "the calendar year following the year of its birth, "unless it has been medically certified (§ 10) that it "has had the natural small-pox; (2) every pupil of a "public or private school, except Sunday and evening "schools, within the year in which the pupil has com-"pleted his (or her) twelfth year, unless it be medically "certified that he (or she) has had natural small-pox, "or has been successfully vaccinated within the last "five years."

1516. (*Mr. Bradlaugh.*) It would be well to have the earliest case of re-vaccination occurring under the German law. There is legislation as to re-vaccination dating back for 50 years, is there not?—Only for the army.

1517. (*Mr. Picton.*) Are you not aware of the law of 1835?—That was not a law; it was an ordinance, and that so far as I know did not make re-vaccination compulsory except under certain circumstances.

1518. Are you aware that it is inserted in the "Gesetz-Sammlung für die Königlichen Preussischen Staaten," which is a collection of laws?—Yes, but it has never been considered to be a law, and has never had the force of a law.

1519. It is a legal regulation, is it not?—It is a legal regulation; but according to all the German authorities it never absolutely had the effect of a law because it could always be avoided.

1520. Are you not aware that there are certain penalties enforced?—Yes, but the penalties were not invariably enforced; in fact, according to many persons, especially Schulz, who is now Director of the Royal Vaccination Institute in Berlin, the penalty was very seldom enforced indeed, and only indirect pressure was brought to bear.

1521. (*Mr. Bradlaugh.*) On that you have, I presume, no knowledge of your own except that which is derived from the writings of these gentlemen?—Yes, but they are officials. I may state that when the German Commission sat in 1884 one of the anti-vaccinationist members of that Commission, Dr. Böing, made a similar statement.

1522. (*Professor Michael Foster.*) When was the report of that Commission published?—I could not be certain when it was published, but it must have been published about the end of 1885 or the beginning of 1886.

1523. Might we have a copy of that?—There is a copy here, and you will find there that Dr. Böing distinctly states, although he is an anti-vaccinationist, "We had no vaccination law in Prussia before 1874." I am reading now from a paper which I wrote for the "Medical Press and Circular."

1524. (*Dr. Collins.*) Will you kindly continue the passage and finish the quotation?—"Before 1874 we "had no vaccination law in Prussia; nevertheless I "believe that the thorough vaccination of the popula-"tion before the compulsory law of vaccination was "promulgated was greater than at the present time."

1525. It was, therefore, more complete than at present?—The part of the sentence that you want me to read is this: "Because in former times children were "vaccinated who, according to the present vaccination "law, are not now required to be presented for vacci-"nation." Many children were vaccinated in the third, fourth, fifth, and sixth months who at the present time are not vaccinated until the following year. This shows a greater per-centage of vaccinated children during the first year of life than at the present time, when parents wait for the official notification.

1526. (*Professor Michael Foster.*) The whole of this is apparently an answer of Dr. Böing to a statement of Dr. Koch comparing Berlin with London, is it not?—No, this is simply on the question of whether more children were not vaccinated formerly in Prussia before there was compulsory vaccination.

1527. (*Chairman.*) Or rather that the children were vaccinated at an earlier age, and, therefore, that the per-centage of unvaccinated was less; that is what I understood to be the statement?—Yes, that is to say, during the first year of life only.

1528. He explains that to mean, as I understand, that before the compulsory law, which now does not compel vaccination until the end of the second year, people brought the children to be vaccinated in the first year, and, therefore, the per-centage of unvaccinated children was smaller. The point was whether there was a compulsory law in Germany before 1874?—I have here a translation of a letter which I received from Dr. Koch, the head of the Imperial Health Office in Berlin, to whom I wrote on the question. I asked him whether I was right in stating that there had not been compulsory vaccination in Prussia before 1874, and his reply to me was, "Previous to the year 1874 vaccina-"tion in Prussia was optional not obligatory. Com-"pulsory vaccination dates from April 1st, 1875, in "which year the Imperial vaccination law of the 8th "April 1874 came into force. You are, therefore, "perfectly right in your statement." That is from Geheimrath Koch, the head of the Health Office. An important fact is that the number of vaccinations had decreased in Berlin from 1864 to 1866 very considerably, showing that there could have been no very severe compulsion; whereas now-a-days the number is always on the increase, and there is very little escape.

1529. (*Dr. Collins.*) Your own figures apparently show that from 1865 to 1869 there was an increased per-centage of vaccinations to births in the year, from 36 per cent. in 1865 to 57 per cent. in 1869?—Those are the successes. In 1864 there were 25,000 vaccinations altogether in Berlin, and in 1869 there were 9,000. I have similar statistics as regards vaccination for 1883 and 1884, but it would be only a repetition of similar figures to those given in my answer to Question 1512. There is one table that I should like to be allowed to hand in, and that is a comparison of the mortality from small-pox in Berlin, London, and Vienna from 1870 up to 1883. (*The table was handed in. See Appendix II., Table O: page 240.*)

1530. (*Chairman.*) What is the source of that?—It is all taken from the reports of the German Commission on Vaccination. It only goes up to 1883, the commission sitting in 1884.

1531. (*Professor Michael Foster.*) From what page are the figures taken?—They are taken from the tables at the end; I cannot give the page; but the figures are correct. For London I have taken the figures from the report of Mr. Burt's Committee, which gives a table at the end for London. The table which I have handed in shows that, for the nine years from 1875 to 1883, the mortality from small-pox per 100,000 was in Berlin 1·7, in London 25·83, and in Vienna 89·29.

1532. (*Mr. Bradlaugh.*) That is summarised from a controversial article which appeared in an evening paper, is it not?—No; the figures I gave to the evening paper, I think, afterwards. I had had the notes by me for a long time. I could not be quite sure as to the dates.

1533. (*Chairman.*) I understand that these are merely figures taken as to Berlin from the report of the Commission; where do you get the Vienna figures from?—Also from the report of the Commission; and I verified the London figures from the Registrar-General's reports. They are all given by Dr. McVail in his book, and I have verified them all as far as possible.

1534. To return to the vaccination in the German army, are there any further statistics that you have to give?—In 1870–71 the mortality from small-pox in the German army amounted to 60·99 per 100,000, but in the Austrian army, which was as yet not attacked by the epidemic, it was 57·38. That is also from the tables presented to the German Commission on Vaccination. In the following year the small-pox mortality

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fell in the German army, but showed a marked rise in the Austrian army. The German army had in 1872, 5·65; in the first quarter of 1873, 2·68; and in 1873–74, 0·33 deaths per 100,000 from small-pox. Since 1874 there has not been a single death from small-pox in the German army, not one. In the Austrian army, on the other hand, in 1872 the average per 100,000 was 101, in 1873 it was 109, and in 1874 it was 67. The yearly average of deaths from small-pox per 100,000 in the Austrian army up to 1879 was 19·1, and in the French army up to 1882 it was 15·1. That is calculated from the time when the German law was passed so as to give a comparison. Whereas the Germans had no deaths per 100,000, the Austrians had 19, and the French 15. As to the number of cases of small-pox in 1870 and 1871 together, the number in the German army was at the rate of 1280·44 per 100,000 men, but in the Austrian army it was at the rate of 1503·05. In the respective years 1872 to 1874 the number of cases rose in the Austrian army to 1,798, 1,658, and 1,003; whereas the maximum in the German army during the same period was 161·35, and the minimum 8·35 per 100,000 per annum. Since the Imperial vaccination law came into force in Germany the average number of cases of small-pox per 100,000 men per annum for the German army up to 1882 was 4·9, for the Austrian army up to 1879 it was 355, and for the French army up to 1881 it was 169. The re-vaccination in the Austrian army is considered by German authorities to be now-a-days about on a par with the vaccination in the German army in the year 1830, when very few per cent. of the cases were successful. Now-a-day, of course, in some instances public vaccinators, like Dr. Pissin, have 100 per cent. of their vaccinations successful results, as good as those obtained by Dr. Cory.

1535. (*Chairman.*) Does that complete your information with regard to small-pox and vaccination in the German army?—I have also a table which gives the small-pox in the German army from 1831 to 1869. It is taken from Dr. Villaret's recent "Handwörterbuch der Gesamten Medizin," page 12, Stuttgart, 1888. Dr. Villaret does not state whence he gets his information. (*The table was handed in. See Appendix II., Table P: page* 241.)

1536. (*Mr. Bradlaugh.*) That is one of the cases you have not verified?—No, I cannot verify this, but it is a book that is well known and each article is written by a specialist.

1537. (*Chairman.*) Have you any information to give with reference to small-pox mortality and vaccination in France?—I have here a table which I have taken from the report of Dr. Vacher, published in the "Gazette Medicale de Paris," No. 38, of September 18th, 1875. It is an important table, because Dr. Vacher gives the number of persons disfigured in the various years. He gives the number of births, the number of vaccinations, the number of cases of small-pox, the number of deaths, and the number of people permanently injured, and also details as to the various departments. (*The table was handed in. See Appendix II., Table Q: page* 241.)

1538. Those will all depend upon the authority, whatever it may be, of Dr. Vacher?—Dr. Vacher takes his figures from the reports sent in to the Academy of Medicine, and I have verified them in the report of the Academy of Medicine. From some departments no reports were sent in, so that it is not quite complete. Dr. Vacher gives the total number of deaths in France, in the epidemic, as being at least 200,000.

1539. You say that these figures can be obtained from official statistics?—Yes. Dr. Vacher points out that the mortality from small-pox was most terrible in these departments like the Morbihan, in which the money supplied to defray the expenses of vaccination is totally inadequate.

1540. Have you verified the figures?—I have.

1541. This only goes to 1871, I see?—Only to 1871. I have not been able to obtain any further information since then.

1542. Has there been any continuation of that, because 1871 was the first year of the epidemic, and one would rather like to have similar figures subsequent to the epidemic down to the present time for the purposes of comparison?—It is perfectly possible to obtain them. Vacher, in the body of his paper, goes into details as to the number of people who were rendered blind and so forth in the various departments, and also as to the nature of the vaccination in the different departments.

1543. Have you from official documents any information as to the small-pox mortality in the French army before and during the war?—Yes, from the Statistiques Médicales de l'Armée Francaise, Paris, 1869. In 1869, before the war, there were 63 deaths from small-pox in the various French garrisons, or nearly as many as occurred in the Prussian army during the 30 years 1835 to 1864. In 1869 there were 1,599 cases of small-pox in the whole army, and of those 154 were still under treatment at the end of the year. In the four years from 1866 to 1869 there were 380 deaths to 5,525 cases of small-pox, 323 being in the active army, the mean strength of which was 383,177 men; whereas there were but 77 deaths from small-pox in the Prussian army from 1835 to 1869. The increase in the deaths from small-pox during the war corresponded to the relative small-pox mortality of the two armies during peace. This is the statement about which there has been so much trouble. According to the "Wiener "Medicinische Wortenschrift," it is reported that at the Congress of Statisticians held in St. Petersburg in 1872 it was stated on French authority (the authority has not been given) that 23,469 Frenchmen died from small-pox during the war. This statement has recently been confirmed from Paris, but I have only seen it mentioned in a German newspaper, and I have not been able to find out on what French authority it is; but it is stated that it is really confirmed that so many men died from small-pox. I believe the recent confirmation of that is official. The published reports that I have been able to get hold of giving the mortality in a garrison town in France, the only one I could find in the British Museum, is the "Rapport au Conseil de la "Société française de secours aux blessés," Vol. I., p. 500. There it is stated that in the garrison of Langres, which was 15,000 strong, and was never closely invested, but only watched from the middle of September 1871, during seven months there died of small-pox 334, of dysentery 29, and of typhoid 121. In the whole Prussian army, the average strength of which for the 12 months, July 1871 to June 1872, may be calculated at about 540,000 (that is putting it very low, and it, of course, makes the rate higher), there died of small-pox 316, of dysentery 1,744, and of typhoid 6,418; giving per 10,000 men a rate for the Prussian army of deaths from small-pox of 5·8, and for the French garrison of Langres of 222·6; from dysentery for the Prussians 32·3, and for the French 19·3; and from typhoid for the Prussians 118·8, and for the French 80·6. I hand in a diagram illustrating these figures. (*See Appendix II., facing page* 240.) Then from Lotz I have also taken some notes as to the French soldiers who were confined in Switzerland.

1544. Are those official statistics?—They are official from Surgeon-Major Dr. Ziegler, of Switzerland. Of 90,314 French soldiers confined, 1,701 died during their short stay, the deaths from small-pox being 156, or 17·3 per 10,000; and the number would have been far greater if the spread of the disease had not been checked by wholesale vaccinations. Guttstadt also states that of the French prisoners in Germany, where 10,876 died, 1,214, or more than 11 per cent., died from small-pox. The Swiss army itself also suffered from small-pox, which was carried in by the French, but I have not any accurate details as to the extent.

1545. Can you give the Commission any information from sources that can be relied on with reference to vaccination in the French army; was it enforced?—Vaccination in the French army was supposed to be enforced first of all in the year 1806, but the vaccination was very bad until quite recently, for in 1875 the Minister of War issued a declaration to the effect that vaccination should be more thoroughly carried out; but it was not until 1885 that proper instructions were sent out to the French medical officers; and to show that the French army was not as well vaccinated as the German army, although it is constantly stated that it was, there is a report given by a German surgeon of his experiences in the war.

1546. Where does this come from?—This is from the "Berliner Klinische Wochenschrift." The writer states that "During the campaign of 1870–71 I was "quartered for the months of January and February "1871 in the small French fort of Rocroi, situated on "the Belgian frontier. A slight epidemic of small-pox "prevailed in the fort, and as the only French doctor "had fled I was charged by the commandant with the "treatment of the French sick. From the 1st of January "to the 15th of February I treated 44 small-pox pa-"tients, three of whom had never been vaccinated at

" all, none re-vaccinated, and the remainder only vacci-
" nated in the first year of life. Of our soldiers, all of
" whom had been vaccinated at least twice, only two
" were taken ill, a Uhlan and myself, both of us having
" varioloid, whereas of the 44 French soldiers only 20
" had varioloid, and the remaining 24 variola. Fifteen
" of the 44 Frenchmen died, but we two Germans re-
" covered rapidly. The number of the Prussians was
" 750, and the number of the French 900." Thus only 0·27 per cent. of the Prussians, but 5 per cent. of the French, caught the small-pox, the mortality amongst the former being nothing, and amongst the latter 34 per cent. Then as to the vaccinations in the French army, I have here a table which I have taken from the " Rapport presenté à S.E.M. le Ministre de l'Agriculture " par l'Academie Impériale de Médicine sur les Vacci-" nations pratiquées en France, pendant l'année 1868," published in 1870. (*The table was handed in. See Appendix II., Table R: page* 242.)

1547. (*Mr. Bradlaugh.*) Have you the report itself there?—No, I copied this from the table in the British Museum. It only gives the number of vaccinations amongst a certain number of regiments in the garrison of Paris. As the garrison of Paris is generally something like 100,000 strong, it must have been that in 1868 the amount of vaccination performed could not have been very great; and also the per-centage of successes to the number of re-vaccinations performed was only 33·12, whereas in the German army, even before the war, it was 60.

1548. (*Chairman.*) Are there any other papers that you wish to hand in?—I should like to be allowed to send in afterwards a paper which has been mislaid during my illness, a complete account of the deaths from small-pox in Prussia in 1886, as to whether the patients were vaccinated or not and the ages, taken also from the works published by the Imperial Board of Health. I shall have to make another translation.

1549. (*Sir Guyer Hunter.*) Have you verified all the statements that you have made before the Commission to-day?—I could not swear that I have verified them all, because in some instances I have not been able to obtain the necessary works in the British Museum; but I have verified such as it was possible to obtain. I have the tickets with me of the various works that I have looked through during the time that I have been engaged on the question.

1550. You have made every endeavour at any rate to verify your statements?—I have, and those that I could not obtain in the museum I have obtained from the Local Government Board; but there were certainly one or two cases where it was not possible to verify them.

1551. (*Chairman.*) However, as regards the latter part of your evidence you have told us the sources from which you have obtained your information?—I have.

1552. (*Professor Michael Foster.*) I think I understood you to say that in the report on the epidemic in Chemnitz, Drs. Flinzer and Schulz made almost a house-to-house inquiry?—Yes, Dr. Flinzer or his subordinates did.

1553. Do you know whether in that report they paid attention at all to so-called sanitary conditions as to their influence on either the incidence or the mortality?—I do not remember whether any mention was made of that.

1554. (*Mr. Meadows White.*) You have, I believe, put upon each paper the source from which you obtained the information?—Yes.

1555. I could not catch all the names of the books which you referred to, but they are all stated on the papers?—They are all stated on the papers.

1556. (*Mr. Picton.*) I should like to ask whether you have been studying this question from the point of view of a medical expert or from the point of view of a statistician?—I should hardly presume to pose as a statistician, never having made a special study of statistics. I only took to the vaccination question since I came back to England, because, as I have already stated, in Germany it is hardly mentioned.

1557. But your experience is solely German, I think?—Solely.

1558. You are not an English medical practitioner?—Oh, dear, no, I am not a practitioner at all.

1559. But you have had a medical education?—I have had a medical education, and I obtained a medical degree in Germany, which, however, does not entitle me to practise in England.

1560. But have you had any experience at all in England of the course of vaccination here? You are not yourself a practical vaccinator?—Certainly not.

1561. Have you had any opportunity of observing the consequences of vaccination among the population?—No.

1562. Then you do look at it mainly from a statistical point of view?—Certainly. The only opportunity I have ever had of seeing any vaccination in England has been in Lamb's Conduit Street; I have seen some of the vaccinations performed there by Dr. Cory.

1563. You have given the Commission some tables specially referring to Berlin, I think, showing that after the law was passed in 1874 there was an immediate and rapid diminution of small-pox?—Yes.

1564. I think you told us to-day that in 1876 in Berlin the proportion of successful vaccinations was only 39 per cent.?—Yes, I think that was so. In 1877 it was 56, and in 1878, 66.

1565. In 1876–77 the proportion appears to have been comparatively low?—Yes.

1566. Do you think that that proportion, 39 per cent. or 57 per cent. of successful vaccinations, would fully account for the sudden reduction of the amount of small-pox?—No, certainly not, but you must remember that the town had only just recovered from a furious epidemic, and that only the new births would have to be considered.

1567. Then you think that the recent epidemic and the enormous force with which that operated would account for a cessation for a time?—Certainly.

1568. You told us that the vaccination was begun in the French army as far back as 1806, but you said that it was very bad, and that it was very bad until quite recently; may I ask what you mean by very bad vaccination?—As I showed in the table which I handed in (Table R.), in Paris there were only 33 per cent. of successes.

1569. (*Chairman.*) Do you mean that it was bad in the sense of not being well done?—In the sense of its not being well done; it did not produce the necessary results.

1570. (*Mr. Picton.*) On what evidence does that rest?—That rests upon the evidence of French authorities, and also upon that same report which I mentioned just now, the report sent into the Academy of Medicine.

1571. Have they taken means to improve it?—Yes, so I understand. First of all in 1875; then again in 1885 a proper list of instructions was sent out to the French military medical officers.

1572. You told us that there were 40 Frenchmen in a fortress on the Belgian frontier who were seized with small-pox of whom all but three had been vaccinated?—Three were unvaccinated, none had been re-vaccinated, and the others had been only vaccinated during the first year of their lives.

1573. You would infer from that that vaccination during the first year of life is quite inoperative at adult age?—I would hardly go so far as that.

1574. But you gave that as a reason for the prevalence of small-pox?—No; what I meant to imply there was simply to show that the vaccination in the French army was very bad; that whereas it is often stated, as Dr. Bayard did, that in the French army there was no exemption, yet many men could pass the doctor without being re-vaccinated.

1575. How did they know that those men had not been re-vaccinated; was it not from the marks?—I cannot tell whether it was from the marks or from their being questioned.

1576. Still I again ask you what you think of the effect of vaccination in the first year of life; do you or do you not think that it would die away at mature age?—Certainly it does die away.

1577. Then you think that compulsory vaccination without compulsory re-vaccination is insufficient?—Certainly.

1578. You think that there ought to be compulsory re-vaccination at the age of, say, 12?—Yes, and I would see it done a third time.

1579. And without that you think that compulsory vaccination in infancy is comparatively valueless?—Cer-

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tainly not, because compulsory vaccination in infancy saves children up to 12 years of age, as is shown by the tables which I have handed in both from Prussia and Bavaria.

1580. I am speaking of the effect upon the population generally; does it prevent epidemics of small-pox?—I think we have evidence that, fairly speaking, it does; that the terrible epidemics do not occur. Bavaria illustrates that fact.

1581. (*Dr. Collins.*) May I take it that the evidence which you have given us from Germany presents all the evidence from that country which you think would be necessary for the formation of an impartial judgment upon the value of vaccination there, or at any rate that it would be a fair sample of such evidence?—I am afraid that it is an imperfect sample, a poor sample, because there is so much more evidence that could be obtained from the Imperial Health Office. It is only within recent years that they have begun to work out their statistics so very carefully.

1582. May I take it that, as far as possible, it is an impartial sample of such evidence as Germany can provide upon the subject?—Yes, I think so.

1583. If there were any partiality it would only be such as the facts themselves would warrant?—Certainly.

1584. Because I notice that in some communications of yours to the press, which I have before me, you find fault with the honourable member for Leicester for his *rechauffé* of errors, and you also speak of Dr. Alfred Russell Wallace and others as "assiduous promulgators "of false statements"; I therefore take it that you have endeavoured to preserve strict impartiality and accuracy yourself?—Certainly I have.

1585. With regard to the Chemnitz epidemic, do you give us that as a tolerably fair example of how the epidemic of 1871 struck most of the German towns, or because it is exceptionally favourable to vaccination?—I give that because the statistics of Chemnitz are the first really good statistics that have ever been given, and also because in Chemnitz they have such an excellent medical officer in Dr. Flinzer, who was careful to see that vaccination was properly carried out.

1586. You do not think that the Chemnitz epidemic is a peculiarly unique and exceptional one as apparently showing the value of vaccination, but that it might be taken as a fair sample of other epidemics in Germany at the same time?—That is hardly possible, because there were so many different laws as to vaccination in Germany, and consequently there would be a great deal of difference as to the manner in which the small-pox would attack the various communities, depending entirely upon the manner in which they had been vaccinated and what their law upon the subject might be. The difference between Bavaria and Prussia is something enormous.

1587. I believe Chemnitz is in Saxony?—Yes.

1588. That is one of the old provinces, as you call them, without compulsory vaccination?—As far as vaccination is concerned, the Kingdom of Saxony was on a par with the old Prussian provinces.

1589. Do you not think that this table with regard to Chemnitz might give a wrong impression as to the way in which small-pox attacked other towns in Germany in 1870-71?—I do not see how it is possible to compare the statistics of Chemnitz with those of any other places unless they were statistics of a similar nature. You could not possibly do so.

1590. Then so far as your information goes you do not consider this epidemic in Chemnitz to have been a very exceptional one?—I consider that Chemnitz showed itself, so far as the vaccinated portion of the population was concerned, to be very well protected.

1591. I observe that in Chemnitz in 1870-71 there were 3,596 cases with 249 deaths, or 6·92 per cent.; do you consider that a common average of mortality in small-pox epidemics?—That includes the vaccinated and the unvaccinated. For an epidemic that is a very low rate.

1592. An exceptionally low rate?—You may say an exceptionally low rate.

1593. For instance, I find in 1871-72 in Berlin out of 20,648 cases there were 4,524 deaths, which would be a mortality of about 20 per cent.?—Yes.

1594. So that apparently as regards the mortality per cases the epidemic in Chemnitz was peculiarly mild?—That the epidemic was mild I am not prepared to say.

1595. The mortality was slight?—The mortality was slight.

1596. I also find in Chemnitz that of 249 deaths 242 were unvaccinated, whereas in Berlin from 1871 to 1872 out of 4,524 deaths only 1,383 were unvaccinated; can you give me any reason why that very extraordinary difference appears in the statistics of Chemnitz and those of Berlin with regard to the number of unvaccinated who died?—May I ask to which table you are referring as regards Berlin?

1597. I am referring to a work which, as you are familar with the literature of the subject, you know, "Beiträge zur Beürtheilung des Nutzens der Schutz-"pockenimpfung," published by the Kaiserlichen Gesundheits-Amte in 1888?—I have not seen that.

1598. I am quoting from that document. Have you any reason to think that the figures there given are otherwise than accurate?—For Berlin there is always this to be said: that there was no possibility at that time of finding out whether the people were really vaccinated or not, because only a person's word was taken, so that there was no certainty at all.

1599. How do you know that?—It has been admitted time after time.

1600. By whom?—It would be hard for me to give you a name at the present moment, but I think I shall be able to supply you with plenty of authorities; certainly Dr. Guttstadt himself mentions it, because the original tables published about Berlin, Muller's, which have been so frequently quoted, were totally wrong.

1601. Do you consider that these figures in the Imperial report would not be reliable?—I consider the figures of that time as regards the condition of the population with respect to vaccination are certainly not reliable.

1602. Again, with regard to the Chemnitz table, I see that of 224 cases admitted to the town hospital, 184 had been vaccinated and 37 were unvaccinated, or 16·5 per cent.?—Roughly.

1603. Whereas you see of the 3,596 cases in the town 2,643 were unvaccinated?—Yes.

1604. Being 73·5 per cent.?—Yes.

1605. Why should 73·5 per cent. of the cases in the town be unvaccinated and only 16·5 per cent. of the cases in the hospital?—That would be a question which could be easily answered if one inquired into the social position of the various parties; those in the town hospital would probably be poorer people, the others would be treated in their own houses.

1606. You would not think that it would be the more serious cases that would go to the hospital, as is generally the case in large towns?—I cannot tell that without referring again to Flinzer's paper.

1607. Do not you think that there again there is a remarkable divergence of figures?—I do not see on what point it bears. You have in the hospital and in the town exactly the same result, that the children who died were unvaccinated.

1608. You could not offer any satisfactory explanation of that divergence?—Not at present. No doubt I could supply you with one. I will make a note of it.

1609. You also state in this Chemnitz table that there was one case of small-pox in every 255 households in which all the persons were vaccinated, but one in every 26 households containing both vaccinated and unvaccinated persons?—Yes.

1610. Can you tell me with regard to those mixed households whether the small-pox invariably entered by the unvaccinated?—There again I am not sure; there is no note in Flinzer's paper with regard to that, that I remember.

1611. You cannot tell me whether in any case it entered by the unvaccinated?—No.

1612. Are you acquainted with the experience in Cologne with reference to that point?—No. I have heard various statements about Cologne. May I ask what authority you are referring to?

1613. Oidtmann?—Oidtmann is not altogether reliable.

1614. Can you tell me, with regard to the law of 1874, whether it did or not increase the proportion of those

vaccinated in the population?—I should certainly say it did; no doubt about it.

1615. The proportion of vaccinated in the population was much less before 1874 than it has been since?—Yes.

1616. Have you any figures to show the number of individuals of all ages who are vaccinated in the population at the present time in the States of Germany?—The only figures that I have are those which refer to vaccinations and re-vaccinations for those few years the reports for which have been published up to the present time.

1617. May we take it that some 95 per cent. of the Germans are vaccinated now?—I hardly know whether it would be possible to take that as the per-centage, because there are so many cases which are postponed; there is a good deal of indulgence in Germany in respect to delicate children.

1618. Can you tell us whether 60 per cent. or 70 per cent. or 80 per cent. of the total population of Germany are vaccinated now-a-days? Do any figures exist which would show that, or are they obtainable?—They should certainly be obtainable.

1619. Can you tell me to what extent before the law of 1874 vaccination was practised in Germany?—In Bavaria there was a law of primary vaccination, then, I think, Wurtemburg and Hesse followed suit. Saxony, was one of the last to do so.

1620. Can you tell us whether vaccination was general or not say in Prussia?—In Prussia, certainly not.

1621. What about Rhineland—Rhenish Prussia?—The vaccination conditions would be pretty well the same, there being no compulsory law.

1622. Would it be unfair to claim that Prussia was a well vaccinated country in 1871?—Certainly; Prussia was anything but a well vaccinated country in 1871.

1623. I find at page 317 of the Minutes of the Committee of 1871, Question 5603, Dr. Seaton is asked "Is Prussia well protected?" and the reply is, "Prussia is "well protected, but in Prussia they leave vaccination "till the children are 12 months old"?—Prussia was not at all well protected. You will see from the table I handed in with regard to Berlin how the number of vaccinations varied.

1624. Then, apparently, Dr. Seaton was either misinformed or was misleading the Committee of 1871 when he informed them that Prussia was well protected in that year?—I would not say that Dr. Seaton was a sort of man to mislead the Committee.

1625. Then he must have been misinformed?—He must have been misinformed.

1626. I understood you to say that under the law of 1874 it was possible for vaccination not to take place till the end of the second year?—Yes.

1627. So that an improvement in the law apparently had not been effected in that direction?—There was no law before.

1628. That you adhere to?—That I adhere to.

1629. Taking Rhenish Prussia as being relatively a badly vaccinated country in 1871 to 1873 before the law of 1874, are you aware that in the epidemic in Cologne in 1871 to 1873, according to the official document which I have already handed to you, out of 2,361 cases of small-pox 2,107 were vaccinated, 141 were re-vaccinated, and only 34 were unvaccinated; that is to say, 95·21 per cent. were either vaccinated or re-vaccinated?—That simply shows that they must have had quite as energetic medical officers as in Chemnitz, but it is no guarantee as to the nature of the vaccinations.

1630. Does it show nothing more than that?—To my mind, no.

1631. Would you say that vaccination has no effect as regards incidence of attack by small-pox on the population?—It certainly has when properly performed.

1632. If in 1871 to 1873 Cologne was a badly vaccinated community, and 95 per cent. of the cases of small-pox were vaccinated, do you think that that shows that vaccination had a large influence *qua* incidence of attack?—It simply shows that the vaccination must have been very bad.

1633. I do not know whether you would wish us to draw any conclusion from the fact that, while in Chemnitz 73·5 per cent. of the cases of small-pox were unvaccinated, in Cologne only 5 per cent. were unvaccinated?—It comes back almost to the same question, what was the nature of the vaccinated; how were they vaccinated in Cologne; what evidence is there that they were properly vaccinated; was there any certificate of vaccination to be shown, or was it only as Guttstadt states, that the word of the parent or the guardian or the pastor was taken that the child had been vaccinated? These statistics are now considered valueless in Germany.

1634. As I understand the proportion of vaccinated to unvaccinated is not obtainable?—The accuracy of the returns on this question cannot be guaranteed.

1635. (*Mr. Savory.*) You say you have not seen the information with regard to Cologne to which Dr. Collins referred?—No. I have always understood from various German works that till the law of 1875 was passed it is perfectly impossible to obtain any accurate knowledge as to the condition of the population with respect to vaccination, because no certificates were required to be produced—the word of the parent or guardian was taken—and, invariably, to avoid the penalty, the parent or guardian said the child had been vaccinated, because before 1874 there was a penalty for those whose children suffered from small-pox, being unvaccinated; it was naturally a premium on falsehood.

1636. (*Dr. Collins.*) Am I to understand, notwithstanding your very extensive study of the literature of the subject in Germany, you are not acquainted with this important work published last year, to which I have called your attention?—I had returned to England then, and I had not seen it till you placed it in my hands.

1637. Let me ask your attention to your Table N, which gives the per-centages of deaths from small-pox in various places at different times, in both vaccinated and unvaccinated. Do you notice that in the mortality column for the vaccinated there are much higher figures for the latter years than for the earlier years, speaking roughly?—Yes.

1638. For instance, in Coblentz, in 1871, I find a mortality of 18 per cent. amongst the vaccinated?—Yes, that was a year of epidemic, Coblentz being a town not particularly well protected.

1639. On the other hand, I find in Bohemia, in the years 1835 to 1855, a mortality of 5 per cent. among the vaccinated. Do you wish the Commission to draw any conclusion from these varying per-centages amongst the vaccinated?—The only conclusion I can draw from the table itself as a whole is that it shows most distinctly the value of vaccination. It is not so much the difference between the per-centages for various years in countries where the mode of performing vaccination was so totally different, as the difference between the mortality amongst the vaccinated and the unvaccinated.

1640. I am asking you to confine your attention to the column for the vaccinated for a moment, and I ask you whether you think that the considerable variation from 1 per cent. to 18 per cent. amongst the vaccinated calls for any particular explanation from you?—The only explanation to be given for it is that there must have been a very great deal of difference in the nature of the vaccination performed.

1641. You would wish us to believe that there was better vaccination in the years 1816 to 1841 in France than there was in Coblentz in 1871?—If you compare those two periods you must remember that 1871 was war time, and that Coblentz was then invaded by small-pox brought home not only by the German soldiers on their return but also by the French, who were really the people who propagated small-pox throughout Germany.

1642. Then take Marseilles in 1828. The mortality is 1 per cent. amongst the vaccinated, whilst in Coblentz in 1871 it is 18·03 amongst the vaccinated?—I am not aware whether the two periods are comparable. I am not aware whether or not 1828 was a year of epidemic in Marseilles; and then, again, the quality of the vaccination in each case may have something to do with the variations in the per-centages.

1643. If the variations be due to variations in the quality of the vaccination this table would seem to suggest that the quality was worse in 1871 than it was in 1828?—The two places are so totally different.

1644. You wish us to infer that there are other considerations besides the mere question of vaccination which exercise a very great influence upon the mor-

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tality in post-vaccinal small-pox?—Certainly there are other conditions.

1645. I see, for instance, in your Chemnitz table the mortality of unvaccinated under 10 years of age was only 9 per cent.?—Yes.

1646. Whereas of vaccinated in Coblentz in 1871 there is a mortality of 18 per cent. at all ages, or twice the mortality of unvaccinated at Chemnitz?—That certainly is so.

1647. What inference would you draw from that?—You are comparing the small mortality amongst children of a certain age in the one case with the total mortality from small-pox for all ages in the other case. This table giving the mortality in various places for different years is for all ages, whereas the Chemnitz table is amongst unvaccinated under 10 years of age; therefore there is no comparison between the two.

1648. That being the case, supposing we take the mortality for the whole of the unvaccinated at Chemnitz, those over 10 years of age as well as those under 10 years of age, would it be higher or lower than 9 per cent.?—The cases were 57·63 per cent. amongst the unvaccinated, and the deaths 9·16.

1649. So the total mortality at all ages in the unvaccinated at Chemnitz in 1870–71 was 9 per cent., whereas the total mortality at all ages in the vaccinated at Coblentz in 1871 was 18·03 per cent.?—Yes.

1650. Would not that lead one to believe that there must be other causes of very considerable influence which affect the mortality in small-pox than that of vaccination?—That there are other causes which do affect the mortality there can be doubt; but I think this is to be borne in mind, that in Chemnitz they had the advantage of the services of an excellent medical officer, a man who was noted for vaccination.

1651. How should careful vaccination influence the mortality in the unvaccinated?—I must refer again to Flinzer and see if he does not give an explanation as to the severity of the epidemic.

1652. In short, must there not be other influences than vaccination of very considerable moment which affect the relative mortality from small-pox if at one place amongst unvaccinated you get a mortality of 9 per cent., whereas at another place in the vaccinated you get 18 per cent.?—No doubt there are other influences.

1653. (*Mr. Bradlaugh.*) Did I quite correctly understand you to-day to say that with reference to the alleged mortality from small-pox in the French army in 1870–71 that had been contradicted but had been recently confirmed by a statement from France?—Yes.

1654. Did I understand you correctly to say that you believed that confirmation to be official?—I believe it to be so.

1655. On what ground do you believe it to be so?—I read it in a German medical paper—the "Berliner "Klinische Wockenschrift" for August of this year, and there it was stated somewhat as follows—we are happy to learn from Paris in a recent publication that it is a fact that 23,469 men did die of small-pox of the French army, though French authority places our loss from small-pox at somewhat higher than our official number, 459 instead of 316.

1656. After reading this statement in a German medical paper, did you take any pains whatever to ascertain the French source?—I have had no opportunity; I have seen no French medical paper.

1657. When did you read this?—I should say about six weeks ago.

1658. Since you read it six weeks ago, having told the Commission you believe the confirmation to be official, have you taken any pains whatever to ascertain whether it is official or not?—I have not written to Paris.

1659. Have you taken any pains whatever, whether by writing or otherwise, to ascertain whether the confirmation is official or not?—No; the only thing is that the original statement in the Vienna medical paper said it was on French authority, the quotation has been made many times in various German works on the question, the statement has only been disputed in England, nowhere else.

1660. You do not mean that the statement has been made many times since the recent alleged confirmation, do you?—No.

1661. You told the Commission that you had taken to the examination of this question of vaccination since you returned to England. I forget whether on the previous occasion you stated the date of your return to England?—February 1888.

1662. Had you previous to February 1888 studied the question at all?—In the usual course of lectures on hygiene and the course on vaccination in Germany.

1663. But not specially?—Not specially.

1664. Since February 1888 you have gone into print upon the matter considerably?—About three or four times.

1665. Vigorously?—Vigorously.

1666. You have a strong view in favour of vaccination?—Certainly.

1667. Do you think that in your studies since February 1888 you have taken the same pains to collect facts that might tell in favour of anti-vaccination that you have taken to collect the facts and figures that you have given the Commission?—Yes, I have been careful to go into the works of anti-vaccinationists.

1668. I did not quite make myself clear. My question rather meant, have you in the statistics and works which you have summarised for the Commission searched carefully for facts or for statements which told in favour of anti-vaccination?—Yes; I have collected a good deal of evidence from Germany as regards the injuries which may result from vaccination.

1669. That we will deal with by-and-by. You told the Commission to-day, if I understood you rightly, that Prussia had no law prior to 1874 regulating vaccination, to the extent of putting a twelvemonth's limit to children, and so on?—What I meant to convey was this: there was no real compulsion in Prussia till 1874, the law before that did not say that every child must be vaccinated as it does now.

1670. There was, prior to 1874, some law regulating vaccination with a twelvemonth's limit to children, was there not?—No.

1671. Are you quite sure?—Quite sure.

1672. Just attend. Dr. Seaton in 1874, at Question 5603, is asked "Is Prussia well protected?" and his answer is "Prussia is well protected, but in Prussia "they leave vaccination until the children are 12 "months old." Then Question 5604 is: "Why do "they leave it to 12 months old?" and his answer is "Such is their rule; their law has been in operation "for years and years, and they have not altered it." Do I understand you to disagree with Dr. Seaton?—Certainly.

1673. With regard to the German authority to which Dr. Collins referred with regard to Cologne, you said that it was not reliable; had you seen those figures at all before?—No, but I know from what I have read on the subject that any tables with regard to vaccinated and unvaccinated during 1870 and 1871 are unreliable.

1674. Then I understand you to say that your description of the figures as being unreliable was not founded upon any examination of the paper that was handed to you or similar papers, but was your general conclusion from what you had read?—In Prussian official works.

1675. Does that mean documents published by the authority of the Government or by medical men?—In one instance by the authority of the Government; that is to say, the papers of the Statistical Office of the Berlin Government; in another instance a book written by a medical man, the chief vaccinator in Berlin; he also says most particularly that there was no reliance to be placed on such statistics, because parents naturally said their children were vaccinated.

1676. For what years in Germany and up to what year should you think German statistics unreliable on the question of vaccination and small-pox?—I only say that one particular class of statistics is unreliable; that is all.

1677. Do I understand you to say that in reference to vaccination and small-pox statistics there is one particular class of statistics which is unreliable up to a particular date?—You might say up to 1874–75.

1678. Which is the class that is unreliable?—That which states whether a patient suffering from small-pox had previously been vaccinated or not, that is, assuming there was no certificate presented.

1679. Are any of the statistics that you have given to the Commission of unvaccinated in Germany prior to the date of 1874–75?—Yes.

1680. (*Chairman.*) You have suggested from your reading that statistics up to a certain date would not be reliable which professed to discriminate between the unvaccinated and the vaccinated in cases of small-pox. I suppose so far as there was error arising from the causes you have mentioned, namely, that it depended on the statements of the parents, it would be to overstate and not understate the number of vaccinated?—Yes.

1681. So that any correction that would have to be made or any discount that would have to be allowed on account of that would have to be in the direction of treating the number of vaccinated as less than appeared from the statistical tables?—Just so.

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1682. (*Mr. Bradlaugh.*) And there would be this possibility, would there not, that persons who were recorded in the statistical tables as being vaccinated and having a low rate of mortality might have been unvaccinated and still have a low rate of mortality?—The possibility would be there, certainly.

Adjourned till Wednesday next at 1 o'clock.

Ninth Day.

Wednesday, 16th October 1889.

PRESENT:

THE RIGHT HON. THE LORD HERSCHELL in the Chair.

Sir JAMES PAGET, BART.
Sir W. GUYER HUNTER, K.C.M.G., M.P.
Sir EDWIN HENRY GALSWORTHY.
Mr. WILLIAM SCOVELL SAVORY.
Dr. JOHN SYER BRISTOWE.
Dr. WILLIAM JOB COLLINS.
Mr. JOHN STRATFORD DUGDALE, Q.C., M.P.
Professor MICHAEL FOSTER.
Mr. JONATHAN HUTCHINSON.
Mr. J. ALLANSON PICTON, M.P.
Mr. SAMUEL WHITBREAD, M.P.
Mr. F. MEADOWS WHITE, Q.C.

Mr. BRET INCE, *Secretary.*

Mr. WILLIAM GAYTON, M.D., examined.

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1683. (*Chairman.*) You are at the present time medical superintendent of the North-Western Fever Hospital?—Yes, I have held that appointment nearly six years. Before becoming attached to the North-Western Fever Hospital I was medical superintendent of the Homerton Small-Pox Hospital from 1870 to 1883. In 1881 I took a chief part in the organisation and had medical charge of a camp for small-pox at Darenth; and in 1882 I was visiting medical officer of the hospital ships for small-pox.

1684. Having been so long connected with the Metropolitan Asylums Board in relation to hospitals, you have had considerable experience with regard to small-pox?—Up to the year 1884 I may say that my experience of the other infectious diseases was comparatively small. Since that time I have only seen something like 700 cases of small-pox, my attention being entirely devoted to the treatment of fever.

1685. Before that time had you seen a large number of cases of small-pox?—The total number of cases that have come under my observation is 12,920; but I would exclude from those 2,104 cases which were treated at Darenth and were convalescent cases, and 413 cases of other diseases that were sent in error as cases of small-pox; so that 10,403 represents the actual number of acute cases of which I can give any definite and particular account.

1686. Having, therefore, had large experience in the treatment of small-pox, have you formed any opinion as regards the value of vaccination as a protective or as tending to diminish the severity of the disease in those attacked?—I think that if the system of vaccination and re-vaccination could be rigidly enforced, and the operation properly performed, it would prove, as Jenner anticipated, an all-powerful protection against small-pox. From a somewhat long and extended experience, I think I am justified in expressing the opinion that good vaccination undoubtedly has the power of transforming what is probably the most loathsome, hideous, and fatal disease into one of the simplest disorders that the physician has to deal with.

1687. Can you produce any statistics which will assist the Commission with reference to these 10,000 cases which you have referred to?—I have prepared a table in which the whole of the 10,403 cases are considered under four respective headings. First, those "Vaccinated with good marks"; secondly, those "Vaccinated with imperfect marks"; thirdly, "Vaccinated, but without evidence"; and, fourthly, the confessedly "Not vaccinated." (*The table was handed in. See Appendix III., Table A: pages* 243–4.) I may add that I prepared a table similar in all respects to this in 1887, and it is embodied in my annual report to the Metropolitan Asylums Board, the only difference being that the numbers were 5,479 instead of 10,403. The results in that case were strikingly similar.

1688. First, to get an explanation of the table, does "1 Good" mean one good mark?—One good mark.

1689. And "1 Imperfect" means an imperfect mark?—Yes.

1690. Then there is a heading "Vaccinated, but without evidence"?—I will, with your Lordship's permission, classify those cases. Under that heading come those cases which are stated to be vaccinated, but as to which there is no evidence of its having been done, there being no scar or cicatrix.

1691. "Not vaccinated" are those who have no mark and who do not profess to have been vaccinated?—Those who are confessedly unvaccinated.

1692. (*Dr. Bristowe.*) What dates does this table embrace?—From 1870 to 1883, and then a collection of 700 more cases in 1884.

1693. (*Chairman.*) Covering, one may say, 14 years?—Yes.

1694. And including the period of the great epidemics between 1871 and 1873?—Yes; and also those between 1876–78; 1881–82; and 1884–85.

1695. What are the principal points in reference to this classification and the results to which you wish to call the attention of the Commission?—Taking those which

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come under the first heading, namely, those "Vaccinated with good marks," it will be observed that they have been further subdivided into four divisions, one, two, three, or more cicatrices; and, further, the males and females are separated. Now as regards 282 males with one good mark, 12 died, or 4·2 per cent. Of 375 with two good marks, 15 died, or 4 per cent. Of 302 with three good marks seven died, or 2·3 per cent., and of 204 with four or more good marks, four only died, or 1·9 per cent. Amongst females, of 247 with one good mark, 10 died, or 4·04 per cent. Of 274 with two good marks, seven died, or 2·5 per cent. Of 216 with three good marks, five died, or 2·3 per cent., and of 185 with four or more good marks, two died, or 1·08 per cent. Or taking 1,163 males with one, two, three, or four or more good marks, 38 died, or 3·26 per cent.; and of the 922 females with a similar number of marks and quality of vaccination, 24 died, or 1·08 per cent.; the combination of males and females with *good* marks, irrespective of number, giving a death-rate of 2·6 per cent. Proceeding to the second heading, which includes 4,854 of the 10,403, I found that 821 males were seen with one mark, of whom 122 died, or 14·7 per cent.; 908 with two marks, of whom 96 died, or 10·5 per cent.; 546 with three marks, of whom 39 died, or 7·1 per cent.; and 395 with four or more marks, of whom 13 died, or 3·2 per cent. Of females 638 were received with one mark and 76 died, or 11·9 per cent.; 668 with two marks, of whom 60 died, or at the rate of 8·9 per cent.; 509 with three marks, of whom 31 died, or 6·09 per cent.; and 369 with four or more marks, of whom 18 died, or 4·8 per cent.; thus giving a gross mortality in 2,670 males with one, two, three, four, or more *imperfect* marks, of 10·11 per cent.; and in 2,184 females, with a like condition of protection, of 8·46 per cent. The total mortality among males and females with *imperfect* marks, irrespective of number, was 9·37 per cent. My third division includes those who were said to be vaccinated, but upon whom no scars could be found; and here we had 692 males with 204 deaths, or a mortality of 29·4 per cent.; and 603 females with 148 deaths, or a death-rate of 24·5 per cent., or a combined mortality of 27·18 per cent. Summarised a step-by-step result is produced, according to the previous efficiency of the operation; that is to say, with four or more *good* marks, taking both males and females, the mortality was 1·54 per cent.; with three *good* marks the mortality was 2·3 per cent.; with two *good* marks the mortality was 3·38 per cent.; with one *good* mark the mortality was 4·15 per cent. With four or more *imperfect* marks the mortality was 4 per cent.; with three *imperfect* marks it was 6·63 per cent.; with two *imperfect* marks it was 9·8 per cent; with one *imperfect* mark it was 13·3 per cent.; and of those "said to be vaccinated" it was 27·18 per cent. The fourth and last class is that of the confessedly "unvaccinated," and well illustrates the enormous mortality produced by natural small-pox in the unprotected, more especially in children. Taking all ages in males, the death-rate, according to my observations, was 45·2 per cent., and in females 40·8 per cent.; but in children of both sexes under five years of age the mortality became 56·5 per cent.

1696. Have you any further remarks to make in reference to the ages under which you have classified your cases?—Yes, in the first place I may say that generally they show, I think, the true results as to the comparative mortality of the vaccinated and the unvaccinated at different ages, a point which has more or less hitherto not been well considered. Secondly, at each age-period the mortality of the unvaccinated is much greater than that of the vaccinated or of the doubtfully vaccinated with one exception only. To illustrate this more clearly, I think your Lordship has a copy of a table which I should like to hand in, which is condensed from my figures. (*The table was handed in. See Appendix III., Table B; page* 245.) Thirdly, of the four classes into which the cases are divided, it will be found that the last three, that is to say, the imperfectly vaccinated, the doubtfully vaccinated, and those confessedly unvaccinated, give a general though not an absolute support to the doctrine that the law of natural small-pox is that its fatality is greatest in infancy, decreases to a minimum about the third quinquennium of life, and then rises again. Fourthly, assuming that the period of most complete protection from small-pox is the one which immediately follows vaccination, the succeeding figures bear witness to the proportional effect of good vaccination in conferring immunity from attack. Thus, in the case of children from one to five years of age admitted into the hospital, I found that among 2,085 with good marks only 2·9 per cent. were of that age; among 4,854 with imperfect marks, 37·4 per cent. were of that age; among 1,295 said to be vaccinated, 9·11 per cent. were of that age; while of 2,169 unvaccinated, 31·20 per cent. were of that age. Fifthly, the regular rise in the mortality with increasing age exhibited by the well vaccinated is quite in accord, I think, with the teaching and opinion of those who insist upon the necessity of re-vaccination. Sixthly, of the 10,403 patients, 61 only consisted of well-vaccinated children under five years of age, with no deaths; 182 were imperfectly vaccinated, with 21 deaths; 118 were doubtfully vaccinated, with 47 deaths; while 677 were confessedly not vaccinated, and among them there were 383 deaths. Of those under two years of age four were well vaccinated and there were no deaths; 32 were imperfectly vaccinated, with 3 deaths; 22 were doubtfully vaccinated, with 9 deaths; and 276 were unvaccinated, with 181 deaths. Those are the only remarks that I have to make about the ages.

1697. Upon what did you base your opinion as regards the classification of the vaccine cicatrices?—Upon quality and number and upon quality and number combined. As an illustration of my meaning, I should not, nor did I, place any cases in the good-mark list unless they exhibited cicatrices well foveated, indented, or radiated, and had a well-defined sharp edge, and had an area of, roughly speaking, one-third of a square inch or, say, of a threepenny piece aggregated or separate.

1698. (*Mr. Meadows White.*) Your definition applies to each mark and not to the aggregation of marks?—To each mark.

1699. (*Dr. Bristowe.*) A child with one good mark might have three bad ones, I assume?—Yes, distinctly.

1700. (*Professor Michael Foster.*) By one good mark you mean with regard to its share of the total area?—Exactly.

1701. Among the qualities of a good scar, area is one?—Yes.

1702. You could not have an exceedingly minute good scar, could you?—Yes, I think you might.

1703. Would you count that as a good mark?—That would go under the first heading "1 Good." The first standard is of those which come up to the area which I have described.

1704. (*Mr. Picton.*) I want to get a clear idea of this classification. Supposing that you found a case of one good mark with three imperfect ones, under which which heading would you put it?—The three imperfect marks and the one perfect mark might be classified under the second heading of two good marks.

1705. You would count the three imperfect marks as being equal to one good mark, and the good mark as "1 good"?—You might do so, I think.

1706. But I am speaking of your own classification; what did you do in such a case?—When I had one good mark and three imperfect marks I invariably ignored the three imperfect marks and took the good mark.

1707. (*Mr. Meadows White.*) What was a sufficient area for one good mark?—An extent of surface equal to one fourth of that considered by me as being the *highest* standard of vaccination.

1708. (*Chairman.*) And those four good marks would be in the aggregate the size of a threepenny piece, as I understand?—Yes.

1709. And therefore one good mark should have been a fourth of that size?—Yes.

1710. (*Professor Michael Foster.*) Still I suppose you do not insist absolutely upon the actual diameter. Provided a scar is not too small in diameter you consider that a good scar?—I consider that patients are not perfectly vaccinated unless they come up to the highest standard.

1711. My question has reference to the question of Mr. Meadows White as to the necessary magnitude of the one scar?—That is a cicatrix of a moderate size well foveated, radiated, or indented.

1712. If there were a scar a millimetre in diameter you would not consider that satisfactory?—No, certainly not.

1713. (*Chairman.*) Supposing that the doubtfully-vaccinated cases were added to the vaccinated, would not that have an effect upon the death-rate?—I think it would; but still in favour of vaccination. In other words we

get under two years of age a mortality of 20 per cent. in the vaccinated as against 65 per cent. in the unvaccinated; and over two years of age 10 per cent. as compared with 43 per cent. Thus of vaccinated with and without marks there were 8,234 cases and 869 deaths, or 10·5 per cent.; and of unvaccinated there were 2,169 cases with 938 deaths, or 43·2 per cent.

1714. (*Mr. Whitbread.*) May I ask when the registration upon which this table is based was made? When a child comes in is he registered with his mark there and then?—At once.

1715. The register is made on admission?—Yes, at the time when the patient is seen. That table was first of all started in 1871, I think, upon the recommendation of the late Dr. Brewer, who was the chairman of the Metropolitan Asylums Board, when I had to produce some statistics before a committee which was sitting upon vaccination at that date, and I then kept it up to the time when I ceased to treat small-pox cases.

1716. (*Chairman.*) These, as I understand, were all cases which came under your own personal observation?—Every one of them.

1717. (*Dr. Bristowe.*) I rather gathered from what you said that this table dates from 1871 inclusive; you do not include the year 1870?—In 1870 we had not opened the hospital; we did not open the hospital till 1871. I was resident there in 1870, but we did not commence to take cases till 1871. It was the first small-pox hospital that was opened, excepting those at Highgate and Hampstead.

1718. (*Chairman.*) And, as I understand, your attention was called to the expediency of an investigation of this description by the suggestion of materials being obtained for the committee which was enquiring into this subject in 1871?—I had to procure some papers and figures for that committee, and Dr. Brewer at that time hinted to me the advisability of keeping the thing going, and I did so up to the time that I ceased, to have anything to do with small-pox.

1719. Can you produce any figures as regards small-pox among the hospital staff?—I have given the statistics upon this point upon several occasions, the last time, I think, to the Epidemiological Society, who published the results. Briefly, my experience on the point is this, that from February the 1st, 1871, which was the date when the hospital opened for the reception of patients, to the end of 1877, 366 persons had been employed in the Homerton Small-pox Hospital. All of those were re-vaccinated on commencing duty with the exception of an assistant nurse, F. C., who was not brought under my notice for some reason until after she had been in the wards. This woman in a fortnight was down with small-pox and passed through a severe attack, but recovered. During the succeeding years an equal number were, I think it is fair to estimate, engaged in the work. I regret to say that I cannot get the exact number, though I have made some application for them. Of these, a needlewoman, E. B., was attacked who had not been re-vaccinated, and she also recovered.

1720. Do you mean that those were the only two individuals who were attacked during those years?—Those two only.

1721. (*Mr. Meadows White.*) You cannot give the total number of nurses?—Only up to a certain point. I think I have mentioned 367.

1722. (*Chairman.*) And you say that you have no reason to doubt that the number must have been about the same in the subsequent years?—I think it is fair to reckon about the same number of people. The work was going on continuously to about the same extent. A third woman, M.N., was engaged as a nurse on February 27th, 1880, and was at once sent into a ward after being re-vaccinated. On the 1st of March the result was doubtful, and on the 3rd, it being evidently a failure, the operation was repeated. Unfortunately, however, on the 7th she presented symptoms of small-pox and subsequently passed through a mild attack of the disease. Thus out of, say, 734 there were three who took small-pox. Added to these there were employed approximately at the camp 40, on the ships 100, and at the North-western Hospital in 1884 39, none of whom were attacked. The 960 engaged still, therefore, only affords the three already referred to. This is a continuation of the fact that I brought forward in 1878. The following appeared in the Registrar-General's Return of June 1878:—"'In a recently "'published report dealing with the statistics of the "'Homerton Small-pox Hospital from the 1st February 1871, when patients were first received, to the "'31st of December last, Dr. William Gayton, the "'medical superintendent, makes a statement bearing "'upon the efficacy of adult re-vaccination as a pro-"'tection from small-pox which cannot be too gene-"'rally known.' He says, 'That one only amongst "'the large number of nurses and others who have "'been occupied here (and in her case the operation "'was neglected) should have contracted the disease "'is, or should be, convincing proof of its great and "'almost certain prophylactic influence . . . . . "'Dr. Gayton has further informed the Registrar-"'General that since the hospital was opened, more "'than seven years ago, 367 nurses and others have "'been engaged in the work of the hospital, and, with "'the solitary accidental exception mentioned, re-"'vaccination has been an indispensable condition of "'employment, unless the applicant has had small-"'pox, or had already been re-vaccinated. The re-"'sult has been that not one of these has contracted "'small-pox while there employed.'" So that the other figures really continue that statement.

1723. (*Mr. Meadows White.*) When was that statement made?—In June 1878.

1724. (*Dr. Bristowe.*) I do not understand how you get your 960?—I estimated that the same number of people had been employed subsequently.

1725. The first 367 were employed in which year?—Up to 1878 from 1871, and then from 1878 to 1884.

1726. Is it not possible that some of those may be counted twice over?—I think not, because you discharge your staff when your numbers are reduced. It is only an approximate estimate; it is not correct, nor would it be possible to get the correct numbers.

1727. (*Professor Michael Foster.*) What is the fatality or mortality of all cases?—17·3 per cent., I think.

1728. I suppose you consider that those persons who are vaccinated with imperfect marks together with those who are vaccinated without marks are not adequately protected against small-pox?—Those who were imperfectly vaccinated were undoubtedly protected up to a certain time, otherwise I take it that they would have died at the same rate as the unvaccinated or the doubtfully vaccinated.

1729. Apparently there are 282 (males) who were really properly vaccinated?—Yes, I take it that is the number.

1730. The number of properly vaccinated as compared with imperfectly vaccinated seems exceedingly small?—I think it is the experience of everyone who sees much of vaccination that the well vaccinated do form an extremely small number of those who come under observation.

1731. Have you any reason to think, having regard to the sources from which the patients in your hospital were drawn, that that impression is very much exaggerated?—I must admit that the class of the population coming under observation was of the very poorest.

1732. It is not so much a question of being vaccinated or of not being vaccinated, but of being properly vaccinated?—Yes, the majority of the people that I saw had been vaccinated at public stations or by the district vaccinator; they were not vaccinated by private practitioners.

1733. Is it not the general experience that the public vaccinator vaccinates as successfully as the private practitioner?—I was just going to say that I should expect a higher standard of vaccination from the public vaccinators than from the private practitioners.

1734. So that there probably would be no great error in taking your results as being on the whole illustrative of the fact that a great deal of vaccination was really imperfectly performed?—I think it is admitted that vaccination was very imperfectly performed 15 or 20 years ago. Of course this table is principally made up including the epidemic of 1871 and 1872; that is nearly 20 years ago.

1735. (*Mr. Whitbread.*) With regard to imperfect vaccination or imperfect marks, assuming that you had the highest skill in vaccinating, do you think it would turn out that an overwhelming proportion of the children would show good marks; or is it, on the other hand, a want of susceptibility on the part of the child itself to the poison that results in so few showing good marks?—No, I do not think it is the want of susceptibility. I think that if the child were properly vaccinated

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with efficient lymph you would get a regular run of good marks. If I took a hundred children, varying from two or three days old to three months, and vaccinated them myself with reliable lymph, I should expect to get a tolerably fair standard of good vaccination marks. If I vaccinated in four places I should get four good marks in each child. I was myself a public vaccinator 30 years ago, and I invariably got good marks, for then I kept up an arm-to-arm vaccination. If you vaccinate with stored lymph or with ivory points, as they used to do, I think you could account for the bad results which they obtained.

1736. The extraordinarily small number of children who show good marks, if your theory is correct, points to a tremendous want of care in the exercise of their duties by the public vaccinators, does it not?—I do not know that it was at that time so much the fault of the public vaccinators as the difficulty of keeping up a sufficient supply of lymph.

1737. Do you say that if you had a hundred children you would expect to find good marks in all of them?—I should if I vaccinated them myself.

1738. And yet the table shows a very small per-centage of good marks?—Yes. I may say, just to show the result of my own vaccinations, I have five children, all of whom have been vaccinated by myself (it will stagger the Commission when I mention it) within 24 hours of their birth. All those children have typical cicatrices. The imperfectly vaccinated form the bulk of the admissions to the hospital.

1739. (*Chairman.*) Taking the population of London, from which these patients were drawn, what per-centage of the children between one and two years of age would you put as being probably vaccinated in some shape or another?—I am afraid I can only tell you what I have read and heard, and that is that they vaccinate up to 95 per cent.

1740. At all events a large proportion are vaccinated?—A very large proportion.

1741. Because I observe that of the children between one and two years of age the total admissions, whether with perfect marks or imperfect, or alleged to be vaccinated merely, amounted only to 38?—Quite so.

1742. And that out of the residue, whatever it was, whether it were 5 per cent. or more unvaccinated, there came 121 admissions; that is to say, if of children between one and two years of age 95 per cent. were vaccinated, there came out of the 95 per cent. only 38 admissions, while there came out of the 5 per cent. 121 admissions; is not that so?—Yes; it seems that any kind of vaccination protects up to a certain time.

1743. But does not that point, unless there is some error, to a very much greater proportion of attacks in the case of the unvaccinated than in the case of the vaccinated?—Decidedly.

1744. If 95 per cent. of the children between one and two years of age are vaccinated, and 95 per cent. of the population only yields 38 of the cases attacked, and if the remaining 5 per cent. of the population yields 121 of the cases attacked, it must show an enormously greater proportion of attacks amongst the unvaccinated than amongst the vaccinated?—Distinctly.

1745. (*Sir Guyer Hunter.*) Have you any evidence to show that imperfect vaccination is gradually getting less and less?—I am afraid I cannot answer that question. I do not see anything of vaccination or small-pox now.

1746. (*Professor Michael Foster.*) Your total result of mortality is 17·3. You probably know that it has been stated that the small-pox hospital fatality in the last century was 18·8, and in the early part of this century 18·5; as you are running so very close to it as 17·3, have you formed any ideas about that?—Of course the mortality is made up to a very large extent of the unvaccinated.

1747. It is very curious that the figures should run so near together as 18·8 in 1760, I think 18·5 in 1830, and 17·3 in 1870?—It seems a very difficult thing to come to any conclusion as to what the mortality was before civil registration began.

1748. It has been stated that in small-pox hospitals in the last century the mortality of the cases was 18·8?—May I inquire whether that was estimated upon large numbers or upon very small numbers?

1749. (*Dr. Collins.*) It was upon 18,000?—That is a very fair number, but I have not considered the point.

1750. (*Mr. Meadows White.*) Have you any experience which would show you that vaccination had improved of late years?—I have had no opportunity whatever of seeing any primary vaccination since 1884 except those 700 cases.

1751. You do not know whether the quality of public vaccination has improved of late years?—I do not.

1752. You did not make any inquiry, or you could not tell, the origin of the lymph with which the vaccination had been performed?—No, I had no means whatever of obtaining that information.

1753. But the specific mark is the same whatever the origin may be?—Yes, if you get a typical cicatrix.

1754. (*Mr. Picton.*) I think you told us that, in your opinion, Jenner's anticipation of the effects of vaccination cannot be realised unless re-vaccination be enforced?—Most distinctly.

1755. What value then do you attach to single vaccination?—I think primary vaccination is a very fleeting protection indeed. As to the time that that primary protection lasts, I do not know, but I think it is a very short time.

1756. Does it last 12 years?—Oh, no! I think not.

1757. Does it last seven years?—We find that the rise commences about the age of from 15 to 20, or, as is commonly said, after the age of puberty.

1758. But you said just now that you did not think the effect lasts for 12 years?—I think not to any reliable extent.

1759. Then is primary vaccination alone, without re-vaccination, of any value in averting epidemics?—Only up to a certain age.

1760. But an epidemic affects all ages?—I do not think that primary vaccination is of any value after a certain age.

1761. (*Sir James Paget.*) Is it of no value at all?—I think it is of no value, comparatively speaking, after a certain age; I do not say that it is of no value; it is of value.

1762. But of less value?—Very much less.

1763. Would you say that it ever comes to be of no value at all?—I think it becomes of so small a value as to have hardly any at all.

1764. Does your table show that?—No; my table shows that it is of value up to an advanced age; but the numbers are too few to base any sound conclusion upon.

1765. If it is of no value at all at an advanced age, why is there a difference in the number of cases as between the vaccinated and unvaccinated?—I did not mean to say that it was of no value; I believe it is of value, but of very little as compared with good vaccination.

1766. (*Dr. Bristowe.*) You mean that it is absolutely protective up to a certain age?—Not absolutely.

1767. Partially protective subsequently?—Yes.

1768. (*Mr. Picton.*) Is it absolutely protective up to any age whatever?—My table shows that it is not, because I think there are some cases under two years of age.

1769. Then if the object be the protection of the public from epidemics your experience would show that primary vaccination is quite insufficient?—I say that primary vaccination as a rule protects up to a certain age.

1770. I am speaking of the general protection of the population from epidemics?—Primary vaccination would not ward off an epidemic.

1771. That is your experience?—Yes.

1772. Then if that object is to be secured there ought to be compulsory re-vaccination?—Most distinctly, and until you do get compulsory re-vaccination you can never hope to stamp out epidemics of small-pox.

1773. You told the Commission just now that you felt justified in expressing the opinion that good vaccination transforms a loathsome disease into a comparatively simple disorder; is that as much as you claim for good vaccination?—It not only does that but it protects most distinctly from the *sequelæ* of small-pox. An unvaccinated or imperfectly vaccinated small-pox patient gets a host of disorders coming on afterwards which a well vaccinated one does not.

1774. But I may have misunderstood you, and I wish to understand you rightly. I gathered from you that the chief claim you made on behalf of vaccination was that it transformed the disease into a gentler and simpler attack?—In a simply marvellous manner, I think. Anyone who has seen cases of small-pox in the vaccinated and unvaccinated cannot help being struck by the fact that the two things are totally different.

1775. That is not universally the case, is it?—Universally, and in favour of the well vaccinated. I think I said at the beginning if properly vaccinated.

1776. But I want to get at the present state of opinion. Of course we know that your evidence is that of a skilled medical man and an expert, and you know the general state of expert opinion at the present day; what I want to get at is the difference of opinion now as compared with what was expected to be the opinion when Jenner started his idea. Then, as you know, he insisted that a single vaccination would protect a child throughout his life?—But he altered that opinion very soon afterwards.

1777. Still he believed that if the whole population were vaccinated epidemics of small-pox would be impossible; is that opinion held now?—No; nor do I, with all deference to you, think that Jenner held it; I think he gave a different opinion very soon afterwards. Before his death he certainly found that cases were cropping up where persons who had been vaccinated were attacked by small-pox.

1778. Of course you are better acquainted with that than I am. I am only asking for information. At the present day is the opinion held that universal vaccination would absolutely prevent epidemics of small-pox?—Speaking of primary vaccination, I should think you would hardly find any medical man who would agree to that.

1779. You have a classification here of "Vaccinated, but without evidence;" may I ask whether in any cases reference was made to the vaccination registers?—Not by me.

1780. The only evidence sought then was that of the marks on the body, or the testimony of the patients or their friends?—It included the history. For instance, you get a case in which you cannot see the marks, and you put it down as doubtfully vaccinated, giving the patient the credit of the marks, I mean without any visible evidence, without marks.

1781. Then if a child were brought and the mother stated that the child had been vaccinated, you would not consider that evidence unless you saw the marks?—No.

1782. You would put it under the heading "Vaccinated without evidence"?—Yes.

1783. You would not think it worth while to refer to the register of vaccinations?—I had no opportunity of doing that.

1784. (*Dr. Bristowe.*) Would you not put it among the non-vaccinated?—No; I should put it as "doubtful," without evidence.

1785. (*Mr. Picton.*) The figures in this table refer to the year following the establishment of the law of registration, do they not?—Yes; the registration of vaccination was made compulsory in 1871.

1786. (*Mr. Meadows White.*) You were told that they were vaccinated, but there was no evidence of it?—Quite so.

1787. (*Mr. Picton.*) Can you tell me in what stage of the disease the patients would generally be admitted?—In the ordinary way we receive patients on about the third day of the eruption.

1788. Were none received later than that?—Yes, but quite exceptionally.

1789. (*Mr. Meadows White.*) Would it not be as well that that heading "Vaccinated without evidence" should be altered?—Possibly.

1790. (*Mr. Picton.*) Even at the third day of the disease would not the rash obscure the marks of vaccination that had existed?—If at the end of the third day the eruption was so confluent it would be almost *primâ facie* evidence that the person was unvaccinated; but in order to avoid any error on that point it is simply put down in that list as "without evidence."

1791. I notice that in this table under the head of "not vaccinated" there are 276 cases and 181 deaths, all those being children under two years of age; could you tell us whether the greater number of them would be under six months old?—You must take my answer for what it is worth, but I should say "No," though of course I have nothing to refer to.

1792. Would those include cases where the medical man refused to vaccinate, or postponed vaccination, because of delicacy of health?—I cannot tell you; I have no information whatever upon which to base any answer.

1793. But still there are many such cases, are there not?—Do you mean coming under the heading of insusceptibility to vaccination?

1794. No, but suffering under other diseases. I will give an illustration in order to explain my meaning. My own experience with my own children has been that medical men have refused to vaccinate them until they were more than one year old because of their delicacy of constitution; would there not be many such cases among these non-vaccinated children?—I should think that, taking the class of people in the community from which our cases are drawn, that would not be the case; it would be the better class. For instance, if you took your children to a medical man in all probability he would be very much more careful about vaccinating them than about vaccinating the children of this class of people. These are all paupers admitted by the relieving officer's order, and I am afraid that the same care might not be exercised with regard to those children. They would be sent to the vaccination station and vaccinated there.

1795. You said that the officers at the hospital were all re-vaccinated unless they had had small-pox previously, or had been recently re-vaccinated; were there many cases of those who had had small-pox previously?—It was the exception to have people come to the hospital as servants who had had small-pox.

1796. There was not any considerable proportion?—Oh, no.

1797. (*Dr. Collins.*) You have been asked some questions with reference to the views originally entertained by Jenner, and as to how far your experience has led you to a different opinion; might I ask your attention to a paragraph at the termination of the evidence given by Dr. Jenner before a Committee of the House of Commons in March 1802, in which he says: "It now "becomes too manifest to admit of controversy that "the annihilation of the small-pox, the most dreadful "scourge of the human species, must be the final "result of this practice." Would your experience lead you to think that such a result was possible?—Not by primary vaccination. Jenner is referring there to primary vaccination.

1798. By vaccination and re-vaccination do you think that it would be possible to annihilate small-pox?—I do not. I think you might reduce it to a very small matter not worthy of consideration; but you would not annihilate small-pox, because you would always have imported cases.

1799. I think you told us that Jenner changed his view?—That I remember reading.

1800. I see that in this pamphlet from which you have quoted you refer to Jenner rather severely, and you say, "'Duly and efficiently performed,' he wrote, "'it will protect the constitution from subsequent "'attacks of small-pox as much as that disease will; "'I never expected it would do more, and it will not, "'I believe, do less'"?—Those are his own words, I believe.

1801. And I see you add "proofs are abundant "already, and will continue to accumulate, to disprove "these statements"?—Yes.

1802. So that I may take it that the protective power of primary vaccination is considerably less than that of a previous attack of small-pox?—I think so. According to my experience it is.

1803. Does that apply as well to protection from attack as to mitigation when the disease is present?—Is it the case that a previous attack of small-pox not only lessens the probability of another attack of small-pox, but that if a second attack occurs it is modified by a previous attack?—Very much.

1804. Could you give us any figures which show the mortality from secondary small-pox?—No, I merely give the number. I say: "Lastly the number of cases "of recurrent small-pox has been 92"; that is in the hospital.

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1805. (*Mr. Meadows White.*) That is the number of cases in which in your experience there had been a previous attack?—Yes, in which the patients were already scarred. Of such cases there were only 92.

1806. (*Dr. Collins.*) How many of those died?—I am afraid I cannot tell you. I have not got it here.

1807. I see that the mortality from secondary small-pox is given by other authorities as something like 25 per cent.?—To the best of my recollection very few, if any, of those died.

1808. We have been given to understand that taking Londoners generally about nine in ten are vaccinated in some way or other; I think I understood that in the cases coming to the hospital about eight in ten are vaccinated in some way or other?—That is about the proportion.

1809. (*Sir James Paget.*) Have 80 per cent. of the patients been vaccinated?—8,234 out of 10,403.

1810. (*Chairman.*) That includes the vaccinated, but without any visible evidence of it, who form a considerable number?—Yes.

1811. (*Dr. Collins.*) I see that you state in this pamphlet "that post vaccinal small-pox is of common "occurrence, and brings by far the larger proportion "of inmates to the small-pox hospitals," practically eight-tenths of them?—Yes.

1812. I see also that on page 5 of your pamphlet you say that "in some well-vaccinated subjects modifica-"tion of small-pox is not observed"?—Yes; that I have noticed occasionally.

1813. Can you tell me that any primary vaccination, however good, will absolutely protect from death, from the worst form of small-pox?—Not if they get the worst form of small-pox; but I should expect a thoroughly well-vaccinated person not to get the worst form of small-pox. I have never seen the worst form of small-pox in a young well-vaccinated person.

1814. Have you never seen hæmorrhagic small-pox in a well-vaccinated person?—In advanced age, yes.

1815. I think it is usual amongst small-pox authorities to classify the disease under the headings of "discrete," "confluent," and "hæmorrhagic," is it not?—And semi-confluent also.

1816. Be it so. I believe that the discrete small-pox is a comparatively mild disease even in unvaccinated persons?—It is.

1817. The mortality from it is relatively trivial?—It is very trivial.

1818. Malignant or hæmorrhagic small-pox is almost uniformly fatal, I believe, whether the person has been vaccinated or not; is that so?—It is so. In a table which is now before me I see that amongst the vaccinated between the ages of 20 and 30, 18 males and 15 females died of malignant small-pox.

1819. Out of how many cases?—I cannot tell you, but that probably represents the total number treated.

1820. Then the mitigation of the disease would appear to be chiefly in the confluent and semi-confluent classes, I apprehend?—Yes.

1821. I think you told Mr. Picton that if you saw a confluent case you were generally led to believe that it was presumably unvaccinated?—At the end of the third day I said. I was rather careful about that. I said that if the case presented itself at the end of the third day with a very confluent rash it was *primâ facie* evidence that the patient had not been vaccinated.

1822. Do you or do you not as a matter of practical experience find considerable difficulty, as other observers like Dr. Gregory have found, in discriminating the marks in cases of confluent small-pox?—After the third day.

1823. If admitted after the third day of the rash you do find such difficulty?—If admitted after the third day.

1824. Do you ever find, as I think has been noticed in some of the hospital statistics, that on recovery marks which were previously obscured have become apparent?—Yes. Still in my table they are credited under the heading "Said to be vaccinated," but I could not see any mark.

1825. (*Mr. Savory.*) In cases of confluent small-pox have you made it a practice to look for the marks?—Yes; the first thing is to examine the arm.

1826. And before the third day you would generally be able to see the marks if they existed?—In by far the majority of cases certainly.

1827. (*Dr. Collins.*) I think in this pamphlet you have given, at any rate, one interesting example which tends to show that good vaccination marks may wear out, I refer to the case of Dr. William B. Carpenter?—Yes.

1828. Could you tell the Commission the particulars of that case?—Dr. Carpenter and myself had been talking the matter over, and I asked Dr. Carpenter's opinion about it, and he said some years ago "at about "25 years of age I re-vaccinated myself accidentally "with vaccine taken almost direct from the cow, "having chanced to scratch the ball of my thumb with "a charged lancet. I had a remarkably fine 'Jennerian' "vesicle, leaving a deep pit behind it, but of this there "is not the vestige of any mark, and as far as I "remember there never was after it had once healed." I believe this to be the case with other cicatrices which are far more persistent when established in infancy than when at or near to adult age. I think it is the universal experience that scars made late in life (I say this with all due respect to the eminent surgeons before me) have not the persistency of those made in infancy.

1829. Have you noticed whether the nature of the lymph which has been employed for vaccination as regards its source, apart from the results upon the arm, has had any decided effect in the way of mitigation of small-pox?—I have no opportunity whatever of forming any notion as to the origin of the lymph.

1830. If I understand aright you have been a vaccinator yourself?—That is 30 years ago.

1831. Has your experience enabled you to form any opinion as to the relative value of the different lymphs which have been in use?—No, I cannot form any opinion.

1832. Have you had any experience of cow-pox in the cow?—No. I can only say about the lymph that, so far as vaccinating the staff of our hospital is concerned, I generally succeed in getting a very good vesicle with the lymph which is supplied by the Privy Council.

1833. Have you formed any opinion as to the relationship between cow-pox and small-pox?—No. I know the theories on the subject and the literature on the subject.

1834. But as a man of large practical experience, have you been able to form any opinion on the subject?—No.

1835. In reference to re-vaccination I see you tell us on page 14 of your pamphlet that "nobody should "consider he has been re-vaccinated satisfactorily who "has been operated upon with dry points or with lymph "long stored or without results, as seems to be the case "in a large number of people who say they have been "re-vaccinated and 'did not take.'" How may I understand you to interpret the "results" of re-vaccination?—The result of a re-vaccination is that you commonly get a fairly good but variable vesicle with a certain amount of surrounding local inflammation.

1836. Should you consider a person better protected from small-pox in whom the re-vaccination had succeeded or in whom it had failed after the first re-vaccination?—I should hesitate about giving any opinion as to result until the operation had been repeated two or three times.

1837. I see that you say that "so long as he is liable "to be affected by vaccination, so long I imagine is he "liable to take small-pox"?—I believe that to be the case.

1838. So that apparently successful re-vaccination would indicate susceptibility to small-pox?—Yes, I think so.

1839. So that insusceptibility would be better evidence of protection?—Just so.

1840. Would it or would it not be fair to say that there is no other circumstance except that of vaccination which is likely to operate *qua* mortality in the vaccinated and unvaccinated classes?—I know of course to what you refer, sanitary arrangements.

1841. But would it be true to suggest that, except for the one circumstance of vaccination, vaccinated and unvaccinated persons are perfectly comparable classes as regards mortality from a zymotic disease like small-pox? I have before me an editorial article in the British Medical Journal for October 23rd, 1880, in which

there is this passage:—"It is probable that a larger "proportion of unvaccinated persons is to be found "among the ignorant, dirty, and wretched inhabitants "of the slums of London, and very few indeed among "the educated and better-fed members of society. "The disease is much intensified by overcrowding." Do you think that would be a just criticism?—I do not think that overcrowding has anything to do with starting small-pox, but it will extend small-pox.

1842. Do I rightly understand that the unvaccinated are, as a rule, drawn from a more neglected class than the vaccinated?—I should think certainly from a poorer class.

1843. Do you consider that that is likely to operate detrimentally by way of raising the unvaccinated mortality?—Undoubtedly I think so.

1844. With regard to the relationship of small-pox to insanitary conditions you were going to give us your opinion; will you kindly continue your statement?—I was simply going to say that I do not believe that any insanitary condition would start small-pox.

1845. I have before me your report for the year 1875 in which you say:—"To the prevalence of overcrowding, "which must almost of necessity exist in large cities, "can be attributed the cause and extension of infec- "tious diseases; and until the time arrives when the "removal becomes legally compulsory of those who by "contact can spread a disease, little hope can be "entertained of warding off, except for a time, epide- "mics of greater or lesser magnitude." Apparently you suggest there that overcrowding, &c. can cause and extend infectious diseases like small-pox?—I think overcrowding undoubtedly extends an epidemic of any kind whether it is small-pox or fever; but I do not think it sets it going.

1846. I think you gave evidence before the Royal Commission with regard to infectious hospitals?—I did.

1847. And you have also suggested valuable methods of conveying small-pox patients by water, and so on?—Yes.

1848. Could you give us your view as to the effect which you think could be produced in London as regards the limitation of small-pox epidemics by careful isolation?—I think the action of the Metropolitan Asylums Board has exemplified that in the most marked degree. The number of small-pox patients that have been removed in the last two years is simply marvellous, almost entirely owing, I believe, to the immediate isolation in each case.

1849. To revert once again to your tables, I understood you to say that while the majority of the cases admitted to the hospital were vaccinated a large majority of those vaccinated cases were vaccinated by public vaccinators?—My inference would be that they were. Of course I do not know whether they were vaccinated by private practitioners or by public vaccinators, but being collected from the absolutely pauper class and coming in under relieving officers' orders, I imagine that they would be vaccinated by public vaccinators.

1850. (*Chairman.*) Would that apply equally to those who came in whether vaccinated or unvaccinated?—Yes, they were all absolutely paupers. It is only within the last year or two that patients have been admitted under any other circumstances.

1851. (*Dr. Collins.*) Do I correctly understand that it is the practice at public vaccination stations, where you presume that the majority of these persons were vaccinated, to carry on the vaccination from arm to arm?—I take it that it is so now, but I do not think it was so 20 years ago.

1852. Not in 1871?—I do not think so. I think there was very often a dearth of vaccine then.

1853. As to the mortality of hospital small-pox formerly, do you think there is any reason to doubt the accuracy of the statement that hospital small-pox before this century gave a mortality of 18 per cent.?—No, I do not know that there is any reason to doubt the correctness of the statement.

1854. Have you formed any judgment in your own mind which would explain the reason why, with the large diluting effect of vaccination, as many as 80 per cent. of small-pox cases being vaccinated, the mortality remains at about 18 per cent. now?—No, I do not know of any explanation that I can give, except that the unvaccinated and the badly vaccinated produced the larger share of the admissions.

1855. Natural small-pox, as you term it, apparently now gives a mortality of 46 per cent.?—Yes, something like that.

1856. But natural small-pox in the last century apparently gave a mortality of 18 per cent.; you have no explanation to offer as to that?—No.

1857. (*Chairman.*) You have said that, including in the vaccinated those who were said to be vaccinated, but as to whose vaccination there was no visible evidence, eight out of ten admitted to hospital would be vaccinated; supposing the statistics of the proportion of vaccinated to unvaccinated were to be anything like correct, the eight vaccinated would have been drawn from a larger proportional population than the two unvaccinated?—Very much larger.

1858. I see, if the addition that I have made is correct, that including in the vaccinated admitted up to the age of five all those who were said to be vaccinated there were 319, whilst of those unvaccinated there were 677?—Yes, I believe that is correct.

1859. If it be the case that the 677 were drawn from 5 per cent. only of the population, there ought to have been out of the other 95 per cent. a number enormously greater than 319 if they were attacked in an equal proportion?—Yes, that would be so.

1860. (*Sir James Paget.*) In regard to the abiding influence of vaccination, up to what you call advanced age, say after the age of 40, I find by your tables that after the age of 40 among those with good vaccination there were 48 cases?—Yes.

1861. After the age of 40 in the unvaccinated there were 79 cases?—Yes.

1862. Therefore there were 48 on one side and 79 on the other; I suppose we may take the proportion of 90 per cent. as vaccinated; if so, the 90 per cent. after the age of 40 had yielded only 48 cases, and the 10 per cent. after the age of 40 had yielded 79 cases?—Yes.

1863. Does that imply an abiding influence even after the age of 40?—I think so.

1864. Those are the good vaccinations. Of the "good" and the "imperfect" vaccinations there were 314 cases after the age of 40, and of the "doubtful" and "not vaccinated" there were 210; therefore there was a much larger proportion of cases after the age of 40 in the "doubtful" and "unvaccinated" than in the "imperfect" and "good" vaccinations?—Yes, showing that the vaccination was still keeping up a considerable amount of protection.

1865. (*Mr. Hutchinson.*) I suppose you are an advocate for the repetition of vaccination?—Certainly.

1866. Supposing that vaccination were carefully repeated once every 15 years of an individual's life throughout the whole population, what should you suppose would be the effect upon the prevalence of small-pox?—It would reduce it most materially.

1867. Do you think that it would practically exterminate it?—I am afraid my experience is not sufficient to enable me to answer that question.

1868. You think it would go a long way in that direction?—It would go a long way in that direction, I have no doubt.

1869. I suppose you quite allow for the wearing out of the cicatrices in good vaccination, and you believe that would be different in different individuals?—Yes; I knew a case of a man of 70 who was brought to hospital with small-pox, who had a typical cicatrix from infancy.

1870. Is not that very exceptional?—Yes.

1871. The original vaccination may have been very good in many cases, and the cicatrix may have worn out?—Yes; the number of cases after 30 or 40 years of age are very few.

1872. Supposing the vaccination to have been recorded as satisfactory, is not the interval between the vaccination and the attack of more importance than the visibility of the cicatrix?—I think so.

The witness withdrew.

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1873. (*Chairman.*) You were appointed an Inspector by the Local Government Board in July 1882?—Yes.

1874. You had previously had some sanitary experience, I believe?—Yes, I was Sanitary Commissioner with the Government of Cyprus from April 1880 till July 1882, and before that I was Medical Officer of Health to the combined Craven district in Yorkshire for two years.

1875. Prior to your investigations at Sheffield you had not had a large personal experience of small-pox?—No, very slight. I had observed a small outbreak in Cyprus in 1880, and I had investigated, in connexion with some fever outbreaks, a prevalence of small-pox at Walker-on-Tyne in 1882, of which there is a published report, and as well an outbreak of typhus fever and small-pox at Gateshead in 1883, of which there is also a published report.

1876. On the 5th of January 1888 you received instructions to inquire respecting the small-pox epidemic at Sheffield?—Yes.

1877. You were instructed to investigate the origin of the first cases there as far as you could?—Yes, and I was also to take into account all influences tending either to extend or to diminish the spread of small-pox, as, for instance, vaccination, re-vaccination, sanitary circumstances, including in that term lodgment of the population, sewerage, excrement disposal, water supply; and I was also to take into account the habits of the people and the influence of the hospitals.

1878. Had the epidemic been prevailing for some time then?—It had been prevailing extensively for about four or five months, but it had commenced as far back as March 1887—the first cases occurred then.

1879. But it had not attained large dimensions till something like four months before you commenced your inquiry?—No.

1880. On the 9th of January last year you commenced your inquiry at Sheffield?—Yes.

1881. Was much alarm felt at that time on account of the spread of the epidemic?—Yes, there was something very much like a panic in the town when I went there first. I found that very much had been done by the sanitary authority and the poor law authorities to secure isolation of the sick; the sanitary authority had a hospital in use at Winter Street for 84 patients, and they were building a new hospital at Lodge Moor for 90 patients; they were working at that day and night, at night by the electric light; they had also a hospital for convalescents at Totley for 60 patients. The Sheffield guardians had made provision for 112 patients, and the Ecclesall Bierlow guardians had provided accommodation for 28 acute cases and for something like 24 convalescent cases. I found, however, that there had been very little concerted action towards the carrying out of the Local Government Board's memorandum with regard to vaccination and re-vaccination. The Sheffield guardians, I may say, had taken officially no action whatever; there had been a considerable number of persons re-vaccinated in the North district, but that was really due to the public vaccinator's own action in that district. In the Ecclesall Bierlow Union the guardians had taken some action, they had established additional stations for vaccination, and they had ordered their vaccination officer to make house-to-house inquiries in the neighbourhood of cases of small-pox. I just now referred to the Local Government Board's memorandum with regard to vaccination and re-vaccination, and as I was directed to see that vaccination was properly organised, I think I had better hand in a copy of that memorandum. (*The paper was handed in. See Appendix IV., page* 246.)

1882. This is a memorandum drawn up by the Local Government Board for the information of boards of guardians and sanitary authorities?—Yes; the copy I put in is dated after the date of my visit, but it is really a reprint of the memorandum that was in force when I was there.

1883. Having conferred with the hospital and sanitary committees of the town council and with the boards of guardians, what action was determined on?—I would say with regard to that we got a joint meeting of the four authorities—the two committees of the town council, the Sheffield guardians, and the Ecclesall Bierlow guardians. It was then decided that a house-to-house inquiry for securing vaccination and re-vaccination and for ascertaining the localities of unreported cases of small-pox should be undertaken; that you will note is in accordance with one of the recommendations of the Local Government Board with regard to the action to be taken in places where small-pox is prevalent. Then, secondly, it was decided that extra facilities should be afforded for vaccination and re-vaccination. Thirdly, that steps should be taken to advertise the precautions to be taken against small-pox, for instance, by putting posters on the walls and distributing handbills, and so on, urging precautions against small-pox. The authorities at once decided to take action in the above directions, and it was proposed at the meeting that the expenses should be borne jointly by all the authorities concerned; but finally the two boards of guardians undertook to do the whole thing at their own expense.

1884. Did that include the house-to-house inquiry for securing vaccination and re-vaccination?—That included the house-to-house inquiry.

1885. Will you inform the Commission what was the method of inquiry and what were the sources of information?—I will first refer to the materials that we obtained from the house-to-house inquiry. In that inquiry there were 38 officers employed; they were to ascertain all the persons who were unvaccinated, and also to ascertain all cases of small-pox that had been unreported to the sanitary authorities.

1886. Who was that work performed by?—By men employed by the guardians; men under the supervision of the vaccination officers for the respective districts. In carrying out those duties I thought we could utilise them in taking a vaccination census, and from what we call our census books a very large amount of information was obtained; these books were issued to the several officers in the two unions. There were two methods of carrying out the work of house-to-house visitation, each of them designed with the intention of securing that no houses should be omitted from the inquiry. In the Sheffield Union the Census machinery was employed. The vaccination officers in the Sheffield Union are also the district registrars of the various districts, and they had had the superintendence of the Census in 1881, consequently they had all the machinery of that Census ready at hand, and that machinery was used. They gave a description to each man of his day's work; in the commencement of his book there was a written description given of the houses he was to visit, and in some districts there was a little map drawn showing exactly where he had to go. In the Ecclesall Bierlow Union a rather different system was employed; the whole of the names of the occupiers in the district that the man was to visit in his day's round were entered in his book, the names being obtained at the superintendent registrar's office; in the evening the men brought these books back: they were looked over by the vaccination officer (who was also sub-district registrar of the district), for the purpose of taking out all new cases of small-pox and making out a list of all unvaccinated children. From time to time this officer made an inspection of the work of these various men to see that they were doing it correctly.

1887. Were all the houses in Sheffield visited in that way?—No, not the whole of them, I believe. I can give you the number that were inspected. The total number that were visited was 59,807.

1888. Is there an estimated total of the number of houses in Sheffield?—There are one or two estimated totals. There is one given me by the borough accountant which will be found on page 219 of my report, where he gives the total number of houses as 65,529, that includes both occupied and unoccupied. Then the waterworks engineer gave another estimate, which is given on page 224, where the total number of houses supplied with water is stated for 1887 to be 68,000, so that there are very varying estimates. I think very probably that the difference between the estimate of the water engineer and that of the borough accountant is due to the different ways of counting the houses. For instance, a back-to-back house is counted as one house in some districts, and in another district it would be counted as two. Again, lock-up shops are separately supplied with water and are in this sense reckoned as houses. I have brought a few of these books which probably the members of the Commission might

like to see; they are not selected, they are taken out of the great collection that was sent to me; the returns mount up, I think, to over 60,000 and weighed something like half a ton. These will be sufficient to show how the returns were made to me. Wherever there had been small-pox there was a blue cross put on the page, and of any house in which there was a small-pox death you will also find an entry of the fact.

1889. Take this first one, "North Sheffield, Nether-" thorpe Street, No. 13. Occupier, Dan Brewin." No entry; what would that mean?—That would be an unoccupied house; each man has a different system of making his entries.

1890. Where you find under "Vaccination," "Yes," would that represent the form of answer given by the parent?—By the parent or householder.

1891. (*Mr. Whitbread.*) "No information," does that mean refused information?—Refused.

1892. Were there many cases in which information was refused?—At page 169 of my report it is stated that "Information was altogether refused to the "enumerators by the inmates of 764 houses; details "of one sort or another were refused in 118 instances"; those were mostly cases of maiden ladies who did not like to tell their age.

1893. Were the refusals to supply information at all localised or were they spread over the whole town?—My impression is that the largest number were in the Ecclesall district; there were 226 in the Ecclesall district. There was another district where I believe there were a number of refusals. In Ecclesall there were several refusals from people who lived in higher class houses.

1894. Generally speaking, were the refusals from people who lived in the better class houses or from poor people?—Certainly not from poor people; they were from people in the better class of houses, as a rule. I had better now say something as to how the corrections were made on these returns that came in. These returns are given in the report, and an analysis of them is also added with the following corrections: they are corrected as regards the deaths from my own personal inquiry as to whether the people were vaccinated or unvaccinated; they are corrected also with regard to children under 10 years of age who were reported at the census to have been vaccinated and to have had small-pox; every such case was personally inspected that could be found.

1895. (*Chairman.*) By "corrected" you mean revised?—Yes, or verified. They might have been corrected in some cases.

1896. "Revised" probably would be the better term to use?—Yes. By "verified" I mean that where a child under 10 years of age attacked by small-pox was reported to have been vaccinated, I inspected the child, and if I found that it was unvaccinated, though entered by the enumerator as vaccinated, it was finally returned in the analysis as unvaccinated. When the returns were being analysed a list was made of every child under 10 years of age who was said to be vaccinated, and to have had small-pox; every one of these cases that was living was personally examined. I have got a couple of these lists here for the West Sheffield district. This one (*showing a list*) will be found to correspond with the first part of Table LVI. on page 110 of my report. This is how it came to me from my clerk. Then, at the same time, a list of all cases that were stated to have had small-pox after re-vaccination, or were stated to have had small-pox after a previous attack of small-pox, were also extracted as special cases. This other such list is for the West Sheffield district, and the list to which it corresponds will be found in Table LX. on page 116. These special cases were personally revised in exactly the same way as the cases of vaccinated children under 10 years of age. Then there is another correction. Any child who had died under one month of age was not included in the deaths; that is, any unvaccinated child under one month of age who had died of small-pox was excluded from the calculations. Most of these corrections are noted here on page 17.

1897. Why did you exclude children under one month? Was it because you presumed that none would have been vaccinated before that age?—I excluded them because most of them had small-pox when they were born, and it would not have been fair to count them as unvaccinated children, as if they had acquired small-pox afterwards.

1898. (*Sir James Paget.*) You have not entered them as deaths from small-pox?—They are not entered in the census calculations and comparisons, they appear in the general mortality statistics. Then there was another correction made in the analysis of the facts respecting invaded houses. That correction was this: any child, whether vaccinated or unvaccinated, which was born three months after the last case of small-pox occurred in the house was not counted as an inmate,—it could not be said to have lived in an invaded house, since the house was not infected at the time of its birth or afterwards; the number of these infants is very small, but if the Commission wish to have them I can give the figures for each district, that is to say, the numbers that were subtracted from the inmates of invaded houses. I think those are the main points to which I need call attention with regard to the census. Then the second source of information was the official registers kept by the vaccination officers. Very shortly after my arrival in Sheffield early in January, I had an analysis made of the whole of the registers for the previous 10 years, so as to ascertain as nearly as possible the amount of default there had been in the vaccination in the Sheffield and Ecclesall unions. The summary table of the vaccination registers for 10 years with regard to the whole borough is given on page 185, viz., Table XCVII. Then there was another source of information, a quite distinct source of information from the census; this was the records that were kept at the Health Office of all new cases of small-pox that were reported; these were kept in a particular form, and I have here abstracts of the whole of the cases reported to the health office with certain particulars; there is the name and address, the age, whether vaccinated or not, and where treated, and the result. There is another particular entered on these lists, that is the exact position that the house in which the affected person lived bore to the Winter Street Hospital.

1899. (*Chairman.*) How were these particulars obtained; were they notified by the medical men attending the case, or in what way were they obtained?—There is a system of voluntary notification in Sheffield, there is no system of compulsory notification; there is a fee of 2*s.* 6*d.* paid to medical men for notifying certain cases of infectious diseases. A considerable number of medical men in Sheffield did notify cases of small-pox; but the records at the Health Office also depended upon the reports of inspectors of nuisances and the information of private people. These (*showing lists*) are the abstracts of the health office records for the different districts week by week. I may say that where there is no entry under the head of "Vaccinated or not," "Vaccinated" is the proper word to insert. I got tired of writing the word so often.

1900. Then besides the sources that you have described to us, were personal inquiries made?—Yes. I made personal inquiries, and when I say I, I should wish it to be understood that my colleague, Dr. Bruce Low, who was with me for a short time, made some of the inquiries. We made personal inquiry with regard, first of all, as I have already said, to every child under 10 years of age who was reported to have had small-pox after vaccination. Then I also made inquiry with regard to the quality of the vaccination performed by public and private vaccinators respectively. That inquiry as to quality was on the lines of the local government inspections; we have very strict rules laid down for our inspections for the parliamentary grant (the sum of money granted to the public vaccinators); and my examination with regard to the quality of the vaccination was made in reference to the standard therein adopted, namely, that the cicatrix should be well foveated, with well-defined margins, and that the aggregate area of the scars should be equal to half a square inch. You will find that the measurements of the scars are given in all the cases where I examined them; and those measurements are not rule-of-thumb measurements, they are done with an instrument which I have here (*showing instrument*) and which we use for the purpose. The scars were all of them measured except where they were very large, where they were obviously over the required measurement. Then I also made an inquiry with regard to every death from small-pox whether in vaccinated or unvaccinated persons. Now with regard to the latter class of inquiry I may say that when I first went to Sheffield I got information from the every day sources. I got information from the doctors who had attended the cases, and from the registrars, and from the registers, and so on, and up to the end of May I accepted that information as sufficient for my purposes. But on June the 1st there was a debate in the

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House of Commons on vaccination, when it was announced that particular inquiry was being made into each of these deaths; and a letter appeared in one of the Yorkshire papers very shortly afterwards, written by a gentleman whom I knew to be very strongly opposed to vaccination, in which it was stated that there was grave objection to accepting information from medical men, and that the information would be very much more trustworthy if it was obtained from the nearest relative, and that information from such relative ought to be accepted as final on the question of vaccinated or not vaccinated. It was also suggested that it was very desirable to know the reason why persons were unvaccinated—why they had never been vaccinated. Further, it was alleged that without doubt in a large number of fatal attacks the previous health in the case of the unvaccinated would be found on inquiry to have been very much worse than the previous health in the case of the vaccinated. I at once saw the value of these suggestions, and I determined forthwith to make inquiry as full as possible with regard to every death, and to ascertain from the nearest relatives the facts, and to accept the facts they gave me. I had these cards printed. (*A card was handed in. See Appendix IV., page* 248). We used these cards for entering every case as we inquired into it. I have a number of sample cards here. You will see how they are filled up and the particulars that were obtained.

1901. "If successful state number of scars"; was that left to the relatives?—Yes. They were personally questioned as to that; but their mere word was not taken as to area, or anything of that kind.

1902. In some of these cases the relatives must have had the assistance of the doctor in filling them up?—Possibly one or two were filled up by help of the doctor.

1903. I should think this was: "Character of small-pox—hæmorrhagic"?—That would be my filling up. After they had told me the character of the disease I should fill that up. I myself made the inquiry, and they gave me the description of the disease in each case.

1904. "If successful state number of scars"; would you make an examination of the scars yourself?—No, the persons were dead:—I would show the relatives the instrument which I now hold in my hand, and say, How big were they; were they as big as No. 3? and they would say, They were as large as No. 1, perhaps; and they would be so entered on the cards. But no use has been made of that information at all; I did not think it was worth reporting on. Then, in addition to the information which we obtained with regard to the deaths, there was a separate inquiry made with regard to every one of the persons who were stated to have had small-pox after re-vaccination. There were three sources of our information as to re-vaccinated persons. We had our census. I have shown you a list of special cases extracted from the returns. Secondly, very soon after getting to Sheffield, I put a letter in the various newspapers in circulation in the district asking to be furnished with the names and addresses of all persons attacked with small-pox after re-vaccination. I also wrote to each doctor in Sheffield a letter, of which I have a copy here, asking for information as to any cases of small-pox observed by him after re-vaccination. Any cases that were reported from any of these sources were examined by me personally, and an account of them with their initials and addresses is given in the report. All cases of second attacks of small-pox were dealt with in the same way. Then the source of infection was traced as far as possible in early cases. It was impossible to trace it after the small-pox began to spread epidemically; but in early cases the sources of infection were traced as far as possible, including many cases that occurred near the Winter Street Hospital. Then I personally inspected, in the manner in which we always do inspect in any sanitary inquiry that we are holding, the sanitary circumstances of Sheffield itself. I examined into the drainage and water supply, the excrement disposal, the condition of the dwellings, and the crowding of the dwellings. That ends the personal sources of information, but there are still some other sources.

1905. There are certain registers I understand from which information was obtained?—Yes, in connexion with the hospitals there are certain registers—the hospital registers. Abstracts were made from them with regard to the type of disease in relation to vaccination. I think, perhaps, it may be convenient at this moment to state that I find a rather important error in one of the tables, Table CXII., on page 207. It is stated in that table that at the Borough Hospital in Winter Street two re-vaccinated cases only were admitted, and that those had the mildest type of the disease. As a matter of fact, three re-vaccinated persons were admitted and one of them died; the only death that we could ascertain of a re-vaccinated person in Sheffield. It ought therefore to be three re-vaccinated and one death; then you must take one off the 71 in the next line; it would be 70 deaths among the vaccinated. Then there were the mortality registers; the tables that are given in my report on pages 226 and 227; namely, the tables of general and special mortality that occurred during 27 years in the borough of Sheffield. These statistics for the years 1861 to 1870 were obtained from registers that had been compiled by the superintendent registrars of the Sheffield and Ecclesall Bierlow Districts for the use of the town council; those registers are deposited in the Free Library at Sheffield. From 1871 to 1886 inclusive, the statistics are obtained from the Registrar-General's annual summaries, and for 1887 from the weekly returns furnished to the Medical Officer of Health. The particulars in the large number of tables that follow CXX., on pages 230 to 247, are obtained for 1861 to 1870 from the town council registers, and from 1871 to 1887 from the quarterly returns of the Registrar-General. Then the particulars as to age at death from various diseases, which are given on pages 258 to 264, were obtained for the first series of years, from 1861 to 1870, also from the town council's registers; and for the second 10 years, from 1876 to 1883, and for 1886 and 1887, they were taken from books which they call the Disease Register Books in the Sheffield Health Office. There are two years break—1884 and 1885—in which two years the books were not kept, consequently the data could not be got. The returns for the district of Upper Hallam were all made out for me by the superintendent registrar of the district.

1906. Does that cover all that you have to say with regard to your sources of information?—I think that gives every source of information.

1907. We will turn next to the results of the inquiry so far as they are connected with the question with which this Commission has to deal?—The inquiry took account of all the nine sub-districts of Sheffield, and treated them each as a separate district, so that we might compare any differences that there might be in sanitary circumstances or the housing or status of the population, in order to ascertain how far these had any influence on the epidemic. The object that I had in view in dividing them in this way was to find out whether any one circumstance had a dominating influence on the epidemic. I have prepared here a map of Sheffield showing the divisions of the districts on a very much larger scale than any map in my report; it gives a very much better notion of the position of the inhabited parts of the borough than the smaller maps that are attached to my report. (*The map was handed in. See Appendix IV., facing page* 248.) You will see on looking at this map that there are four districts known as North, West, South, and Park; these form the old township of Sheffield, and that is the oldest part of the borough. On the map that I have handed in I have marked those particular parts of the town where the dwellings are very much crowded together, where the largest amount of crowding has taken place. You will find on referring to page 219 that, as regards North Sheffield, I state that it is the "most densely and uniformly populated "area within the borough, the density at the census "of 1881 being at the rate of 273 persons per acre. "The sub-district lies generally on a steep incline "sloping to the north-east, east, and south-east." The most thickly-inhabited part of this district is a triangle bounded on the south by Broad Lane (that is the division between the North and West districts), on the west by St. Philip's Road, and on the east by the road traversed by the Sheffield and Hillsborough Tramway line. The houses in that area are almost exclusively occupied by the working classes, a great many of them being unfurnished with any means for through ventilation. Then in West Sheffield there is a similar area which is densely populated; that area may be said to lie between Broad Lane and Tenter Street on the one side, and Portobello Street, Trippett Lane, and Campo Lane on the other. That part includes a number of the old crofts, which are extremely crowded places with very insufficient ventilation of the houses. Then in South Sheffield there is also a crowded area; that

is situated in the northern part of that district, and may be said to be bounded generally on the east by Pond Street, Paternoster Row, and Brown Street, on the south by Furnival Street, and on the north and west by the sub-district boundaries. Then in Sheffield Park, which is another of the old districts of the town, there is a crowded area bounded by Granville Street, Talbot Street, Hampden Street, Park Hill Lane, and Broad Street. Then in Ecclesall there is a crowded portion bounded generally by a line drawn from Clarkson Street to St. Barnabas Church on one side, and on the other two sides by the South and West Sheffield districts. In Brightside there is a crowded district at the Wicker; that lies just between the Manchester, Sheffield, and Lincolnshire Railway and the River Don. There is also another crowded area in the district in the neighbourhood of Pye Bank.

1908. (*Dr. Bristowe.*) What are the circles?—Those have to do with the Winter Street small-pox hospital. I will refer to them directly.

1909. (*Mr. Meadows White.*) The union workhouse is in the north district, is it not?—No, the Sheffield Union Workhouse is in the Brightside district. The Ecclesall Bierlow Workhouse is situated in the Ecclesall district. The Winter Street Hospital is situated in the North district, and there are four circles round it, the largest of which has a radius of 4,000 feet; the radii are respectively 1,000, 2,000, 3,000, and 4,000 feet. The district of Attercliffe and parts of Brightside are very low lying. In the Attercliffe district there is a crowded area lying between the River Don and the Sheffield and Rotherham Railway. The Ecclesall district, except the part that I have mentioned as being crowded, is really the West End of Sheffield where houses are commonly well separated from one another, having grounds round them—houses of the upper class of inhabitants. In Upper Hallam there are some very large houses also, and the houses here are far apart. The whole of this is part of Upper Hallam (*pointing to the map*); it is most of it wild moorland, and the waterworks are situated in that.

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1910. (*Chairman.*) In short, it is only a small portion of Upper Hallam that can properly be said to be in the town?—Yes. I should say that not any part of Upper Hallam was in the town. In considering the effect of sanitary circumstances upon the epidemic, I had to take into consideration also, as well as the house lodgment of the population, the sewerage, the excrement disposal, and the water supply. Now as regards sewerage the whole town has been sewered on one system, it has all been re-sewered within recent years; but there is a point with regard to the house drainage which should be noted: that is, that in the older parts of the town, and in parts of the town where small-pox was most prevalent, there is no connexion between the interior of the houses and the drains. The drains are better disconnected in the poorer parts of the town. In the houses of the wealthier classes in Sheffield you find very much more direct communication between the drains and the interior of the houses.

Adjourned till Friday next at 1 o'clock.

Tenth Day.

Friday, 18th October 1889.

PRESENT:

THE RIGHT HON. THE LORD HERSCHELL in the Chair.

Sir JAMES PAGET, BART.	Mr. JOHN STRATFORD DUGDALE, Q.C., M.P.
Sir CHARLES DALRYMPLE, BART., M.P.	Professor MICHAEL FOSTER.
Sir EDWIN HENRY GALSWORTHY.	Mr. JONATHAN HUTCHINSON.
Mr. WILLIAM SCOVELL SAVORY.	Mr. J. ALLANSON PICTON, M.P.
Dr. JOHN SYER BRISTOWE.	Mr. SAMUEL WHITBREAD, M.P.
Dr. WILLIAM JOB COLLINS.	Mr. F. MEADOWS WHITE, Q.C.

Mr. BRET INCE, *Secretary.*

Mr. FREDERICK WILLIAM BARRY, M.D., Sc.D., further examined.

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1911. (*Chairman.*) When the Commission adjourned you were giving us the different divisions of the town of Sheffield in reference to their special characteristics; have you finished all that you have to say upon that head?—No; I only got, I think, as far as treating the question of sewerage at the time the Commission adjourned. There is one point that I should like to add to my evidence of Wednesday with respect to the estimated number of houses in the borough. I gave two estimates, from the borough accountant's books and from the waterworks engineer's books, but there is a very careful estimate made by the Medical Officer of Health which will be found on page 276 of my report. In that estimate the number of inhabited houses in the borough is stated to be 63,238; that probably is as nearly correct an estimate as any. There was another point as to the number of houses omitted in the census,—the number of houses where persons refused to give information. I have looked into that, and I can give the per-centages of refusals in the different districts. I find that in the Attercliffe district the per-centage was 2·5; in Brightside, 1·1; in North Sheffield, ·9; in the Park, ·4; in South Sheffield, ·8; in West Sheffield, 1·1; in Ecclesall, 1·4; in Nether Hallam, 1·4; and in Upper Hallam, ·3. So that the greatest proportion of refusals were given in the Attercliffe district and in the Ecclesall and Nether Hallam districts.

1912. I suppose those were amongst the most thickly peopled districts?—No, in the most thickly peopled districts we got the smallest proportion of refusals. The most thickly peopled districts are the North, Park, South and West districts. The next point with regard to the sanitary circumstances of the borough has reference to the excrement and refuse disposal. I have entered into that fully on pages 221 and 222 of my report, and there it will be seen that, as regards excrement disposal, Sheffield is very much behind a great many towns. It retains the old privy midden system. At the end of 1887 there were only 4,137 waterclosets to be found in the borough, and those were chiefly in Ecclesall, Nether Hallam, Upper Hallam, and at Pitsmoor, in the Brightside district. In the centre of the town, that is, in West and North Sheffield, the shops and offices and hotels alone were provided with waterclosets. The form of midden that is in vogue in Sheffield is a very primitive one; it consists usually of a pit sunk to the depth of 2 or 3 feet in the ground, and has privies erected on either side of the pit, all of which discharge into it, and the ashes are thrown in at a door at one side. Each of these closets, as a rule, serves for the inmates of two houses, and the average number of closets to each midden is, say, three; consequently each midden serves on an average for the requirements of 30 persons. A very large number of these middens are unroofed and consequently receive much rain-water, and the pits not being cemented they receive the sub-soil water as well, and you have as the result offensive decomposition continually taking place in the middens. The parts of the town where these privies were most offensive, owing to faults of construction, were in the Park and the South and North sub-districts; I think in the order in which I name them. The closets in the Park district were certainly the worst, while those in the South and North were perhaps a trifle better. In a large number of cases these middens are connected with the public sewers, having a small cesspool or "sump," as they call it, between the midden and the sewer, for collecting any solid matter that may have passed through the grating at the bottom of the midden. This, of course, leads to decomposition continually going on in the sewers of the town, and has given rise to smells, which have been very much complained of throughout the borough. Then as regards removal of excrement

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and refuse, the emptying of these privies; is done on a very faulty system. It is not done with any very great regularity, but simply as these places become full,—except in the centre of the town, that is in North and West Sheffield, and parts of the South and Park districts where they are emptied at more frequent intervals. The method of emptying again is a very bad one; the scavengers simply throw the foul material out into the yard, and then it has to be wheeled in barrows from there into the street where it is deposited again, and then it is afterwards thrown into carts and taken away to the railway; or when they have not enough sale for it, it is taken to a tip, situated in the Attercliffe district. There has been a very considerable improvement in the manner in which the emptying of these middens has been carried out during recent years. At the present time they are emptied on an average once in two or three months, except in the centre of the town where they are emptied probably once a fortnight or once in three weeks.

1913. What is the water supply of Sheffield?—The water supply of the borough is all obtained from reservoirs situated in the moorland, supplied from two separate watersheds, those of the Rivelin and the Loxley. The whole town is supplied from one or other of these two sources.

1914. Are those satisfactory sources of water supply?—There has been very considerable complaint of one particular supply causing lead poisoning by the action of the water on the lead pipes.

1915. However, that is not a matter affecting the health otherwise. That generally results, or at least it has been supposed to result, from exceptionally pure water?—In this particular case, at any rate, the water is very pure. Taking the whole of the sub-districts, I have given a summary in the report which it would be well perhaps to read in reference to the effect of sanitary circumstances on the spread of disease. It is given on page 251. There I refer to the matter generally and say: "In studying the comparative mortality statistics "of the several sub-districts of Sheffield, it will be "necessary to keep in mind the following facts with "regard to their general sanitary circumstances: that "the greatest huddling together of houses and persons "is to be found in Sheffield Park, and in North, West, "and South Sheffield; that the above-named sub-districts, together with Attercliffe and a large portion "of Brightside, are inhabited by artizans and by the "poorer working classes of the population, and that "all of them contain a considerable proportion of "back-to-back houses; that prior to 1871 Attercliffe "was comparatively sparsely populated, but that between 1871–81, owing to the development of certain "industries in the sub-district, a very large increase "in the population took place, which, during that "period, owing to the want of accommodation, led to "considerable overcrowding; that Nether Hallam, "although chiefly inhabited by artizans, is a comparatively new district; that Ecclesall forms the 'west "end' of Sheffield, whilst Upper Hallam may be regarded as a purely rural district; that prior to 1883 "considerable portions of Ecclesall, Nether Hallam, "Brightside, and Attercliffe were very imperfectly "sewered; that the use of waterclosets has been almost "exclusively confined to the sub-districts of Ecclesall, "Nether Hallam, Upper Hallam, and portions of Brightside, but that, with these exceptions, the common "privy midden is the almost universal means for excrement disposal still in use, and that the most offensive "forms of these are to be found in the Park, North and "South sub-districts of the Sheffield township; that "the public water supply is now common to all the "sub-districts, but that until 1864 a large portion of "Ecclesall was supplied from private sources, whilst "portions of Nether Hallam were similarly supplied "so late as 1871; and that the common lodging-houses "are situated in the North Sheffield, West Sheffield, "and Attercliffe sub-districts." I proceed now to refer rather more fully to the changes that have been effected with a view to comparison of previous years with the year to which the inquiry has reference. The mortality statistics to which I have already referred are taken for a period of 27 years, which was the longest period for which I could get statistics. In the report these have been divided for comparative purposes into three equal periods of nine years, and there have been certain changes in the sanitary circumstances of the people effected from period to period which it will be necessary to bear in mind when considering the influence of sanitary circumstances upon the health of the population. The three periods of nine years are 1861–69, 1870–78, and 1879–87. On page 248 you will find the particulars. During the first period, 1861–69, Sheffield was rapidly growing into a large town, but comparatively little had then been done to meet the sanitary requirements of the inhabitants. The public water supply was intermittent, and considerable sections of the town were still dependent upon wells and other precarious or doubtfully wholesome sources of supply. The means for excrement disposal were of the most primitive description, and the removal of refuse had not at that time been undertaken by the authority. Considerable portions of the town were still undrained, and even where sewers were in existence they were unventilated and usually in direct communication with the interior of houses. There were not until 1864 regulations in force with regard to the construction of new buildings, nor until 1866 were there any byelaws with regard to the prevention of nuisances. These periods that I have taken also correspond with certain changes in the vaccination law and its administration, which it may be convenient also to notice here. They are noted in my report. During the period 1861–69 vaccination was no doubt obligatory, but no efficient means had been instituted for enforcing the vaccination laws; and, further, prior to 1867 no provision had been made to secure the efficiency of such vaccinations as were performed at the public expense. The second period, 1870–78, was one of transition, both as regards measures of sanitation and of vaccination. The Public Health Act of 1872 gave a very great impetus to the work of sanitary improvement, and it was in consequence of this Act that the first medical officer of health for the borough was appointed, and a health department organised. During this period the public water supply was extended to all parts of the borough, and was rendered constant. Large numbers of privies were roofed over, and accumulations of filth were removed; the scavenging of the borough was undertaken by the sanitary authority, many of the worst houses were pulled down, and some of the streets were widened. Minor improvements were also made in house drainage. Little, however, was done during this middle period to improve the public sewerage; the rivers and streams still received all the liquid filth of the town, the building of back-to-back houses was still permitted, and the sanitary staff was quite inadequate to deal with the various matters requiring attention. With respect to vaccination the obligation on the part of parents to have their children vaccinated was, from 1872 onwards, more rigidly enforced than it had hitherto been, as a result of the appointment of vaccination officers by the respective boards of guardians in accordance with the requirements of the Vaccination Act of 1871. During the third period, 1879–87, further and more rapid improvement has been made in the sanitary circumstances of the population. A complete sewerage scheme has been provided, and the sewage no longer finds its way into the streams. Steady progress has been made in the disconnexion of houses from the sewers. More strict supervision has been exercised to secure the cleansing of the streets and the removal of domestic refuse at frequent intervals. Means have been provided for the isolation of persons suffering from infectious disease, and for the disinfection of infected articles, and the erection of houses unprovided with means of through ventilation has been discontinued. The sanitary staff, although still small for so large a town, has been increased. With regard to vaccination, as will presently appear, the compulsory clauses of the Vaccination Acts have been so efficiently enforced that only a very small per-centage of children born in Sheffield have remained unvaccinated. I think those are the chief facts with regard to the sanitary circumstances of districts and the changes effected in them during the 27 years.

1916. What is the next point to which you wish to call our attention?—There is still one other circumstance that I wish to refer to, and that is the position of the hospitals. The hospital that was provided in Winter Street by the sanitary authority in 1880, is situated near to the west boundary of the North district; it is at the centre of the circles which are marked on the maps. This hospital has on the east side, the North district, which is very thickly populated, as also the South and West districts, which are also to a certain extent thickly populated; on the west side it is very sparsely populated indeed. On the north-west the ground surface falls very rapidly; there is a large valley between the hospital and the houses in Nether Hallam.

1917. (*Professor Michael Foster.*) The points of the compass are not marked on the map which you have handed in?—The top is the north. The general position of the Winter Street hospital you will see on the maps in the report, but you will see it very much more

clearly on the index map I have here, which I used in making the inquiry with regard to hospital influence. The hospital is coloured red, and on the north-west side there are no houses at all within 1,000 feet. The hospital belonging to the Sheffield Board of Guardians is situated on the Pitsmoor Road, in the northern part of the Brightside district. That hospital had, as I have already stated, provision for 112 patients. Then the Ecclesall Bierlow Guardians' Hospital is situated at the Ecclesall Bierlow Workhouse in the Ecclesall district; that, I think, is marked; it is at the south-west corner of the map, almost at the bottom. The Convalescent Hospital used by the Sheffield Town Council was four or five miles out due west from the town at a place called Totley. The new hospital, that which they built during the epidemic, is situated at Lodge Moor in the Upper Hallam district, and is some four miles from the town in an absolutely isolated situation.

1918. (*Chairman.*) The next point, I think, to which you desire to direct attention, has relation to the commencement of the epidemic and its progress?—That is so. I now refer to pages 3 to 7 of my report, where an account is given of the origin and progress of the epidemic. There had been some small-pox in the end of 1886, in that portion of Brightside that I referred to in my previous evidence as being particularly overcrowded, namely, at the Wicker. All these cases, so far as they were known, were removed to the Winter Street Hospital; that is the one marked "Fever Hospital" on the map. It was thought then that there were no other cases left in the borough: but in the third week in March 1887, a clerk in a railway office (the railway office being in the Wicker, and the clerk living in the Park district) had some slight indisposition accompanied by an eruption. This was not recognised as anything of an infectious nature, and he went back to his work after two or three days. About 14 days afterwards the clerks in his office were engaged in making up the annual accounts for the railway, and were working very much overtime—were remaining there till late at night. A number of these clerks 14 days after his return to work also suffered from slight illness; some of them had eruptions, and some of them stayed away in consequence for some days. Two or three of them thought they had chicken-pox; medical men were not always called in; they returned to work all except one. This was a young man of 20 years of age, who developed small-pox of a very virulent type. The disease was recognised in his case and he was sent to the Winter Street Hospital. But in several of the houses where the clerks lived who had suffered trifling indisposition, second cases appeared which were duly recognised as small-pox. From one or two of the houses servants were sent home to their friends as soon as they were seen to be ill, and in this way the disease was spread to other parts of the town. In the map No. I. attached to my report, facing page 4, you will see indicated the places where the earlier cases resided. The cases that I am now referring to are those marked in red. In one or other of the above ways there were several centres of small-pox infection established, and by the end of May, 17 persons, who resided in 12 houses situated in various parts of the Brightside and Park districts, had been attacked by small-pox.

1919. The theory, as I understand, is that those early cases, although they appeared trifling ailments, were really mild cases of small-pox?—I think there is no doubt that those were mild cases of small-pox.

1920. They must have been very mild indeed, must they not?—Very mild, but no milder than hundreds of other cases that occurred later, after small-pox had really got hold of the town and was recognised. Of those 17 persons nine were sent to the hospital, one to a house in the country, and the remainder were treated at home. In addition and almost simultaneously there was another outbreak. It occurred rather earlier than the one that I have just been referring to. It was in the Nether Hallam district, close to the barracks, which are situated due north. These are the cases marked blue on Map I. facing page 4 of my report. In this outbreak there was also an unrecognised case. This was ascertained afterwards; it was not known at the time. A man was reported to have had an attack of chicken-pox, and several of his relatives developed small-pox 14 to 20 days after. First of all, some 14 days after the commencement of his illness, one of his children, and two relatives living in the neighbourhood, developed small-pox of so severe a character that it was at once recognised, and they were sent to the Winter Street Hospital on the 24th of March; but they had been ill for some time before they were sent to the hospital, so the disease was spread to other people in the neighbourhood. There were thus two centres of small-pox commencing at the end of March and the beginning of April 1887, including cases scattered about the Brightside, Park, and Nether Hallam districts. Then some additional cases, showing the way in which the disease spread, were observed. The hospital itself was to blame for direct infection in one or two cases, and these are referred to in full on pages 4 and 5 of my report. One instance was that of two brothers who resided in a hitherto uninfected part of North Sheffield, and who were sent to the hospital in the middle of the borough to be treated for what was thought to be small-pox. The elder, aged two years and a half, had been vaccinated; the other, aged 14 months, had not. The younger child was suckled whilst in hospital by a woman who was suffering from small-pox, and who was one of the persons included in the outbreak that is marked in blue on the map. Her own child was not attacked and had been left at home. After remaining in the hospital for about a fortnight the two children were discharged, as the medical officer found that they had not been suffering from small-pox. The elder one remained in good health, but the younger one shortly after his return home developed small-pox of a severe type, and was re-admitted to the hospital on the 30th of May. That was one case of direct infection in the hospital. Another case was that of a girl resident in the Upper Walkley district of Nether Hallam. She was being treated in the hospital for scarlatina, and she was discharged as "well" of scarlatina on June the 8th. Four days afterwards she developed small-pox evidently acquired in the hospital, and was re-admitted. There was another similar case, that of a woman, who was previously resident in the Brightside district, a different part of that district to where the previous cases occurred. She was also being treated in the hospital for scarlatina, and evidently acquired small-pox in the hospital, as she was discharged from hospital on June the 4th, and was re-admitted with small-pox on June the 14th.

1921. (*Sir Edwin Galsworthy.*) Was the hospital one used for scarlet fever and small-pox?—Yes. There are four pavilions in the hospital.

1922. What is the distance between those pavilions?—It is stated on page 268 that the ends of the pavilions of the hospital are 30 feet apart. But I may say that the nurses were going about from one pavilion to another so that there were direct means of carrying the infection within the hospital itself. On referring to map No. I. it will be seen that at an early period small-pox had established itself over a very wide area involving four districts, Brightside, Nether Hallam, North Sheffield, and Sheffield Park. The whole of the cases which had occurred up to the end of May, and of which any record could be obtained, were, with three exceptions, traceable to cases included in one or other of the outbreaks already noticed. After that date I did not try to trace the infection in particular cases, as the disease had become so widespread by that time. You will find the general table, Table II., on page 6 of my report, giving the number of new cases occurring in the different districts and the date of their occurrence. This table also shows where the patients were treated, the cases that were removed to hospital, and where the deaths occurred. It will be noticed that up to August 1887 the great majority of the cases were treated in the Winter Street Hospital. After this time, in consequence of want of accommodation a large proportion had to be treated at their own homes. The total number of cases of small-pox reported to have occurred in Sheffield from the commencement of the epidemic in March 1887 to March 31st, 1888, was 6,088. Of these, 1,798, or 29·4 per cent., were treated in one or other of the four hospitals, and 4,290, or 70·6 per cent., in their own homes. Of the total cases 590, or 9·6 per cent., proved fatal. In Table II. I may point out that the districts are arranged exactly in the order in which they were invaded. The first district to be invaded was Nether Hallam, followed by Sheffield Park, then Brightside, North Sheffield, Ecclesall, Upper Hallam, West Sheffield, South Sheffield, and Attercliffe. Table III. shows the number of attacks and of deaths from small-pox referable to the several sub-districts during the 13 months ending March the 31st, 1888, together with the number in each instance of attacks and deaths per 1,000 of the estimated populations. It might perhaps be convenient to have that table added to my evidence; it is as follows:—

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Registration Sub-District.	Population estimated to middle of 1887.	Total Attacks of Small-pox reported from March 1887 to March 31st, 1888.	Total Deaths from Small-pox during Epidemic to March 31st, 1888.	Small-pox Attack Rate per 1,000 of estimated Population.	Small-pox Death Rate per 1,000 of estimated Population.
Attercliffe -	36,602	506	57	13·7	1·58
Brightside* -	61,732	1,144	99	18·5	1·60
North Sheffield -	39,241	1,374	140	35·0	3·57
Sheffield Park -	20,451	481	42	23·5	2·05
South Sheffield -	18,077	304	38	16·8	2·10
West Sheffield -	13,373	464	61	34·7	4·56
Ecclesall† - -	77,085	927	87	12·1	1·13
Nether Hallam -	47,569	815	65	17·2	1·37
Upper Hallam (part of).	2,868	13	1	4·5	0·35
Borough of Sheffield.	316,288	6,088	590	19·3	1·86

* Including Sheffield Union Workhouse.
† Including Ecclesall Bierlow Union Workhouse.

Before considering the small-pox mortality of different districts, and taking matters exactly in the order in which I made inquiry, I would refer to a particular incidence that occurred in the neighbourhood of the Winter Street Hospital. Before I went to Sheffield, people had noticed, and petitions had been sent up to the Local Government Board with regard to, a particular incidence which was said to have occurred in the neighbourhood of the Winter Street Hospital. I was directed to make particular inquiry into this special incidence, and I think it is necessary to refer to it here because it has greatly complicated the question as to the effect of sanitary circumstances as such, upon the epidemic. On page 275 of my Report, Table CXLIII., I have shown, by a method similar to that adopted with regard to inquiries that had been held with reference to the Fulham Small-pox Hospital, the number of houses newly infected by small-pox each fortnight, from the commencement of the epidemic to the third week of March 1888, in a special area immediately around the hospital, and in the rest of the borough. I may here say that a house was regarded as being infected 13 days before the appearance of the small-pox symptoms in the first case that occurred in that house, 13 days being adopted as the average incubation period of small-pox. The special area which is marked on the map consists of a district bounded by a circle with a radius of 4,000 feet and having the hospital as its centre. This area is further divided into a central circle 0 to 1,000 feet from the hospital and three successive zones, 1,000 to 2,000 feet, 2,000 to 3,000 feet, and 3,000 to 4,000 feet distant respectively from the hospital. The number of houses newly infected fortnight by fortnight in each of these sub-divisions of the special area is given in columns 5 to 8, Table CXLIII., on page 275. The total number of houses actually comprised within this area, that is to say, in the area of 4,000 feet radius, was 18,204, whilst the total number of houses in the rest of the borough was estimated to be 45,034, the latter is the estimate I have already referred to that was made by the medical officer of health. The numbers of houses situated within the small central circle and within the three successive zones were 1,140, 3,413, 5,688, and 7,963 respectively. The number in each hundred of houses newly infected in each of the four zones in the whole of the special area, and in the borough outside that area during each fortnight is given in columns 11 to 14, 15, and 16 of the table. In the table I have also given for similar periods the total number of small-pox cases admitted to all the hospitals within the borough, column 1; the average daily number of patients treated in the Winter Street Hospital, column 2; and the number of acute cases received into the same hospital, column 3, as follows:—

Total Acute Small-pox Cases received into Hospitals within the Borough of Sheffield.	Average Daily Number of Small-pox Patients under Treatment in Borough Hospital, Winter Street.	Acute Cases of Small-pox admitted to Borough Hospital, Winter Street.	Fortnight ending	Within 4,000 Feet of the Hospital Houses becoming newly Infected.				In the Borough of Sheffield,—Houses becoming newly Infected.		*The same in Rates per cent. in Houses*					
				Of which situate											
				In Circle 0-1,000 Feet from Hospital.	In Zone 1,000-2,000 Feet from Hospital.	In Zone 2,000-3,000 Feet from Hospital.	In Zone 3,000-4,000 Feet from Hospital.	In Special Area 0-4,000 Feet from Hospital.	In the rest of the Borough.	*0-1,000 Feet Circle.*	*1,000-2,000 Feet Zone.*	*2,000-3,000 Feet Zone.*	*3,000-4,000 Feet Zone.*	*In the Special Area.*	*In the rest of the Borough.*
Col. 1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.
—	—	—	26 February 1887 -	—	—	—	—	—	1	—	—	—	—	—	·00
—	—	—	12 March „ -	—	—	—	—	—	3	—	—	—	—	—	·007
3	3	3	26 „ „ -	—	—	—	—	—	—	—	—	—	—	—	—
—	3	—	9 April „ -	—	—	—	—	—	6	—	—	—	—	—	·01
1	4	1	23 „ „ -	1	—	—	—	1	6	·09	—	—	—	·00	·01
7	8	7	7 May „ -	1	1	—	1	3	3	·09	·03	—	·01	·02	·007
8	10	8	21 „ „ -	—	—	—	—	—	2	—	—	—	—	·00	·004
4	14	4	4 June „ -	4	2	2	4	12	8	·35	·06	·03	·03	·07	·02
19	22	19	18 „ „ -	3	3	2	5	13	1	·26	·09	·03	·06	·07	·00
18	30	18	2 July „ -	6	—	1	3	10	5	·53	—	·02	·04	·06	·01
14	36	14	16 „ „ -	20	17	8	4	49	11	1·75	·50	·14	·03	·27	·02
56	52	55	30 „ „ -	8	13	6	5	32	5	·70	·38	·11	·06	·18	·01
39	67	38	13 August „ -	22	13	7	7	49	27	1·93	·38	·12	·09	·27	·06
63	71	61	27 „ „ -	16	34	23	11	84	28	1·40	1·00	·40	·14	·46	·06
52	80	43	10 September „ -	10	9	12	8	39	17	·88	·26	·21	·10	·21	·04
46	84	29	24 „ „ -	21	49	23	22	115	50	1·84	1·43	·40	·28	·63	·11
59	Beds all occupied on average.	42	8 October „ -	12	51	45	38	146	60	1·05	1·49	·79	·48	·80	·13
96		78	22 „ „ -	8	69	49	39	165	67	·70	2·02	·86	·49	·91	·15
98		65	5 November „ -	22	38	42	39	181	132	1·93	1·70	·74	·74	·99	·29
120		91	19 „ „ -	9	43	50	70	172	156	·79	1·26	·88	·88	·94	·33
126		85	3 December „ -	8	36	46	68	158	156	·70	1·05	·81	·83	·87	·33
115		76	17 „ „ -	8	31	47	56	142	214	·70	·91	·83	·70	·78	·48
137		81	31 „ „ -	8	25	45	73	149	312	·70	·73	·76	·92	·82	·69
148		77	14 January 1888 -	12	57	58	80	217	318	1·05	1·67	1·02	1·13	1·19	·71
122		69	28 „ „ -	7	41	58	108	214	382	·61	1·20	1·02	1·36	1·18	·85
140		72	11 February „ -	8	21	31	59	119	326	·70	·61	·53	·74	·65	·73
89		54	25 „ „ -	9	15	28	45	97	268	·79	·44	·49	·56	·53	·60
103	*	52	10 March „ -	2	9	12	32	55	239	·17	·26	·21	·40	·30	·53
83	*	2	Week ending 17 March.	—	2	2	4	8	63	—	·06	·03	·05	·04	·14
		1,144	12 February 1887 to 17 March 1888	225	599	595	811	2,230	2,866	19·74	17·55	10·46	10·19	12·26	6·37

* Winter Street Hospital patients removed to Lodge Moor.

1923. (*Chairman.*) I notice that the proportion of attack as compared with the rest of the town appears to be higher in the second circle, in the 1,000 to 2,000 feet, than in the circle next the hospital, the 0 to 1,000 feet. You give the general rate in the special area and the number of attacks as compared with the rest of the borough in column 15; and columns 11 to 14 give it in each of the circles beginning with the nearest and going to the furthest. The second column appears to consist very frequently of higher figures than the first column; have you any suggestion to account for that?—That applies rather to the second six months of small-pox, previously the small central circle shows higher rates; if you take the whole period, you will find at the bottom of columns 11 and 12 the total rates for central circle and next succeeding zone given as 19 and 17; so that the central circle really had the heaviest incidence if you take account of the whole period of hospital operations. From the commencement of the epidemic to March 17th, 1888, it will be seen that of 5,096 houses infected 2,230 were situated in the special area and 2,866 in the rest of the borough. The proportions relatively of these numbers to the total houses situated inside and outside the special area were 12·26 and 6·37 per cent. respectively, the incidence of small-pox on the special area therefore being almost double that on the rest borough.

1924. (*Mr. Picton.*) May I ask whether you have any means of saying what proportion of those cases occurred in the northern or north-west semi-circle and what proportion in the south-west?—I have not.

1925. You pointed out to the Commission the other day certain crowded districts which are all situated within your circle, but which are at the lower part of it, the south-west?—Yes, on the map which I myself handed in on Wednesday (*see Appendix IV., facing page* 248) you will see marked crowded portions of the west district, which come into the second, third, and fourth zones, and as well as crowded parts of the north district which come very slightly into the second, but chiefly into the third and fourth zones.

1926. Have you been able to distinguish between the effect of the infection from the hospital on the one hand and the effect of crowded neighbourhoods on the other?—No, I am afraid not; the matter is a very complex one.

1927. (*Mr. Meadows White.*) These maps in your report would show something of the sort, would they not?—They would to some extent. The red spots are put exactly on the localities of houses as nearly as may be.

1928. Would not these maps taken together show the spots?—They would in a rough way; it might be expressed roughly.

1929. (*Chairman.*) It struck me that for a considerable number of weeks or fortnights the incidence of the attack in the second circle appeared to be greater than in circle No. 1, but that appears not to have occurred until for some little time there had been a considerable amount of attack in circle No. 1; then I suppose circle No. 1 would become a centre of infection for circle No. 2, and then you find a considerable increase in circle No. 2; might that be the explanation?—I think that is a very probable explanation. You will find that that runs through all the circles. No. 1 is first, and then No. 2 gets a very great increase, and then No. 3 gets an increase later still, and No. 4 gets its increase later still.

1930–1. (*Dr. Bristowe.*) This table goes to the end of the epidemic, does it not?—Not to the end of the epidemic; to the end of the period to which my inquiry was directed.

1932. It was dying out then?—It was. As nearly as possible the exact position of all these houses is shown on the maps II. to XXV.

1933. (*Professor Michael Foster.*) The maximum is much later in No. 2 than in No. 1, and later again in No. 3?—Yes. Then the exact houses that were attacked in the first circle are shown in the second series of maps, the maps beginning from XXVI. and going on to XXXIX. Map XXXIX. shows the whole of the houses in the first circle that became infected during the whole epidemic. In following that special hospital incidence I would call attention to the table on page 278—that is, Table CXLIV., which gives, for the 13 months from February 1887 to March 17th, 1888, the number of acute cases of small-pox received into the Borough Hospital, Winter Street, during six successive periods, and the extent to which, during these periods, houses in the special areas within 4,000 feet of the hospital, and houses in the rest of the borough of Sheffield, were newly infected by small-pox as follows:—

Total Acute Small-pox Cases received into Hospitals within the Borough of Sheffield.	Average Daily Number of Small-pox Patients under Treatment in Borough Hospital, Winter Street.	Acute Cases of Small-pox admitted to Borough Hospital, Winter Street.	Periods (varying use of Winter Street Hospital).	Within 4,000 Feet of the Hospital Houses becoming newly Infected, of which situate				In the Borough of Sheffield Houses becoming newly Infected.		*The same in Rates per cent. of Houses.*					
				Under 1,000 Feet from Hospital.	In Zone 1,000–2,000 Feet from Hospital.	In Zone 2,000–3,000 Feet from Hospital.	In Zone 3,000–4,000 Feet from Hospital.	In Special Area within 4,000 Feet of Hospital.	In the Rest of the Borough.	0–1,000 Feet Circle.	1,000–2,000 Feet Zone.	2,000–3,000 Feet Zone.	3,000–4,000 Feet Zone.	In the Special Area.	In the Rest of the Borough.
1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.
4	1	4	From commencement of epidemic to April 21rd, 1887 (pre-hospital period) 2 months	1	—	—	—	1	16	0·09	—	—	—	0·00	0·03
15	9	15	April 23rd, 1887, to May 21st, 1887 (minor operations of hospital) - - 4 weeks	1	1	—	1	3	5	0·09 | 0·03 = 0·04		— | 0·03 = 0·00		0·02	0·01
3	41	209	May 21st, 1887, to August 27th, 1887 (first sub-period of major operations of hospital) 14 weeks	79	82	49	39	249	85	6·93 | 2·51 = 3·53		0·85 | 0·49 = 0·64		1·87	0·19
89	84	348	August 27th, 1887, to November 19th, 1887 (second sub-period of major operations of hospital) - - - - 12 weeks	82	279	221	236	818	482	7·20 | 2·17 = 7·98		3·88 | 2·97 = 3·20		4·50	1·07
877	84	514	November 19th, 1887, to February 25th, 1888 (third sub-period of major operations of hospital) - - - - 14 weeks	69	226	311	490	1,096	1,976	5·26 | 6·62 = 6·28		5·48 | 6·87 = 5·92		6·02	4·50
185	*	54	February 25th, 1888, to March 17th, 1888 (decline of hospital operations) 3 weeks	2	11	14	36	63	302	0·17 | 0·32 = 0·23		0·24 | 0·45 = 0·30		0·35	0·67
1,775	—	1,144	Whole period from commencement of epidemic to 17th March 1888 - - -	225	720	595	811	2,230	2,866	19·75 | 17·55 = 18·10		10·46 | 10·19 = 10·29		12·26	6·37

* All Patients transferred to Borough Hospital, Lodge Moor.

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This gives the special incidence for certain periods. I have divided the whole epidemic into six periods. The first period, from the commencement of the epidemic to April the 23rd, 1887, which may be called the pre-hospital period, is a period of two months, during which only four cases were admitted into hospital. The second period, from April the 23rd, 1887, to May the 21st, 1887, which may be called the period of minor operations of hospital, is a period of four weeks, during which 15 cases only were received. Then in a third period, from May the 21st, 1887, to August the 27th, 1887, which may be called the first sub-period of the hospital being in full use, there were 209 cases admitted, and there was an average daily number of small-pox cases in hospital of 41; and it is during that period that you see the incidence to be specially marked in the neighbourhood of the hospital, that being where it first shows itself. On reference to the table, columns 11, 12, 13, and 14, it will be seen that during that period in the first circle there was an incidence of 6·93 per cent., in the second circle it was 2·41 per cent., in the third circle ·86 per cent., and in the fourth circle ·49 per cent.; or, taking those together, for the first two circles within 2,000 feet of the hospital it was 3·53 per cent. for these inner circles, as against ·64 per cent. for the outer circles, whereas in the borough the incidence was only ·19 per cent. of the houses.

1934. (*Mr. Meadows White.*) You do not include the hospital itself, I suppose?—No. Then the fourth period is taken from August the 27th, 1887, to November the 19th, 1887, that is a period of 12 weeks. During that time 348 acute cases were admitted into the hospital, and there was an average daily number of 84 small-pox cases under treatment. During that period the incidence on the first circle was 7·20 per cent. of the houses; on the second 8·17 per cent.; on the third 3·88 per cent.; and on the fourth 2·97 per cent.; or taking them in two circles of 2,000 feet each on the first 2,000 feet it was 7·92 per cent.; and on the second it was 3·30 per cent.; whereas the incidence in the rest of the borough was 1·07 per cent. During the fifth period, which is taken from November the 19th, 1887, to February the 25th, 1888, a period of 14 weeks, 514 cases were admitted to the hospital, and the hospital had a daily average of 84 cases under treatment. In this period the number of houses infected in the first circle were 5·26 per cent.: in the second 6·62 per cent.; in the third 5·48 per cent.; and in the fourth 6·27 per cent.; or, taking them as before in two circles, in the first 2,000 feet it was 6·28 per cent., and in the second 5·92 per cent.; whereas in the rest of the borough the rate was 4·40 per cent.; still showing a very considerable excess of prevalence in the hospital area as against the rest of the borough. The last period that I was able to show was only for a short time of three weeks, after the hospital discontinued to receive patients. There were 54 actually admitted, but they were sent away to the borough hospital at Lodge Moor almost immediately after their admission, and there were practically no patients in the hospital. I think only one patient was left over until the end of the period. During this time the infections of houses fell at once; in the first circle the rate was ·17 per cent., in the second it was ·32 per cent., in the third ·24 per cent., and in the fourth ·45 per cent.; whereas in the rest of the borough it was ·67 per cent.

1935. (*Sir Edwin Galsworthy.*) At that time how was the hospital supplied? Was there free communication between the tradespeople of the neighbourhood and the hospital?—You will find that an account of the regular and occasional visitors to the hospital is given in full on page 279 of my report. The tradesmen supplying the hospital delivered their goods at a side door of the administrative block, and none of them came necessarily into communication with patients or with actual attendants on the sick.

1936. Then the tradespeople resided near the hospital, possibly?—No, I should say not; in scarcely any case would the tradespeople reside near the hospital, because the hospital gets its goods from the town proper.

1937. (*Professor Michael Foster.*) Would they reside outside your last zone?—I could not say that for certain. The chief business part of the town is in the High Street and the Far Gate; that is the division line between the south district and the west.

1938. And some of it stretches, does it not, beyond your last circle?—Yes; the business part of the town is most of it outside these circles altogether.

1939. (*Dr. Collins.*) Have we the date at which the hospital was closed for the admission of small-pox patients?—The 17th of March is practically the date at which the hospital was closed, but at an antecedent date it had in effect ceased operations. With regard to the earlier cases that occurred in this hospital area, I inquired into every case to ascertain whether there had been any direct communication with previous cases or with the hospital, and I give an account of most of those at the bottom of page 279. By comparing the first map, map No. I., in the early part of my report with map No. II. and with the following maps, it will be at once seen how the incidence of the earlier cases was transferred from the outside area to the inside after the cases began to be removed to the hospital. Taking the first two months of the epidemic, ending April the 23rd, a period during which, as I have already stated, only four small-pox cases were treated in the Winter Street Hospital, 17 houses in the whole borough were infected, and only one of these was in the special area. You will see it marked in map No. II. That was a case where direct infection was probable. In the next four weeks, April 23rd to May 21st, already referred to as the period of minor operations of hospital, during which 15 cases were treated there, eight houses became infected, three of them in the special area. Those are shown in map No. III.

1940. (*Mr. Meadows White.*) These successive maps show new cases?—All new houses infected.

1941. But you do not show the old cases as well?—No, those are shown only as regards the first circle in the larger set of maps.

1942. (*Dr. Bristowe.*) You do not show the number of cases but only the houses?—Only the houses.

1943. Do you know at all the number of cases occurring in each circle?—I have a record of the number of cases, but those are not given in the report. Taking map No. III., as regards two out of the three houses which were situated in the first and third zones, there was history of possible direct exposure of the first cases in the houses to antecedent small-pox. As regards the third house, as you will see from a larger map, map No. XXVII., it was immediately in the rear of the hospital; and here no exposure of the first sufferer could be traced, and there was said to be no communication whatever between the hospital and the inmates of that house. In the next map, map IV., which deals with the two weeks ending June the 4th, during which there was a daily average of 14 small-pox patients under treatment in the hospital, you will see that a considerable number of new houses were infected; the figures are given in the last table but one that I have read. (*See Question* 1922, *page* 32.) In this fortnight, out of 20 houses newly infected in the borough, no less than 12 were situated in the special area. Of the 12, four were in the inner circle, two in the first zone, two in the second zone, and four in the third zone. In the case of two only out of the 12 could history be obtained of likely exposure of the person suffering small-pox to an antecedent case of the disease. As regards the other 10 no sort of personal communication with antecedent small-pox in the town or in the hospital at such time as would account for their attack could be discovered. In the larger maps you will see that I have always shown the antecedent invasions by small-pox. The particular houses that became infected in any given fortnight are shown in red, whereas all the previously infected houses are shown in blue; so that an idea can be formed as to the inter-communication that might have taken place between one house and another. After June I did not attempt to trace infection in individual cases, the centres of infection being so numerous; moreover, it was so very long after the commencement of the outbreak when I held the inquiry that this could not usefully be done. Taking the whole epidemic, I have given a summary of the hospital incidence at the bottom of page 277, where I say: "To sum up the whole period "of hospital operations from the commencement of the "epidemic in 1887 to March the 17th, 1888, the incidence of small-pox on houses within the special area "was nearly twice as great as on houses in the rest "of the borough, and the incidence on the central "circle and zone nearest the hospital was nearly twice "as great as on the two outer zones of the special "area."

1944. (*Mr. Meadows White.*) Map XXXIX. shows the aggregate incidence?—Yes, in the first circle.

1945. It is curious that there are no houses on the western half of that?—On the western half there are no houses, and generally the houses of the central circle are not nearly so crowded together as they are in a great many other parts of the borough and in some of the outer zones. There is much more crowding in the third and fourth zones than in the first circle.

1946. It is pretty thickly infected?—Yes.

1947. (*Mr. Picton.*) But it is marked as thickly populated in some of these maps?—Yes, in the small maps of my report.

1948. And that densely populated district extends up to the fever hospital?—Yes. These maps are of course very much reduced and do not show the gradations to the same extent as the map which I handed in on Wednesday. There you can judge almost from the width of the streets and the distance of the houses one from another which are the crowded districts; and on the map which I handed in on Wednesday last I have marked the districts where over crowding of houses on area actually has occurred to the greatest extent.

1948a. (*Chairman.*) Do you wish to say anything further as to the question of sub-district incidences of the disease in the recent as compared with former epidemics?—In reference to the subject of sub-district incidences of small-pox in 1887–88 compared with those of former epidemics in Sheffield, in Table CXXXII., which is given on page 255 of my report, is shown the number of deaths registered from small-pox in each sub-district of Sheffield during the epidemics of 1857–58, 1863–64, 1868–69, 1871–72, and 1887–88, together with the small-pox death-rates per thousand of the population estimated to be living in each sub-district in the several periods. That table exhibits considerable variations from epidemic to epidemic in the incidence, actual and relative, of fatal small-pox on certain of the sub-districts, and especially conspicuous differences in 1887–88 in these incidences from any which had obtained in previous epidemics. In illustration of what is in effect a new departure in 1887–88 of small-pox at Sheffield in the matter of sub-district incidences, Summary Table CXXXIII. has been drawn up. This table gives the rank *quâ* mean small-pox death-rates in epidemics prior to 1887–88 of the several sub-districts; the mean rates of each sub-district and of the borough in the previous epidemics referred to; the extent to which the above mean small-pox death-rates of the sub-districts severally exceeded or fell short of the mean small-pox death-rate of the borough; the actual small-pox death-rates in 1887–88 (to March 31st, 1888) of each sub-district of the borough, and the extent to which in 1887–88 the sub-district small-pox death-rates severally exceeded or fell short of that of the borough for the same period; as follows:—

Order or Rank of Sub-districts.	In four previous Epidemics: 1857–58, 1863–64, 1867–68, and 1871–72.		Epidemic 1887–88 (to March 31st, 1888).	
	Mean Small-pox Death Rates.	Ratio of Mean Sub-district Rates to Mean Borough Rate; latter = 100.	Small-pox Death Rates.	Ratio of Sub-district Small-pox Death Rates to Borough Rate; latter = 100.
Column 1.	2.	3.	4.	5.
(1.) North Sheffield	4·77	+ 58 per cent.	3·57 (2)	+ 92 per cent.
(2.) Brightside	3·75	+ 24 „	1·60 (5)	− 14 „
(3.) Attercliffe	3·58	+ 19 „	1·58 (6)	− 15 „
(4.) South Sheffield	3·39	+ 12 „	2·10 (3)	+ 13 „
(5.) West Sheffield	2·95	− 2 „	4·56 (1)	+145 „
(6.) Sheffield Park	2·79	− 8 „	2·05 (4)	+ 10 „
(7.) Nether Hallam	1·74	− 42 „	1·37 (7)	− 26 „
(8.) Ecclesall	1·57	− 48 „	1·13 (8)	− 39 „
Borough of Sheffield	3·02	—	1·86	—

Upper Hallam is excluded on account of the smallness of the figures.

This summary table, while showing incidentally the comparative insignificance of the recent epidemic as it affected the borough as a whole (that is about one half of what the previous four epidemics had been, taking the mean rate of the four epidemics) exhibits a marked change of rank, as compared with previous epidemics, of certain sub-districts in the matter of gravity of small-pox incidence. Of four sub-districts formerly especially prone to suffer heavily from small-pox, only two are found in 1887–88 with rates above that of the borough, while other four districts formerly least prone to suffer heavily from small-pox have in 1887–88 suffered, as compared with the borough as a whole, higher death-rates than in previous epidemics. Among the latter, and at the head of the list, stands West Sheffield, with an actual rate of 50 per cent. higher than ever before, and 145 per cent. in excess of the current rate of the borough. Second and third come North Sheffield and South Sheffield, both formerly prone to small-pox, but now with rates less than their average in previous epidemics, though 92 and 13 per cent. respectively above the current rate of the borough. Sheffield Park stands fourth, for the first time, with a rate 10 per cent. above that of the borough. The remaining four sub-districts, all of them with actual rates below that of the borough, include Attercliffe and Brightside, formerly prone to suffer heavily from small-pox, and as well Nether Hallam and Ecclesall, which have already been referred to, as sub-districts not formerly especially prone to small-pox, but bearing in 1887–88 a larger share of the borough rate than ever before. It will be obvious, from what has already been said, that the different incidence in 1887–88, whether in increase or in decrease of fatal small-pox on sub-districts, cannot well have been related to changes in their general sanitary circumstances or in the condition of their vaccination, and the question arises how far the rank in 1887–88 of at any rate some of these sub-districts has been influenced by their proximity to the Winter Street Hospital, which had not at the date of previous epidemics been built.

1948b. Your conclusion being that the proper inference to be drawn is that the change arose from the effect produced by the hospital?—Yes. In order to facilitate the study of the differences of incidence of small-pox (non-fatal as well as fatal) on the several sub-districts at different periods of the epidemic of 1887–88, I have given in Table CXXXIV. for each sub-district of Sheffield the number of attacks of small-pox which were reported to have occurred (together with the small-pox attack rate per 1,000 of the population) dur-

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ing four successive periods—the four months ended June 30th, 1887, and in each of the quarters ended September 30th, December 31st, 1887, and March 31st, 1888, respectively, as follow :—

District.	Number of Cases of Small-pox reported to have occurred during					Population estimated to middle of 1887.	Small-pox Attack Rate per 1,000 of the Population during				
	Four months ended June 30th, 1887.	Quarter ended September 30th, 1887.	Quarter ended December 31st, 1887.	Quarter ended 31st March 1888.	Thirteen months ended March 31st, 1888.		Four months ended June 30th, 1887.	Quarter ended September 30th, 1887.	Quarter ended December 31st, 1887.	Quarter ended March 31st, 1888.	Thirteen months ended March 31st, 1888.
Column 1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.
Attercliffe - - -	—	10	92	464	566	30,092	—	·28	2·55	12·84	15·67
Brightside - - -	23	38	337	746	1,144	61,732	·37	·61	5·46	12·08	18·52
North Sheffield - - -	17	170	701	486	1,374	39,241	·43	4·33	17·82	12·38	34·96
Sheffield Park - - -	3	11	98	309	481	20,451	·15	·54	4·78	18·02	23·51
South Sheffield - - -	—	4	112	188	304	18,077	—	·22	6·25	10·40	16·87
West Sheffield - - -	2	28	217	217	464	13,373	·15	2·09	16·23	16·23	34·70
Ecclesall - - -	2	50	363	512	927	77,085	·03	·65	4·71	6·64	12·02
Nether Hallam - - -	12	113	319	371	815	47,369	·25	2·39	6·74	7·83	17·21
Upper Hallam - - -	1	2	1	9	13	2,868	·35	·70	·3	3·14	4·51
Borough of Sheffield -	60	426	2,240	3,362	6,088	316,288	·19	1·35	7·08	10·63	19·2

From the consideration of the table it will be seen that (omitting any reference to Upper Hallam, where the figures are too small to give trustworthy results) the greatest rates of small-pox attack (both actual and relative) in the four months ended June 1887 occurred in North Sheffield, Brightside, and Nether Hallam (the two last named being, as before noticed, the districts in which small-pox first made its appearance) ; that in the quarter ended September 30th, 1887, the rates of attack (actual and relative) were highest in North Sheffield, West Sheffield, and Nether Hallam, which were followed at a considerable distance by Ecclesall and Brightside; that in the quarter ended December 31st, 1887, attack rates (actual and relative) were highest in North and West Sheffield, which were followed at a considerable distance by Nether Hallam and South Sheffield, and that in the quarter ended March 31st, 1888, the order was Sheffield Park, West Sheffield, Attercliffe, North Sheffield, Brightside, and South Sheffield. It will thus be seen that there have been throughout the four periods under consideration considerable changes in the sub-district incidences, and that whilst in the first three periods the excess of incidence was either confined to the districts into which the disease was originally introduced or to the districts bordering upon and within a certain radius of the Winter Street Hospital, excess of incidence in the last period affected other districts. It is considerations of the above sort which dispose me to regard the influence of the Winter Street Hospital as having overshadowed the influence of sanitary circumstances in determining exceptional incidence of small-pox on one and another sub-district.

1949. (*Chairman.*) That closes what you have to say with regard to the hospitals?—Yes.

1950. Have you made a comparison of small-pox mortality in the borough, as a whole, for the 27 years, 1861-87, with the mortality from certain other diseases? —Yes, I have made that comparison, and that will be found on pages 225–229. The actual figures are given in Table CXX. on pages 226 and 227. In those tables I have given the death-rates from all causes at all ages, and the death-rates from small-pox, measles, scarlatina, diphtheria, whooping-cough, fever, and diarrhœa. These are shown separately. The seven diseases that I have last named are the so-called zymotic diseases of the Registrar-General, and some of these diseases have points of similarity, in their manner of spread, to small-pox; and as to others of them, we know the effect, at any rate to some extent, that sanitary circumstances have had upon them. I have also given there the annual mortality of infants under one year of age per 1,000 births, which is known as the infant mortality rate. These are given in column 24 of Table CXX. You will see that the figures are very large from which the gross rates are calculated for the whole period.

1951. What is the meaning of the figures that are printed in thicker type?—They show rates in excess of the rate for the whole borough for the whole period of 27 years.

1952. (*Mr. Picton.*) And what are the figures in italics?—Those are the rates that are not in excess.

1953. (*Mr. Meadows White.*) And the mean is in the last horizontal column?—Yes; the mean rates also are printed in thick figures.

1954. In the last vertical column, for example, anything over 175 will be printed in thicker type?—Yes.

1955. (*Mr. Picton.*) There are no italics on the other page?—No, where they are in thick type or italics they are rates per 1,000. The gross figures with regard to both births and deaths are given in columns 2 to 12, and in column 13 is the estimated population for each year. I may say that I have adopted for years since 1881 the estimated populations of the Registrar-General. From 1861 to 1881 the populations have all been re-calculated on the bases of the populations that were actually found at the censuses of 1861, 1871, and 1881. From a consideration of the figures given in the table it will be seen that during the period 1861-87 we are dealing with a total of 169,313 deaths, or an average of 6,270 per annum. This number gives for the whole population a death-rate of 24·8 per 1,000. That is the mean of the whole 27 years. During the 27 years also 47,089 deaths, or an average of 1,744 per annum, were registered in Sheffield as occurring in children under one year of age, and the ratio of these to births registered (the number of which was 269,218 in 27 years) was during the same period 175 per 1,000. The gross number of deaths from small-pox during the period 1861-87 was 2,547 from measles, 3,274; from scarlatina, 8,178; from diphtheria, 677; from whooping cough, 4,521; from fever, 5,169; and from diarrhœa and dysentery, 10,204. It will be noticed that the number of registered deaths from diphtheria is very small compared with the deaths from other diseases. In diagrams XXIII. to XXIX. the annual mortality from each of the seven diseases that I have mentioned per 100,000 of the population living in Sheffield, is shown in a diagrammatic form. The mean of the 27 years is shown in these diagrams by a dotted line, so that you can at once see when the mortality from any particular disease has been above the average or when it has been below the average. After consideration of the various figures and the diagrams, and particularly the diagrams, it will be readily seen that there has been a decrease in the mortality from each of these diseases during the 27 years, a gradual decrease in some of them, and in some of them a sudden decrease. In the summary at the foot of page 228 the facts with regard to the mortality which prevailed in the borough of Sheffield during the 27 years will be found. There had been a marked decrease in recent years in the general and infant death-rates; and as regards mortality from the diseases specified in the table,—after omitting any reference to diphtheria on account of the smallness of the figures, there is seen a notable diminution in the mortality

from small-pox since 1871, and from fever and diarrhœa since 1876. As regards measles and scarlatina there had also been some diminution in the mortality, though not to the same extent, whilst with regard to whooping-cough there has been little alteration in the mortality. It will further be clear that as regards groups of years there had been fluctuations of a more or less marked character, at intervals of considerable regularity throughout the whole period, in the case of measles, scarlatina, whooping-cough, and diarrhœa, and up to 1872 in the case of small-pox, and up to 1876 in that of fever. These fluctuations have in the case of small-pox been entirely wanting between 1872 and 1887, and they have very much diminished in the case of fever from 1876 to the present time. I shall refer more particularly to the diminution later on when I deal with more precise figures. That this decrease in these rates has been general throughout the borough, will be seen by a reference to Tables CXXI. to CXXIX., where the rates are given for the particular years for the several sub-districts, the gross figures and the rates being given in exactly the same way in those tables as they are given with regard to the borough as a whole. In Table CXXX. the death-rates from the various diseases for the several sub-districts are given period by period; I have divided the 27 years into three sections, each of nine years, and the rates for each of those periods are shown separately on page 249. In the diagrams XXX. to XXXVI. the death rates are shown with regard to the borough, and with regard to each of the sub-districts, for each of these three periods for the various diseases for which diagrams are given previously for the borough. I have dealt with these in detail on pages 250 and 251. I think it will probably be sufficient to read the summary which is given on page 251; that is, with regard to the three periods: "From "a consideration of the facts it is evident that, as "regards the borough of Sheffield, as also its consti- "tuent sub-districts, there have been, as compared "with 1861–69, progressive and well-marked reduc- "tions in the general and infant death-rates during "the two nine-year periods, 1870–78 and 1879–87; "that there have also been in the borough as a whole, "and (with certain modifications) in the sub-districts, "similar reductions in the rates of mortality from "each of the specified diseases (with the exception of "scarlatina, the mortality from which was greatest "during 1870–78) during the second and third periods "of nine years; and that these reductions in the "mortality have been coincident with material im- "provements in the sanitary well-being of the "population." I have already given you an account of the changes that took place in the sanitary circumstances of the people. "It will further be observed "that the progressive decrease in the mortality rates "has been most marked in the case of three diseases, "small-pox, 'fever,' and diarrhœa. In the case of "two of these, 'fever,' and diarrhœa, the effect of "improved sanitary circumstances in the reduction of "mortality has elsewhere been generally recognised. "The case of small-pox, however, presents here as "elsewhere, complications not offered by the two "diseases already referred to, for apart from any "influence of improved sanitary surroundings, there "has been a marked and progressive improvement in "the completeness and efficiency of infantile vaccina- "tion in consequence of the enforcement of the provi- "sions of the Vaccination Act of 1871." At this point, however, the effect of vaccination cannot be taken into account inasmuch as for the moment mortality at all ages is being dealt with, and any inferences in which the age-incidence at death during this period was not taken into account would be liable to lead to fallacies.

1956. (*Chairman.*) Is that all you have to draw our attention to before you come to the age incidence?—I must take the district incidence of mortality, which I have summarised at page 253. It will be found also in a tabular form in Table CXXXI., on page 252, where the average annual number of deaths registered during 1861–87 in each sub-district, and amongst these the various classes to which I have already been referring, are given, as well as the mean annual death-rate. The mean death-rates, however, when they are above that for the borough, are shown in the same manner as they are shown in the previous tables by being printed in thicker type. From that table it will be seen that in the 27 years the rates of mortality from all causes at all ages, and amongst infants under one year of age, were above the average of those for Sheffield in each of the four sub-divisions of the Sheffield township, that is to say, the North, West, Park, and South districts, and in the sub-district of Brightside, but the general and infant mortality rates were lowest in Upper Hallam, whilst in Ecclesall and Nether Hallam those rates were considerably below those of Sheffield as a whole. The rates of mortality for the 27 years from small-pox in North Sheffield, West Sheffield, Brightside, and South Sheffield were 73, 35, 22, and 8 per cent. respectively above that of the borough; whilst in Sheffield Park, Attercliffe, Nether Hallam, Ecclesall and Upper Hallam, the small-pox rates were 3, 5, 43, 43, and 68 per cent. respectively below that of the borough. The rates of mortality from measles in Sheffield Park, North Sheffield, Brightside, South Sheffield and West Sheffield, were 29, 20, 19, 6, and 4 per cent. respectively above that of the borough, whilst in Attercliffe, Nether Hallam, Ecclesall, and Upper Hallam, the measles rates were 6, 23, 23 and 71 per cent. respectively below that of the borough. The rates of mortality from scarlatina in Brightside, Attercliffe, Sheffield Park, Nether Hallam and North Sheffield were 19, 8, 7, 7, and 2 per cent. respectively, above that of the borough, whilst in West Sheffield, South Sheffield, Ecclesall, and Upper Hallam, the scarlatina rates were 8, 15, 18, and 24 per cent. respectively below that of the borough. The mortality rates from diphtheria have been too small to allow of their being dealt with in a similar manner to that adopted for the other specified diseases. The rates of mortality from whooping-cough in North Sheffield, Sheffield Park, South Sheffield, and West Sheffield were 36, 17, 12, and 12 per cent. respectively above that of the borough, whilst in Brightside, Attercliffe, Nether Hallam, Ecclesall, and Upper Hallam the whooping-cough rates were 7, 9, 17, 18, and 30 per cent. respectively below that of the borough. The rates of mortality from fever in North Sheffield, Sheffield Park, and West Sheffield were 92, 29, and 14 per cent. respectively above that of the borough, whilst in Brightside, South Sheffield, Attercliffe, Nether Hallam, Ecclesall, and Upper Hallam the "fever" rates were 8, 11, 28, 28, 36, and 39 per cent. respectively below that of the borough. The rates of mortality from diarrhœa in Sheffield Park, North Sheffield, West Sheffield, and South Sheffield were 48, 34, 16, and 9 per cent. respectively above that of the borough, whilst in Brightside, Attercliffe, Ecclesall, Nether Hallam, and Upper Hallam the diarrhœa rates were 1, 10, 25, 29, and 69 per cent. respectively below that of the borough. Taking the whole 27 years into consideration it will be seen that if scarlatina and diphtheria be excepted there has been an excess of fatal incidence of small-pox and of the other specified diseases in the sub-districts of North Sheffield, West Sheffield, Brightside, South Sheffield, and Sheffield Park, and similarly an excess in them of mortality during the same period from all causes at all ages and amongst infants under one year of age. It will thus be seen that the sub-districts in which excess in the mortality is most conspicuous are those in which, taking the average of the period, conditions of over-crowding both of houses and persons, combined with defective ventilation and general unwholesomeness, have been most pronounced. I think those are the chief points with regard to district mortality.

1957. Then your next point is the age incidence of fatal small-pox cases in certain periods?—Yes. That is dealt with in pages 257 to 267. In order to compare for the borough as a whole the age incidence of death from small-pox with the age incidence of death from other diseases, I made abstracts of the ages at death from small-pox, measles, scarlet fever, diphtheria, whooping-cough, fever, and diarrhœa during two periods, the two periods being taken as far apart as I could in order that one might get them under circumstances as widely different as possible. I take first of all the period of 10 years from 1861 to 1870, whereas my second 10 years consists of the eight years from 1876 to 1883 and the two years 1886–87—the years 1884 and 1885 being missed out. I was unable to obtain the statistics of those years, no separate record having been kept of them. This gave an interval of five years between the two periods, during which interval the Vaccination Act of 1871 came into force and also the Public Health Act of 1872. The abstracts with regard to the deaths in these two 10-year periods are given in Tables CXXXV. to CXLI. In Table CXLII., on page 266—the second part of the table—the death-rates in 10 years 1876–83, 1886–87 are compared with those in 1861–70, the latter rates being taken as 100 in each case. From this table it will be seen, on com-

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parison of small-pox during the second period with small-pox in the first, that there is a recorded decrease of 82 per cent., that is to say, the first period as compared with the second period was as 100 to 18. As regards measles there was a reduction of 22 per cent. in mortality, as regards scarlet fever 27 per cent., as regards diphtheria 61 per cent., as regards whooping cough 7 per cent., as regards fever 66 per cent., and as regards diarrhœa 28 per cent. That gives the general decrease that has taken place between the two periods, giving it more exactly than I gave it before with regard to the nine-years periods. I may note with regard to the decrease in small-pox, the large decrease shown there of 82 per cent., that if the whole epidemic had been taken into consideration it, of course, would not have shown so much decrease. I was only dealing in these figures with the epidemic up to the end of 1887, and if I could have taken the 10 years ending 1888 the figures would not have shown quite so much decrease as is shown here. In the introduction that Dr. Buchanan gives to my report he deals with the matter somewhat differently and draws conclusions which I do not propose to refer to particularly now; he takes the deaths into account to the end of the epidemic. The data are given on page xiii of his introduction.

1958. (*Mr. Meadows White.*) You have, doubtless, read it through; are the statements and figures contained in it approximately accurate?—I cannot speak to anything further than to the figures taken from my report. I have verified the figures that had reference to my report. I had nothing to do with the compilation of that introduction.

1959. As far as the figures are concerned they correspond with the figures in your report?—Yes. With regard to this decrease that has taken place in the mortality from these diseases, I have, as I have already said, tabulated them at various ages and shown the results during my two ten-year periods. The tables are discussed on pages 265 and 266 of my report, and I thus summarised them on page 266: "From a consideration of the figures given in the tables, it will be seen that, during the first ten-year period, of each 100 deaths attributed to small-pox, measles, scarlatina, diphtheria, whooping-cough, and diarrhœa respectively, the largest share was borne by children." That is to say, out of every 100 deaths from small-pox, in the first decennial period, 72 occurred in children under five years of age, and 13 in children aged five but under 10 years. Out of every 100 deaths from measles in the first decennial period, 92 occurred in children under five years of age, seven in children aged five but under 10 years. Out of every 100 deaths from scarlatina in the first decennial period 67 occurred in children under five years of age, and 27 in children aged five but under 10 years. Out of every 100 deaths from diphtheria during the first decennial period, 68 occurred in children under five years of age, and 23 in children aged five but under 10 years. From whooping-cough during the first decennial period, out of every 100 deaths 95 occurred in children under five years of age and 4·5 in children aged five but under 10 years. From diarrhœa during the first decennial period, out of every 100 deaths 87 occurred in children under five years of age, and two in children aged five but under 10 years. With respect to "fever" during the first decennial period of every 100 deaths, 26 occurred in children under five years of age, 14 in children aged five but under 10 years, and 60 in persons aged 10 years and upwards. Then I go on to say, "During the second ten-year period, of each 100 deaths attributed to measles, scarlatina, diphtheria, whooping-cough, and diarrhœa respectively, the largest share was likewise borne by children, and little or no change was to be observed in the relative proportions of the deaths caused by each of these diseases at the several age periods. In the case of small-pox, however, during the second ten-year period, the largest share of deaths was borne by adults, the relative figures having become almost entirely reversed"; the figures for small-pox being these: in the second period, out of every 100 deaths, 22 occurred in children under 5 years of age, 6 in children aged 5 but under 10 years, and 72 in persons aged 10 years and upwards. In not one of the other six diseases referred to except fever is there any indication of a similar reversal of fatal age incidence; and in the case of fever such change as occurred is slight, and I think very probably would be accounted for by the improved diagnoses of infantile ailments attended by fever. In the earlier period remittent fever is included as fever, and in the latter period that has been missed out. That would certainly account for some proportion of the cases. In illustration of the changes in age which I have been describing I hand in a diagram which is Diagram No. XL. in my report. (*The diagram was handed in. See Appendix IV., Diagram A: facing page* 248.) Of course what I have been stating now has had to do solely with the share of the mortality at several ages; but in order to allow of comparison of the rates of mortality at different ages from the diseases that I have specified I have given in Table CXLII. the death-rates from each specified disease at all ages and at three groups of ages, calculated on the mean population living in the borough of Sheffield during each period. This table shows clearly that the decrease in the death-rate from small-pox has been almost entirely confined to children; that whereas in children of the age of 5 years and under, and at ages between 5 and 10 years, the death-rates have decreased 95 and 92 per cent. respectively; in persons aged 10 years and upwards the death-rate has only decreased 9 per cent. This enormous reduction amongst children of the mortality from small-pox has no parallel amongst, nor is it even approached in, the cases of the other recorded diseases. In fever, where the decrease in the mortality at all ages during the second period was greater than in any other disease excepting small-pox, the fall was not greatly different at the three age periods, the decrease being 74, 74, and 61 per cent. at the age periods 0–5, 5–10, and 10 years and upwards respectively. Taking the whole period of the epidemic, it was found that there had been an actual increase in the death-rate from small-pox in persons aged over 10 during the second period as compared with the first period. I think this definitely points to the conclusion that there must have been some circumstances affecting persons under 10 years of age as compared with persons over 10 years with regard to small-pox and not to other diseases, this reduction being confined, as it is, entirely to children, or almost entirely to children.

1960. (*Chairman.*) I think that covers the whole of the points till we come to deal with the question of vaccination in relation to small-pox?—Yes.

1961. What information have you to give the Commission upon that head?—I think probably, first of all, I should deal with the relations of small-pox and vaccination on the basis of our census returns. I will take the different series of returns—I mean the returns received from different sources—in order one after the other, commencing with the census. I have already referred to my having considered Sheffield as nine separate districts. These, as I have already stated, greatly differ in sanitary circumstances, and in giving the facts which I am now about to give, I shall state them, first of all, for the borough, and afterwards for the several districts for the purpose of displaying any differences in the relation of small-pox and vaccination in the different districts. On pages 170, 172, and 173 there are tables giving the gross figures and the rates of small-pox attacks and deaths, by way of showing the relation between vaccination and small-pox, as ascertained from the vaccination census, for Sheffield as a whole and for each of the several sub-districts. The total population, with regard to which information was obtained, was 275,878. I should note that the statistics of the two workhouses are omitted from the tables. The total number of persons enumerated, excluding the two workhouses, was 274,112. Of this number 268,937, or 97·9 per cent., were stated to have been vaccinated, and 5,715, or 2·1 per cent., to be unvaccinated. Under 10 years of age the proportions were 96·8 per cent. vaccinated and 3·2 per cent. unvaccinated. In persons aged 10 years and upwards the proportions were 98·3 per cent. vaccinated and 1·7 per cent. unvaccinated. The proportions vary to some extent in the different districts. In the Attercliffe district (page 20) in which the total population enumerated was 28,646, 28,064, or 98 per cent., were stated to have been vaccinated and 582, or 2 per cent., to be unvaccinated. Under 10 years of age the proportions were 96·2 per cent. vaccinated to 3·8 per cent. unvaccinated, and in persons aged 10 years and upwards the proportions were 98·7 per cent. vaccinated to 1·3 per cent. unvaccinated. In the Brightside district (page 34) the total population enumerated was 55,399. Of this number 54,021, or 97·5 per cent., were stated to have been vaccinated and 1,378, or 2·5 per cent., to be unvaccinated. Under 10 years of age the proportions were 96·7 per cent. vaccinated to 3·3 per

cent. unvaccinated, and in persons aged 10 years and upwards the proportions were 97·8 per cent. vaccinated to 2·2 per cent. unvaccinated. In the North Sheffield district (page 55) the total population enumerated was 31,151. Of this number 30,389, or 97·5 per cent., were stated to have been vaccinated and 762, or 2·5 per cent., to be unvaccinated. Under 10 years of age the proportions were 96·3 per cent. vaccinated to 3·7 per cent. unvaccinated, and in persons aged 10 years and upwards the proportions were 98 per cent. vaccinated to 2 per cent. unvaccinated. In the Sheffield Park district (page 76) the total population enumerated was 18,946. Of this number 18,598, or 98·2 per cent., were stated to have been vaccinated as against 348, or 1·8 per cent., unvaccinated. Under 10 years of age the proportions were 97·7 per cent. vaccinated to 2·3 per cent. unvaccinated, and in persons aged 10 years and upwards the proportions were 98·3 per cent. vaccinated to 1·7 per cent. unvaccinated. In the South Sheffield district (page 90) the total population enumerated was 16,136. Of this number 15,761, or 97·7 per cent., were stated to have been vaccinated and 375, or 2·3 per cent., to be unvaccinated. Under 10 years of age the proportions were 96·3 per cent. vaccinated to 3·7 per cent. unvaccinated, and in persons aged 10 years and upwards the proportions were 98·2 per cent. vaccinated to 1·8 per cent. unvaccinated. In the West Sheffield district (page 104) the total population enumerated was 11,433. Of this number 11,059, or 96·7 per cent., were stated to have been vaccinated and 374, or 3·3 per cent., to be unvaccinated. Under 10 years of age the proportions were 95·8 per cent. vaccinated to 4·2 per cent. unvaccinated, and in persons aged 10 years and upwards the proportions were 97 per cent. vaccinated to 3 per cent. unvaccinated. In the Ecclesall district (page 123) the total population enumerated was 69,500. Of this number 68,327, or 98·3 per cent., were stated to have been vaccinated and 1,173 or 1·7 per cent. to be unvaccinated. Under 10 years of age the proportions were 97·2 per cent. vaccinated to 2·8 per cent. unvaccinated, and in persons aged 10 years and upwards the proportions were 98·7 per cent. vaccinated to 1·3 per cent. unvaccinated. In the Nether Hallam district (page 143) the total population enumerated was 40,270. Of this number 39,573, or 98·3 per cent., were stated to have been vaccinated and 697, or 1·7 per cent., to be unvaccinated. Under 10 years of age the proportions were 97 per cent. vaccinated to 3 per cent. unvaccinated, and in persons aged 10 years and upwards the proportions were 98·7 per cent. vaccinated to 1·3 per cent. unvaccinated. In the Upper Hallam district (page 160) the total population enumerated was 2,631. Of this number 2,605, or 99 per cent., were stated to have been vaccinated and 26, or 1 per cent., to be unvaccinated. Under 10 years of age the proportions were 98 per cent. vaccinated to 2 per cent. unvaccinated, and in persons aged 10 years and upwards the proportions were 99·3 per cent. vaccinated to 0·7 per cent. unvaccinated. I propose now to deal with the proportions in the total population of the vaccinated and the unvaccinated respectively who had been attacked and who had died of small-pox. These are shown in parallel columns with regard to Sheffield as a whole and with regard to the several sub-districts.

With regard to the whole of Sheffield the proportions are thus given at page 171:—

Vaccinated.	*Unvaccinated.*
Of the 268,397 persons of all ages returned as vaccinated 4,151, or 1·55 per cent., had been attacked by small-pox and 200, or 0·07 per cent., had died.	Of the 5,715 persons of all ages returned as unvaccinated 552, or 9·7 per cent., had been attacked by small-pox and 274, or 4·8 per cent., had died.

In the Attercliffe district (page 23) these were the proportions:—

Vaccinated.	*Unvaccinated.*
Of the 28,064 persons of all ages returned as vaccinated 226, or 0·8 per cent., were reported to have recently suffered from small-pox and 17, or ·07 per cent., to have died.	Of the 582 persons of all ages returned as unvaccinated 36, or 6 per cent., were reported to have recently suffered from small-pox and 16, or 2·75 per cent., to have died.

In the Brightside district (page 37) these were the proportions:—

Vaccinated.	*Unvaccinated.*
Of 54,021 persons of all ages returned as vaccinated 716, or 1·3 per cent., were reported to have recently suffered from small-pox and 36, or 0·07 per cent., to have died.	Of 1,378 persons of all ages returned as unvaccinated 81, or 5·9 per cent., were reported to have recently suffered from small-pox and 38, or 2·76 per cent., to have died.

In the North Sheffield district (page 58) these were the proportions:—

Vaccinated.	*Unvaccinated.*
Of the 30,389 persons returned as vaccinated 947, or 3·1 per cent., were reported to have recently suffered from small-pox and 47, or 0·15 per cent., to have died.	Of the 762 persons returned as unvaccinated 135, or 17·7 per cent., were reported to have recently suffered from small-pox and 73, or 9·6 per cent., to have died.

In the Sheffield Park district (page 79) these were the proportions:—

Vaccinated.	*Unvaccinated.*
Of the 18,598 persons of all ages returned as vaccinated 323, or 1·7 per cent., were reported to have recently suffered from small-pox and 13, or 0·07 per cent., to have died.	Of the 348 persons of all ages returned as unvaccinated 27, or 7·8 per cent., were reported to have recently suffered from small-pox and 19, or 5·5 per cent., to have died.

In the South Sheffield district (page 93) these were the proportions:—

Vaccinated.	*Unvaccinated.*
Of the 15,761 persons of all ages returned as vaccinated 204, or 1·3 per cent., were reported to have recently suffered from small-pox and 8, or 0·05 per cent., to have died.	Of the 375 persons of all ages returned as unvaccinated 37, or 9·9 per cent., were reported to have recently suffered from small-pox and 22, or 5·9 per cent., to have died.

In the West Sheffield district (page 107) these were the proportions:—

Vaccinated.	*Unvaccinated.*
Of the 11,059 persons of all ages returned as vaccinated 322, or 2·9 per cent., were reported to have recently suffered from small-pox and 19, or 0·17 per cent., to have died.	Of the 374 persons of all ages returned as unvaccinated 78, or 20·8 per cent., were reported to have recently suffered from small-pox and 39, or 10·4 per cent., to have died.

In the Ecclesall district (page 126) the proportions were:—

Vaccinated.	*Unvaccinated.*
Of the 68,327 persons of all ages returned as vaccinated 729, or 1·1 per cent., were reported to have recently suffered from small-pox and 33, or 0·05 per cent., to have died.	Of the 1,173 persons of all ages returned as unvaccinated 88, or 7·5 per cent., were reported to have recently suffered from small-pox and 42, or 3·6 per cent., to have died.

In Nether Hallam (page 146) the proportions were:—

Vaccinated.	*Unvaccinated.*
Of the 39,573 persons of all ages returned as vaccinated 672, or 1·7 per cent., were reported to have recently suffered from small-pox and 26, or 0·06 per cent., to have died.	Of the 697 persons of all ages returned as unvaccinated 69, or 10·5 per cent., were reported to have recently suffered from small-pox and 25, or 3·6 per cent., to have died.

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In Upper Hallam (page 160) the figures are too small to give rates of any value.

1962. That was scarcely part of the town at all?—It deals with 13 cases of small-pox; it is hardly worth while to refer to that. There was only one death altogether in that district; that was the case of a vaccinated person.

1963. At what age?—41; she had been vaccinated in infancy only. Then dividing these "persons of all ages" into two classes, viz., children under 10 years of age and persons over 10 years of age, we get the following proportions in the respective districts:—

Borough of Sheffield (page 171).

Vaccinated.	*Unvaccinated.*
Of 68,236 vaccinated children under 10 years of age 353, or 0·5 per cent., had been attacked and 6, or 0·009 per cent., had died.	Of 2,259 unvaccinated children under 10 years of age 228, or 10·1 per cent., had been attacked and 100 (exclusive of children aged under one month), or 4·4 per cent., had died.
Of 196,905 vaccinated persons aged 10 years and upwards 3,774, or 1·9 per cent, had been attacked and 194, or 0·10 per cent., had died.	Of 3,429 unvaccinated persons aged 10 years and upwards 322, or 9·4 per cent.. had been attacked and 174, or 5·1 per cent., had died.

Attercliffe District (page 23).

Vaccinated.	*Unvaccinated.*
Of 8,106 vaccinated children under 10 years of age 19, or 0·2 per cent., were attacked and 1, or 0·01 per cent., died.	Of 319 unvaccinated children under 10 years of age 17, or 5·3 per cent., were attacked and 8, or 2·5 per cent., died.
Of 19,565 vaccinated persons aged 10 years and upwards 207, or 1·06 per cent., were attacked and 16, or ·08 per cent., died.	Of 262 unvaccinated persons aged 10 years and upwards 19, or 7·2 per cent.. were attacked and 8, or 3·0 per cent., died.

Brightside District (page 37).

Vaccinated.	*Unvaccinated.*
Of 14,546 vaccinated children under 10 years of age 67, or 0·5 per cent., were attacked and 2, or 0·01 per cent., died.	Of 489 unvaccinated children under 10 years of age 32, or 6·6 per cent., were attacked and 15, or 3·1 per cent.. died.
Of 38,774 vaccinated persons aged 10 years and upwards 642, or 1·7 per cent., were attacked and 34, or 0·08 per cent., died.	Of 886 unvaccinated persons aged 10 years and upwards 49, or 5·5 per cent., were attacked and 23, or 2·6 per cent., died.

North Sheffield District (page 58).

Vaccinated.	*Unvaccinated.*
Of 7,700 vaccinated children under 10 years of age 71, or 0·9 per cent., were attacked and of these none died.	Of 300 unvaccinated children under 10 years of age 59, or 19·7 per cent., were attacked and 26, or 8·7 per cent., died.
Of 22,547 vaccinated persons aged 10 years and upwards 872, or 3·9 per cent., were attacked and 47, or 0·21 per cent., died.	Of 461 unvaccinated persons aged 10 years and upwards 75, or 16·3 per cent., were attacked and 47, or 10·2 per cent., died.

Sheffield Park District (page 79).

Vaccinated.	*Unvaccinated.*
Of 4,937 vaccinated children under 10 years of age 24, or 0·5 per cent., were attacked, and of these none died.	Of 114 unvaccinated children under 10 years of age 9, or 7·9 per cent., were attacked, and 6, or 5·3 per cent.. died.
Of 13,481 persons aged 10 years and upwards 299, or 2·2 per cent., were attacked, and 13, or 0·09 per cent., died.	Of 233 unvaccinated persons aged 10 years and upwards, 18, or 7·7 per cent.. were attacked, and 13, or 5·6 per cent., died.

South Sheffield District (page 93).

Vaccinated.	*Unvaccinated.*
Of 3,913 vaccinated children under 10 years of age 23, or 0·6 per cent., were attacked, and of these none died.	Of 152 unvaccinated children under 10 years of age 17, or 11·2 per cent., were attacked, and 10, or 6·6 per cent., died.
Of 11,848 vaccinated persons aged 10 years and upwards 181, or 1·5 per cent., were attacked, and 8, or 0·07 per cent., died.	Of 223 unvaccinated persons aged 10 years and upwards 20, or 9 per cent., were attacked, and 12, or 5·4 per cent. died.

West Sheffield District (page 107).

Vaccinated.	*Unvaccinated.*
Of 2,429 vaccinated children under 10 years of age 28, or 1·2 per cent , were attacked, and 1, or 0·04 per cent., died.	Of 808 unvaccinated children under 10 years of age 31, or 28·7 per cent., were attacked, and 14, or 13 per cent. died.
Of 8,551 vaccinated persons aged 10 years and upwards 294, or 3·4 per cent., were attacked, and 18, or 0·21 per cent.. died.	Of 266 unvaccinated persons aged 10 years and upwards 47, or 17·7 per cent., were attacked, and 25, or 9·4 per cent., died.

Ecclesall District (page 126).

Vaccinated.	*Unvaccinated.*
Of 16,005 vaccinated children under 10 years of age 65, or 0·4 per cent.. were attacked, and 2, or 0·1 per cent., died.	Of 460 unvaccinated children under 10 years of age 32, or 6·9 per cent., were attacked, and 13, or 2·8 per cent., died.
Of 51,232 vaccinated persons aged 10 years and upwards 712, or 1·2 per cent.. were attacked, and 31, or 0·06 per cent., died.	Of 693 unvaccinated persons aged 10 years and upwards 56, or 8·1 per cent., were attacked, and 29, or 4·2 per cent., died.

Nether Hallam District (page 146).

Vaccinated.	*Unvaccinated.*
Of 9,993 vaccinated children under 10 years of age 56, or 0·6 per cent., were attacked, and of these none died.	Of 304 unvaccinated children under 10 years of age 31, or 10·2 per cent., were attacked, and 8, or 2·6 per cent., died.
Of 28,980 vaccinated persons aged 10 years and upwards 612, or 2·1 per cent., were attacked, and 26, or 0·09 per cent., died.	Of 392 unvaccinated persons aged 10 years and upwards 37, or 9·4 per cent., were attacked, and 17, or 4·3 per cent., died.

That refers to the rates in the general population. Secondly, I propose to take the proportions of vaccinated and unvaccinated who were attacked by and who died from small-pox among inmates of houses that were actually invaded by small-pox; that is, where people were brought into actual contact with the disease. Of course in the general population a number of people never came into contact with small-pox at all. Taking the whole borough (page 171), 18,756 persons of all classes were enumerated as living in houses that had become invaded by small-pox, and of these 4,703, or 25·1 per cent., had been attacked, and 474, or 2·5 per cent., had died.

The proportions of the population of the vaccinated and the unvaccinated classes respectively living in invaded houses in the borough as a whole who had been attacked by, and who had died from, small-pox, were as follows:—

Vaccinated.	*Unvaccinated.*
Of the 18,020 vaccinated persons of all ages enumerated as living in invaded houses 4,151, or 23 per cent. had been attacked, and 200, or 1·1 per cent., had died.	Of the 736 unvaccinated persons of all ages enumerated as living in invaded houses 552, or 75 per cent., had been attacked, and 274, or 37·2 per cent., had died.

1964. (*Mr. Picton.*) Do those include children under one month?—They are all excluded. In the whole of the census figures children under one month are excluded.

Vaccinated.

Of 4,493 vaccinated children under 10 years of age 353, or 7·8 per cent., had been attacked, and 6, or 0·1 per cent., had died.

Of 13,435 vaccinated persons aged 10 years and upwards 3,774, or 28·1 per cent., had been attacked and 194, or 1·4 per cent., had died.

Unvaccinated.

Of 263 unvaccinated persons under 10 years of age 228, or 86·9 per cent., had been attacked, and 100 (exclusive of infants aged under one month), or 38·1 per cent., had died.

Of 469 unvaccinated persons aged 10 years and upwards 322, or 68·6 per cent., had been attacked and 174, or 37·1 per cent., had died.

1965. (*Chairman.*) That is for the whole of the borough?—Yes. In the Attercliffe district (page 23) 1,041 persons of all classes were enumerated as living in invaded houses, and of these 262, or 25·2 per cent., were attacked and 33 or 3·2 per cent., had died. The proportions of vaccinated and unvaccinated were as follows:—

Vaccinated.

Of 989 vaccinated persons of all ages enumerated as living in invaded houses 226, or 22·8 per cent., were attacked and 17, or 1·7 per cent., died.

Of 274 vaccinated children under 10 years of age 17, or 6·9 per cent., were attacked and 1, or 0·4 per cent., died.

Of 709 vaccinated persons aged 10 years and upwards 207, or 29·2 per cent., were attacked and 16, or 2·6 per cent., died.

Unvaccinated.

Of 52 unvaccinated persons of all ages enumerated as living in invaded houses 36, or 69·2 per cent., were attacked and 16, or 30·8 per cent., died.

Of 24 unvaccinated children under 10 years of age 17, or 71 per cent., were attacked and 8, or 33·3 per cent., died.

Of 28 unvaccinated persons aged 10 years and upwards 19, or 68 per cent., were attacked and 8, or 28·6 per cent., died.

In the Brightside district (page 37) 3,350 persons of all classes were enumerated as living in houses invaded by small-pox, and of these 797, or 23·8 per cent., were attacked and 74, or 2·2 per cent., died. The proportions of the population of the vaccinated and unvaccinated classes respectively living in invaded houses in this district were as follows:—

Vaccinated.

Of 3,247 vaccinated persons of all ages enumerated as living in invaded houses 716, or 22 per cent., were attacked and 36, or 1·1 per cent., died.

Of 829 vaccinated children under 10 years of age 67, or 8·1 per cent., were attacked and 2, or 0·2 per cent., died.

Of 2,397 vaccinated persons aged 10 years and upwards 642, or 26·8 per cent., were attacked and 34, or 2·3 per cent., died.

Unvaccinated.

Of 103 unvaccinated persons of all ages enumerated as living in invaded houses 81, or 78·7 per cent., were attacked and 38, or 36·9 per cent., died.

Of 32 unvaccinated children under 10 years of age 32, or 100 per cent., were attacked and 15, or 46·9 per cent., died.

Of 71 unvaccinated persons aged 10 years and upwards 49, or 69 per cent., were attacked and 23, or 32·4 per cent., died.

In the North Sheffield district (page 58) 4,202 persons of all classes were enumerated as living in houses invaded by small-pox and of these 1,082, or 25·7 per cent., were attacked and 120, or 2·9 per cent., died. The proportions of the vaccinated and unvaccinated were as follows:—

Vaccinated.

Of 4,031 vaccinated persons of all ages enumerated as living in invaded houses 947, or 23·5 per cent., were attacked, and 47, or 1·2 per cent., died.

Of 992 vaccinated children under 10 years of age, 71, or 7·2 per cent., were attacked, and of these none died.

Of 3,026 vaccinated persons aged 10 years and upwards 872, or 28·8 per cent., were attacked, and 47, or 1·5 per cent., died.

Unvaccinated.

Of 171 unvaccinated persons of all ages enumerated as living in invaded houses 135, or 79·0 per cent., were attacked, and 73, or 42·7 per cent., died.

Of 65 unvaccinated children under 10 years of age 59, or 90·8 per cent., were attacked, and 26, or 40 per cent., died.

Of 105 unvaccinated persons aged 10 years and upwards 75, or 71·5 per cent., were attacked, and 47, or 44·8 per cent., died.

In the Sheffield Park district (page 79) 1,189 persons of all classes were enumerated as living in houses invaded by small pox, and of these 350, or 29·4 per cent., were attacked, and 32, or 2·7 per cent., died. The proportions of vaccinated and unvaccinated were as follows:—

Vaccinated.

Of 1,142 vaccinated persons of all ages enumerated as living in invaded houses, 323, or 28·3 per cent., were attacked, and 13, or 1·1 per cent., died.

Of 344 vaccinated children under 10 years of age 24, or 7 per cent., were attacked, and of these none died.

Of 796 vaccinated persons aged 10 years and upwards 299, or 37·6 per cent., were attacked, and 13, or 2·4 per cent., died.

Unvaccinated.

Of 47 unvaccinated persons of all ages enumerated as living in invaded houses 27, or 57·4 per cent, were attacked, and 19, or 40·4 cent., died.

Of 9 unvaccinated children under 10 years of age, all were attacked, and 6, or 66·6 per cent., died.

Of 38 unvaccinated persons aged 10 years and upwards 18, or 47·4 per cent., were attacked, and 13, or 34·2 per cent., died.

In the South Sheffield (page 93) district 845 persons of all classes were enumerated as living in houses invaded by small-pox, and of these 241, or 28·5 per cent., were attacked, and 30, or 3·55 per cent., died. The proportions of the vaccinated and unvaccinated were as follows:—

Vaccinated.

Of 799 vaccinated persons of all ages enumerated as living in invaded houses 204, or 25·5 per cent., were attacked, and 8, or 1 per cent., died.

Of 184 vaccinated children under 10 years of age 23, or 12·5 per cent., were attacked, and of these none died.

Of 615 vaccinated persons aged 10 years and upwards 181, or 29·4 per cent., were attacked, and 8, or 1·3 per cent., died.

Unvaccinated.

Of 46 unvaccinated persons of all ages enumerated as living in invaded houses 37, or 80·4 per cent., were attacked, and 22, or 47·8 per cent., died.

Of 24 unvaccinated children under 10 years of age 17, or 70·8 per cent., were attacked, and 10, or 41·7 per cent., died.

Of 22 unvaccinated persons, aged 10 years and upwards 20, or 91 per cent., were attacked, and 12, or 54·5 per cent., died.

In the West Sheffield district (page 107) 1,532 persons of all classes were enumerated as living in houses invaded by small-pox, and of these 400, or 26·1 per cent., were attacked, and 58, or 3·8 per cent., died. The proportions of vaccinated and unvaccinated were as follows:—

Vaccinated.

Of 1,437 vaccinated persons of all ages enumerated as living in invaded houses 322, or 22·4 per cent., were attacked, and 19, or 1·3 per cent., died.

Of 301 vaccinated children under 10 years of age 28, or 8·6 per cent., were attacked, and 1, or 0·3 per cent., died.

Of 1,134 vaccinated persons aged 10 years and upwards 294, or 25·9 per cent., were attacked, and 18, or 1·6 per cent., died.

Unvaccinated.

Of 95 unvaccinated persons of all ages enumerated as living in invaded houses 78, or 82·1 per cent., were attacked, and 39, or 41·0 per cent., died.

Of 34 unvaccinated children under 10 years of age 31, or 91·2 per cent., were attacked, and 14, or 41·2 per cent., died.

Of 61 unvaccinated persons aged 10 years and upwards 47, or 77 per cent., were attacked, and 25, or 41 per cent, died.

In the Ecclesall district (page 126) 3,280 persons of all classes were enumerated as living in houses invaded by small-pox, and of these 817, or 24·9 per cent., were attacked and 75, or 2·3 per cent., died. The proportions of vaccinated and unvaccinated were as follows:—

Vaccinated.

Of 3,160 vaccinated persons of all ages enumerated as living in invaded houses 729, or 23·1 per cent., were attacked and 33, or 1 per cent., died.

Unvaccinated.

Of 120 unvaccinated persons of all ages enumerated as living in invaded houses 88, or 73·4 per cent., were attacked and 42, or 35 per cent., died.

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Vaccinated.

Of 772 vaccinated children under 10 years of age 65, or 8·4 per cent., were attacked and 2, or 0·3 per cent., died.

Of 2,357 vaccinated persons aged 10 years and upwards 656, or 27·8 per cent., were attacked and 31, or 1·3 per cent., died.

Unvaccinated.

Of 39 unvaccinated children under 10 years of age 32, or 82 per cent., were attacked and 13, or 33·3 per cent., died.

Of 80 unvaccinated persons aged 10 years and upwards 56, or 70 per cent., were attacked and 29, or 36·2 per cent., died.

In the Nether Hallam district (page 146) 3,243 persons of all classes were enumerated as living in houses invaded by small-pox, and of these 741, or 22·8 per cent., were attacked and 51, or 1·6 per cent., died. The proportions of vaccinated and unvaccinated were as follows:—

Vaccinated.

Of 3,144 vaccinated persons of all ages enumerated as living in invaded houses 672, or 21·5 per cent., were attacked and 26, or 0·82 per cent., died.

Of 780 vaccinated children under 10 years of age 56, or 7·2 per cent., were attacked and of these none died.

Of 2,346 vaccinated persons aged 10 years and upwards 612, or 26·1 per cent., were attacked and 26, or 1·1 per cent., died.

Unvaccinated.

Of 99 unvaccinated persons of all ages enumerated as living in invaded houses 69, or 69 per cent., were attacked and 25, or 25 per cent., died.

Of 35 unvaccinated children under 10 years of age 31, or 88·6 per cent., were attacked and 8, or 22·9 per cent., died.

Of 63 unvaccinated persons aged 10 years and upwards 37, or 58·7 per cent., were attacked and 17, or 27 per cent., died.

The proportions of vaccinated and unvaccinated persons living in the invaded houses are also shown in diagrams. I here hand in two diagrams, one showing the proportions of attacks, both fatal and non-fatal, in vaccinated and unvaccinated persons at all ages, and two groups of ages living in the invaded houses in the borough. This is Diagram XVII. in the report. The other is a grouping together of all the diagrams for the sub-districts, so that you can compare at a glance the sub-districts which have different sanitary circumstances, different social status of the population, and so on. (*The diagrams were handed in. See Appendix IV., Diagrams B and C: facing page* 248.)

1966. (*Mr. Meadows White.*) That is up to the date of the census?—Up to the date of the census. With regard to the Workhouses, they were omitted; they could not exactly be considered as invaded houses in the same sense as ordinary dwellings; the inmates were under special control of course, and if a case of small-pox occurs in a workhouse the inmates are not brought in contact with it in the same way as the inmates of an ordinary dwelling would be brought in contact with it. That was why the workhouses were taken out from the general figures.

1967. (*Chairman.*) Does that conclude all that you have to say on the first head?—No, not all. The age-periods so far given—the ages at death and the ages at attack—are only two, under 10 years of age and over 10 years of age; the figures were too small in the case of the sub-districts to divide them more than that. In fact, some of the figures are very small for the sub-districts. On pages 175 and 176 I have given the attack rates and the death rates in the total enumerated population and in the invaded houses for other and more numerous age-periods—in fact, up to 20 years of age, in five-year groups, next from 20 to 30 years of age, and then at ages above 30 years. I have given them in six groups of ages instead of two.

The proportions of the borough population of the vaccinated and unvaccinated classes respectively at these several age-periods who to the end of the census had been attacked, and who had died from small-pox, were as follows:—

In the total enumerated population.

Vaccinated.

Of 33,393 vaccinated children under five years of age, 121, or 0·36 per cent., had been attacked by small-pox, and 1, or 0·003 per cent., had died.

Of 34,843 vaccinated children aged five but under 10 years, 232, or 0·67 per cent., had been attacked, and 5, or 0·014 per cent., had died.

Of 32,965 vaccinated persons aged 10 but under 15 years, 629, or 1·9 per cent., had been attacked, and 11, or 0·03 per cent., had died.

Of 27,111 vaccinated persons aged 15 but under 20 years, 979, or 3·6 per cent., had been attacked, and 19, or 0·07, per cent., had died.

Of 44,788 vaccinated persons aged 20 but under 30 years, 1,267, or 2·8 per cent., had been attacked, and 69, or 0·15 per cent., had died.

Of 92,041 vaccinated persons aged 30 years and upwards, 899, or 0·97 per cent., had been attacked, and 95, or 0·1 per cent., had died.

Unvaccinated.

Of 1,981 unvaccinated children under five years of age, 128, or 6·5 per cent., had been attacked by small-pox, and 66 (exclusive of children under one month of age), or 3·3 per cent., had died.

Of 278 unvaccinated children aged five but under 10 years, 100, or 36 per cent., had been attacked, and 34, or 12·2 per cent., had died.

Of 235 unvaccinated persons aged 10 but under 15 years, 91, or 38·7 per cent., had been attacked, and 32, or 13·6 per cent., had died.

Of 282 unvaccinated persons aged 15 but under 20 years, 84, or 29·8 per cent., had been attacked, and 53, or 18·8 per cent., had died.

Of 884 unvaccinated persons aged 20 but under 30 years, 98, or 10·6 per cent., had been attacked, and 61, or 6·9 per cent., had died.

Of 2,028 unvaccinated persons aged 30 and upwards, 49, or 2·4 per cent., had been attacked, and 28, or 1·4 per cent., had died.

Those are the figures for the general population.

Adjourned till Wednesday next at 1 o'clock.

Eleventh Day.

Wednesday, 23rd October 1889.

PRESENT:

THE RIGHT HON. THE LORD HERSCHELL IN THE CHAIR.

Sir JAMES PAGET, Bart.
Sir W. GUYER HUNTER, K.C.M.G., M.P.
Sir EDWIN HENRY GALSWORTHY.
Mr. WILLIAM SCOVELL SAVORY.
Dr. JOHN SYER BRISTOWE.
Dr. WILLIAM JOB COLLINS.
Mr. JOHN STRATFORD DUGDALE, Q.C., M.P.
Professor MICHAEL FOSTER.
Mr. JONATHAN HUTCHINSON.
Mr. J. ALLANSON PICTON, M.P.
Mr. SAMUEL WHITBREAD, M.P.
Mr. F. MEADOWS WHITE, Q.C.

Mr. BRET INCE, *Secretary.*

Mr. FREDERICK WILLIAM BARRY, M.D., Sc.D., further examined.

Mr. F. W. Barry, M.D.

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1967*a*. (*Chairman.*) On the last occasion, when the Commission adjourned, you had given the proportions of the borough population of the vaccinated and unvaccinated classes at certain age-periods. You had not, I think, quite finished that part of the case?—No, I still had to deal with the invaded houses. Before proceeding to that I would note that I have not yet given any definition of the words "vaccinated" and "unvaccinated." Perhaps I had better, at the commencement to-day, state the meaning of these words as I use them in my report. The definitions will be found at the bottom of page 19 of my report: "'*Vaccinated class*' includes all persons "successfully vaccinated at any period exceeding 13 "days prior to the appearance on them of the eruption "of small-pox. '*Unvaccinated class*' includes all persons "who have either never been successfully vaccinated or "whose vaccination was performed for the first time "within 13 days of the appearance on them of the "eruption of small-pox," that being taken for the incubation period of small-pox. But, as a matter of fact, I may say that in the whole report I do not think there is any recorded case, in which small-pox quickly followed vaccination or re-vaccination, when the interval between the operation and the appearance of small-pox exceeded six or seven days.

1968. (*Dr. Collins.*) May I ask whether those definitions were explained to those who were responsible for the vaccination census?—No, certainly not. In the vaccination census if a person stated that he was vaccinated that was accepted as correct; if he stated he was unvaccinated that again, was accepted as correct.

1969. (*Chairman.*) Did you get the date of vaccination in the census?—Yes.

1970. So that you could tell whether the small-pox cases came within the vaccinated or the unvaccinated class?—Yes, so far as their being vaccinated during the incubation period.

1971. (*Sir James Paget.*) But the other cases were taken entirely on the statements of the persons themselves?—Entirely, so far as the census was concerned, with the exception, of course, of children under 10 years of age.

1972. Is that likely to have increased the number reported as vaccinated or the number reported as unvaccinated?—That would increase to some small extent the proportion reported as vaccinated.

1973. A certain number were reported as vaccinated who were unvaccinated?—Yes. Then there is the definition of the word "fatality" which is given on page 18: "By 'fatality' is to be understood the ratio "of mortality to total attacks in each class referred "to." I wish to give that definition in order to distinguish fatality from mortality; the latter of course is the rate of death on the population.

1974. (*Chairman.*) You proceed now to the proportions of the enumerated population of vaccinated and unvaccinated in the invaded houses?—Yes. Those figures are given on page 175. This is for the whole borough:—

Vaccinated.	*Unvaccinated.*
Of 2,154 vaccinated children under five years of age enumerated as living in invaded houses, 121, or 5·6 per cent., had been attacked by small-pox, and 1, or 0·05 per cent., had died.	Of 154 unvaccinated children under five years of age enumerated as living in invaded houses, 128, or 83 per cent., had been attacked by small-pox, and 66 (exclusive of children under one month old), or 42·9 per cent. had died.
Of 2,339 vaccinated children aged five but under 10 years, 232, or 9·9 per cent., had been attacked, and 5, or 0·21 per cent., had died.	Of 109 unvaccinated children aged five but under 10 years, 100, or 91·8 per cent., had been attacked, and 34, or 31·2 per cent., had died.
Of 2,496 vaccinated persons aged 10 but under 15 years, 629, or 25·2 per cent., had been attacked, and 11, or 0·4 per cent., had died.	Of 93 unvaccinated persons aged 10 but under 15 years, 91, or 98 per cent., had been attacked, and 32, or 34·4 per cent., had died.
Of 2,370 vaccinated persons aged 15 but under 20 years, 979, or 41·3 per cent., had been attacked, and 19, or 0·8 per cent., had died.	Of 98 unvaccinated persons aged 15 but under 20 years, 84, or 85·8 per cent., had been attacked, and 53, or 54·1 per cent., had died.
Of 3,279 vaccinated persons aged 20 but under 30 years, 1,267, or 38·7 per cent., had been attacked, and 69, or 2·1 per cent., had died.	Of 124 unvaccinated persons aged 20 but under 30 years, 98, or 79·1 per cent., had been attacked, and 61, or 49·2 per cent., had died.
Of 5,290 vaccinated persons aged 30 years and upwards, 899, or 17·4 per cent., had been attacked, and 95, or 1·8 per cent., had died.	Of 154 unvaccinated persons aged 30 years and upwards, 49, or 31·8 per cent., had been attacked, and 28, or 18·2 per cent., had died.

The facts are illustrated in the diagram that I now hand in, which in my report is Diagram XVIII., opposite to page 176. (*See Appendix IV., Diagram D: facing page* 248.)

1975. Does that conclude all that you have to say with reference to the census data?—Not quite. There are the census data for the Workhouses, and I have still to consider the fatality of small-pox in different classes. The data with regard to the workhouses are given in Tables XCIV. and XCV. on pages 176 and 177. The numbers are very small. The total population enumerated in these workhouses was 1,766, of whom 1,658, or 93·8, per cent. were stated to have been vaccinated, and 108, or 6·1 per cent., to be unvaccinated. Under 10 years of age the proportions were 98·4 vaccinated to 1·6 unvaccinated, and in persons aged 10 years and upwards the proportions were 93·1 to 6·9. Up to the period of enumeration 43 persons, or 2·4 per cent. of the inmates, were stated to have been attacked by small-pox, and of these 4, or 0·23 per cent., had died. Of the 1,658 vaccinated persons at all ages 40, or 2·4 per cent., had been attacked, and 3, or 0·18 per cent.,

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had died. Of the 108 unvaccinated persons 3, or 2·8 per cent., had been attacked, and 1, or 0·9 per cent., had died. In Table XCVI. on page 178 is given the number of small-pox attacks and small-pox deaths, together with the per-centage of death to attack, namely, the fatality at various ages.

1976. (*Mr. Meadows White.*) I see a note "Deaths of "*unvaccinated infants* less than one month old are not "included in this table"?—Yes; that is common to the whole of the census data. From that tab'e it will be seen that the total cases of small-pox which were reported to have occurred in the borough to the end of the enumeration period were 4,703 in number. Of these 4,151 were stated to have occurred in vaccinated as against 552 in unvaccinated persons. In 474 cases, or 10·1 per cent. of the total of all classes attacked, the disease had proved fatal. Of the 4,151 vaccinated persons who had been attacked 200, or 4·8 per cent., had died, whilst of the 552 unvaccinated persons who had been attacked 274, or 49·6 per cent., had died. The fatality per cent. of attack in the vaccinated and unvaccinated classes respectively at different age-periods in the Borough is shown below in parallel columns:—

Vaccinated.	*Unvaccinated.*
Of 121 vaccinated children under 5 years of age who were attacked by small-pox, 1, or 0·8 per cent., died.	Of 128 unvaccinated children under 5 years of age who were attacked by small-pox, 66 (exclusive of infants aged under one month), or 51·1 per cent., died.
Of 232 vaccinated children aged 5 years but under 10 who were attacked, 5, or 2·2 per cent., died.	Of 100 unvaccinated children aged 5 years but under 10 who were attacked, 34, or 34 per cent., died.
Of 629 vaccinated persons aged 10 years but under 15 who were attacked, 11, or 1·7 per cent., died.	Of 91 unvaccinated persons aged 10 years but under 15 who were attacked, 32, or 35·1 per cent., died.
Of 979 vaccinated persons aged 15 years but under 20 who were attacked, 19, or 1·9 per cent., died.	Of 84 unvaccinated persons aged 15 years but under 20 who were attacked, 53, or 63·2 per cent., died.
Of 1,267 vaccinated persons aged 20 years but under 30 who were attacked, 69, or 5·4 per cent., died.	Of 98 unvaccinated persons aged 20 years but under 30 who were attacked, 61, or 62·2 per cent., died.
Of 899 vaccinated persons aged 30 years and upwards who were attacked, 95, or 10·6 per cent., died.	Of 49 unvaccinated persons aged 30 years and upwards who were attacked, 28, or 57·1 per cent., died.
The total number of vaccinated persons under 10 years of age who were attacked was 353, of whom 6, or 1·7 per cent., died.	The total number of unvaccinated persons under 10 years of age who were attacked was 228, of whom 100, or 43·9 per cent., died.
The total number of vaccinated persons aged 10 years and upwards who were attacked was 3,774, of whom 194, or 5·1 per cent., died.	The total number of unvaccinated persons aged 10 years and upwards who were attacked was 322, of whom 174, or 54·2 per cent., died.

That gives the fatality at the various age-periods. In the report I follow on with a further series of contrasts, which I do not propose to read in full, showing the relations of vaccination and small-pox; but I think I might perhaps read certain extracts from them as a summary,—to some extent stating in plainer language the meaning of some of the figures which we have already referred to. I am now referring to page 180. Taking the vaccinated and unvaccinated at all ages among the general population it was found on the data obtained at the census that at all ages and relatively to the numbers living in each class for each individual vaccinated person suffering from small-pox 6·2 unvaccinated persons were attacked by the disease. At ages 0 to 5 years, for each individual vaccinated infant suffering from small-pox 18 unvaccinated infants of similar age were attacked. At ages 5 to 10 years, for each individual vaccinated child suffering from small-pox 54 unvaccinated children of similar age were attacked. At ages 10 to 15 years, for each individual vaccinated person suffering from small-pox 20 unvaccinated persons of similar age were attacked. At ages 15 to 20 years, for each individual vaccinated person suffering from small-pox 8 unvaccinated persons of similar age were attacked. At ages 20 to 30 years, for each individual vaccinated person suffering from small-pox 3·9 unvaccinated persons of similar age were attacked. At ages 30 years and upwards, for each individual vaccinated person suffering from small-pox 2·4 unvaccinated persons of similar age were attacked. Or dividing the enumerated population of Sheffield as a whole into two classes under 10 years and over 10 years of age, for each individual vaccinated child under 10 years of age suffering from small-pox 20 unvaccinated children of similar age were attacked; and for each individual vaccinated person aged 10 years and upwards suffering from small-pox 5 unvaccinated persons of similar age were attacked. Then in the invaded houses where the relations were very much closer, where you had people in sustained relation with actual small-pox, somewhat different proportions were observed. In them at all ages and relatively to the numbers living in each class for each individual vaccinated person suffering from small-pox, 3·3 unvaccinated persons were attacked. At ages 0 to 5 years, for each individual vaccinated infant suffering from small-pox 15 unvaccinated infants were attacked. At ages 5 to 10 years, for each individual vaccinated child suffering from small-pox 9 unvaccinated children were attacked. At ages 10 to 15 years, for each individual vaccinated person suffering from small-pox 4 unvaccinated persons of similar age were attacked. At ages 15 to 20 years, for each individual vaccinated person suffering from small-pox 2 unvaccinated persons of similar age were attacked. At ages 20 to 30 years, for each individual vaccinated person suffering from small-pox 2 unvaccinated persons of similar age were attacked. At ages 30 years and upwards, for each individual vaccinated person suffering from small-pox 2 unvaccinated persons of similar age were attacked. Dividing again the enumerated population living in invaded houses into persons under and persons over 10 years of age:—For each individual vaccinated child under 10 years of age suffering from small-pox 11 unvaccinated children were attacked; and for each individual vaccinated person aged 10 years and upwards suffering from small-pox 2·4 unvaccinated persons of similar age were attacked. Then taking the relations of small-pox within the bodies of persons actually attacked, that is the fatality, we find that at all ages for each individual vaccinated person suffering from a fatal attack of small-pox 10·3 per cent. unvaccinated persons were fatally attacked. For each individual vaccinated infant from 0 to 5 years of age suffering from a fatal attack of small-pox 64 unvaccinated infants were fatally attacked. For each individual vaccinated child from 5 to 10 years of age suffering from a fatal attack of small-pox 15·4 unvaccinated children were fatally attacked. For each individual vaccinated person from 10 to 15 years of age suffering from a fatal attack of small-pox 20·6 unvaccinated persons of similar age were fatally attacked. For each individual vaccinated person from 15 to 20 years of age suffering from a fatal attack of small-pox 33·2 unvaccinated persons of similar age were fatally attacked. For each individual vaccinated person from 20 to 30 years of age suffering from a fatal attack of small-pox 11·5 unvaccinated persons of similar age were fatally attacked. For each individual vaccinated person aged 30 years and upwards suffering from a fatal attack of small-pox 5·3 unvaccinated persons of similar age were fatally attacked. Dividing again the attacks according to two groups of ages, under and over 10 years, the results were as follows: for each individual vaccinated child from 0 to 10 years of age suffering from a fatal attack of small-pox 25·8 unvaccinated children were fatally attacked; and for each individual vaccinated person aged 10 years and upwards suffering from a fatal attack of small-pox 10·6 unvaccinated persons of similar age were fatally attacked.

1977. What is the next point to which you wish to refer?—The next point to which I wish to refer is the relations between the attack-rate and death-rate in the vaccinated and unvaccinated classes of the general population. That I will summarise in a very few words. In the general population the attack-rate under 10 years of age of the vaccinated bore to the unvaccinated the proportion of 5 to 101, or in other words of 1 to 20; whilst the death-rate bore the proportion of ·09 to 44 or 1 to 480. Similarly the attack-rate over 10 years of age bore the proportion of 19 to 94, or in other words of 1 to 5 and the death-rate was

1 to 51. The attack-rate at all ages bore the proportion of 15·5 to 97, or in other words of 1 to 6; whilst the death-rate bore the proportion of 0·7 to 48, or 1 to 64. In invaded houses the attack-rate under 10 years of age was as 78 to 869, or in other words as 1 to 11; the death-rate under 10 years of age being as 1 to 381. The attack-rate over 10 years of age was as 281 to 686, or in other words as 1 to 2; the death-rate being as 14 to 371, or in other words as 1 to 26. The attack-rate for all ages was as 230 to 750, or in other words as 1 to 3; and the death-rate at all ages was as 11 to 372, or in other words as 1 to 34. This showed as regards invaded houses rates of attack and of mortality more nearly approximately than in the general population though continuing to maintain the same ratios the one to the other. There is one further point to which I wish to draw attention before quitting the evidence with regard to the census data, and that is the proportions of vaccinated and unvaccinated persons in invaded houses and in the general population. They are given on page 179. I there say: "From Table "XCI. it will be seen that of the total population of "Sheffield at all ages enumerated at the census 97·9 "per cent. were stated to have been vaccinated and "2·1 per cent. to be unvaccinated. Under 10 years of "age the per-centages were 96·8 vaccinated to 3·2 "unvaccinated; and in persons aged 10 years and "upwards the per-centages were 98·3 vaccinated to "1·7 unvaccinated. On the other hand, in houses "which were actually invaded by small-pox it will be "seen that of the total inmates at all ages 96·1 per "cent. were stated to have been vaccinated and 3·9 "per cent. to be unvaccinated. Under 10 years of age "the per-centages were 94·5 vaccinated to 5·5 un-"vaccinated, and in persons aged 10 years and upwards "the per-centages were 96·6 vaccinated and 4·4 un-"vaccinated; so that the proportion of unvaccinated "to vaccinated was slightly higher at all and at each "age-period in invaded houses than in the general "population. The density of the population per house "too was slightly above the average in houses invaded "by small-pox, the average density per house in the "whole borough being 4·8 persons, whereas in invaded "houses the density was at the rate of 5·6 persons per "house."

1978. (*Sir James Paget.*) The vaccinated persons include a large number, I suppose, of those who would be deemed imperfectly vaccinated?—No doubt; but no attempt whatever was made to distinguish different qualities of vaccination.

1979. If they were declared to be vaccinated it is probable that a good many of them would have been imperfectly vaccinated?—Quite so.

1980. Dr. Gayton made, as you know, three or four classes, viz., the vaccinated, the imperfectly vaccinated, the vaccinated but without evidence, and the unvaccinated?—Yes.

1981. Your classification would include the whole of the first three classes which he made, viz., the vaccinated, the imperfectly vaccinated, and the vaccinated but without evidence?—Quite so; they are all included in my class of "vaccinated."

1982. (*Dr. Collins.*) And on investigation I think some of the fatal unvaccinated cases were found to have been vaccinated at sometime or other or had been pronounced insusceptible of vaccination?—I think one or two cases had been pronounced to be insusceptible of vaccination, but as to fatal cases amongst the unvaccinated there are none entered in the unvaccinated list that had been successfully vaccinated at any time.

1983. But "vaccinated at any time" is my question?—My answer is that those on my revised unvaccinated lists had never been successfully vaccinated.

1984. What I wanted to understand was whether any of the fatal unvaccinated cases under 10 years of age had not been vaccinated unsuccessfully or had been pronounced insusceptible of vaccination?—Certain cases had been unsuccessfully vaccinated, and one or two cases, as I have said, had been pronounced to be insusceptible of vaccination.

1985. (*Chairman.*) Would those cases where there had been an attempt at vaccination, though not successful, form a large number of the unvaccinated class?—No, I do not think they would. I can give you the numbers. I find on page 199 that of the fatal cases, which are 343 in number in the whole epidemic, among the unvaccinated, 300, or 87·5 per cent., had never been vaccinated; 24, or 7 per cent., had been vaccinated for the first time during the incubative stage of small-pox; 17, or 4·9 per cent., had been unsuccessfully vaccinated; and 2, or 0·6 per cent., were stated to have been found to be insusceptible of vaccination.

1986. (*Dr. Bristowe.*) On what evidence does the unsuccessfulness of vaccination depend?—Upon the evidence of the nearest relatives. They acknowledged that the vaccination had, in their words, "never taken."

1987. (*Chairman.*) The next head under which you desire to convey some information to the Commission is Health Office data; what are the points that you wish to refer to under that head?—I think I have already explained whence we got the health office data; they were all the reports of cases that were received at the Health Office. These have been summarised, from the data of the sub-districts, for the borough as a whole at pages 190 and 191. On page 191 will be found Table CI., which was compiled from the records kept at the Sheffield Health Office. The heading of the table is "Age, incidence of attack, and death from small-pox "in the Borough of Sheffield during 1887 and to 31st "March 1888, with per-centage of deaths to attacks "'(Fatality)' at certain groups of ages."

1988. (*Professor Michael Foster.*) In that Table CI. at all ages the per-centage of fatality should be 9·7 instead of ·97, should it not?—Yes, the decimal point has got misplaced in the total of all ages in column 4. It ought to be 9·7 instead of ·97. The figures that are given here were obtained in quite a different manner from that in which the figures with which I have been hitherto dealing were obtained. The data with which I have already dealt were, with the corrections that I have named, given on the evidence of the nearest relatives—on the evidence of the people themselves. The figures that I am now about to give depend upon evidence from several sources: from the inspectors of nuisances, from the doctors who attended the cases, and from private individuals who reported the cases to the health office. A good many of them were revised and verified by the Medical Officer of Health for the time being. These figures are corrected in the same way that the census data were corrected in so far as children under 10 years of age are concerned, and in so far as regards fatal cases. These were corrected as a result of my own personal inquiry. I propose to read in very much the same manner as I have read with regard to the census data, the relations of vaccination and small-pox as indicated by the health office data. I first of all take page 190. The total cases of small-pox reported to the health department to have occurred in the borough of Sheffield during the period from the commencement of the epidemic to the 31st of March 1888 were 6,088 in number. Of these it was stated that 5,035 were of the "vaccinated" as against 1,053 of the "unvaccinated" class. In 589 cases, or 9·7 per cent., of the total of all classes attacked the disease proved fatal. Of the 5,035 persons of the "vaccinated" class attacked 246, or 4·9 per cent., died; whilst of the 1,053 persons of the "unvaccinated" class attacked 343, or 32·6 per cent., died. In the "vaccinated" class, small-pox is reported to have attacked 97 persons under 5 years of age, of whom 1, or 1 per cent., died; 243 between 5 and 10 years of age, of whom 6, or 2·5 per cent., died; 2,034 between 10 and 20 years of age, of whom 38, or 1·9 per cent., died; 1,579 between 20 and 30 years of age, of whom 87, or 5·5 per cent., died; and 1,084, aged 30 years and upwards, of whom 114, or 10·5 per cent., died. In the unvaccinated class, small-pox is reported to have attacked 242 persons under 5 years of age, of whom 113, or 46·7 per cent., died; 184 between 5 and 10 years of age, of whom 39, or 21·2 per cent., died; 380 between 10 and 20 years of age, of whom 92, or 24·2 per cent., died; 169 between 20 and 30 years of age, of whom 65, or 38·5 per cent., died; and 78, aged 30 years and upwards, of whom 34, or 43·6 per cent., died.

1989. (*Mr. Meadows White.*) Those are shown in parallel columns in Table CI. on page 191?—Yes. I am going to omit in these figures the children under a month of age. They were included in the district tables, but in reading I will omit them and give the corrected results. The data as to Attercliffe are on page 27. The total number of small-pox attacks reported to the health department to have occurred up to 31st March 1888 in the Attercliffe sub-district was 564. Of these, 495 were of the "vaccinated" as against 69 of the "unvaccinated" class (I am reading a corrected version). In 9·7 per cent. of the total number of all classes attacked the disease proved fatal. Of the 495 persons of the vaccinated class attacked 28, or 5·7 per cent., died, whilst of the 69 of the unvaccinated class attacked,

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27 or 39·1 per cent., died. In the vaccinated class small-pox attacked 11 persons under 5 years of age, of whom none died; 31 between 5 and 10 years of age, of whom 1, or 3·1 per cent., died; 178 between 10 and 20 years of age, of whom 6, or 3·4 per cent., died; 134 between 20 and 30 years of age, of whom 6, or 5·6 per cent., died; and 131 aged 30 years and upwards, of whom 13, or 9·9 per cent., died. In the unvaccinated class small-pox attacked 27 persons under 5 years of age, of whom 14, or 51·9 per cent., died; 14 between 5 and 10 years of age, of whom 4, or 28·6 per cent., died; and 18 between 10 and 20 years of age, of whom 4, or 22·2 per cent., died. Above 20 years of age only 10 unvaccinated persons were attacked, and of those one half died. In the Brightside district, the figures relating to which appear on page 43, the total cases of small-pox reported to the health department to have occurred up to 31st March 1888 were 1,123 in number. Of these, 979 were of the "vaccinated" as against 144 of the "unvaccinated" class. In 90 cases, or 8·2 per cent. of the total of all classes attacked, the disease proved fatal. Of the 979 persons of the "vaccinated" class attacked 45, or 4·6 per cent., died; whilst of the 144 persons of the "unvaccinated" class attacked 45, or 31·3 per cent., died. In the "vaccinated" class small-pox attacked 29 persons under 5 years of age, of whom 1, or 3·5 per cent., died; 47 between 5 and 10 years of age, of whom 1, or 2·1 per cent., died; 356 between 10 and 20 years of age, of whom 6, or 1·7 per cent., died; 297 between 20 and 30 years of age, of whom 16, or 5·4 per cent., died; 249 aged 30 years and upwards, of whom 21, or 8·4 per cent., died. In the "unvaccinated" class small-pox attacked 33 person under 5 years of age, of whom 14, or 42·4 per cent., died; 25 between 5 and 10 years of age, of whom 6, or 24 per cent., died; 48 between 10 and 20 years of age, of whom 9, or 18·7 per cent., died; 25 between 20 and 30 years of age, of whom 10, or 40 per cent., died; 13 aged 30 years and upwards, of whom 6 died. Then you will find the figures for the North Sheffield district on page 63. The total cases of small-pox reported to the health department to have occurred in the North Sheffield sub-district during the year ended the 31st of March 1888 were 1,366 in number. Of these 1,082 were of the "vaccinated," as against 284 of the "unvaccinated" class. In 132 cases, or 9·7 per cent. of the total of all cases attacked, the disease proved fatal. Of the 1,082 persons of the vaccinated class attacked 54, or 5 per cent., died, whilst of the 284 persons of the unvaccinated class attacked 78, or 27·4 per cent., died. In the vaccinated class small-pox attacked 14 persons under 5 years of age, of whom none died; 45 between 5 and 10 years of age, of whom also none died; 490 between 10 and 20 years of age, of whom 7, or 1·4 per cent., died; 342 between 20 and 30 years of age, of whom 18, or 5·3 per cent., died; and 175 aged 30 years and upwards, of whom 29, or 15·7 per cent., died. In the "unvaccinated" class small-pox attacked 66 persons under 5 years of age, of whom 23, or 34·9 per cent., died; 42 between 5 and 10 years of age, of whom 7, or 16·7 per cent., died; 109 between 10 and 20 years of age, of whom 25, or 21 per cent., died; 38 between 20 and 30 years of age, of whom 15, or 39·5 per cent., died; and 19 aged 30 years and upwards, of whom 8, or 42·1 per cent., died. The figures for the Park sub-district appear on page 83. The total cases of small-pox reported to the health department to have occurred in the Sheffield Park sub-district during the epidemic to the end of March 1888 were 481 in number, and of these 412 were of the "vaccinated" as against 69 of the "unvaccinated" class. In 42 cases, or 8·7 per cent. of the total number of all classes attacked, the disease proved fatal. Of the 412 persons of the "vaccinated" class attacked 19, or 4·6 per cent., died; whilst of the 69 persons of the "unvaccinated" class attacked 23, or 33·3 per cent., died. In the vaccinated class small-pox attacked 12 persons under 5 years of age, of whom none died; 22 between 5 and 10 years of age, of whom also none died; 183 between 10 and 20 years of age, of whom 4, or 2·2 per cent., died; 122 between 20 and 30 years of age, of whom 5, or 4·8 per cent., died; and 73, aged 30 years and upwards, of whom 10, or 13·7 per cent., died, thus showing in the vaccinated an increasing liability to a fatal termination with increasing age. In the "unvaccinated" class small-pox attacked 15 persons under 5 years of age, of whom 5, or 33·3 per cent., died; 7 between 5 and 10 years of age, of whom 2 died; 27 between 10 and 20 years of age, of whom 10, or 37·1 per cent. died; 10 between 20 and 30 years of age, of whom 3 died; and 10, aged 30 years and upwards, of whom 3 also died. You will observe that I do not give the per-centages in a good many of these cases because the figures are so extremely small. The figures for the South Sheffield district will be found on page 97. The total cases of small-pox reported to the health department to have occurred in the South Sheffield sub-district in the epidemic to the end of March 1888 were 303 in number, and of these 230 were of the "vaccinated" as against 73 of the "unvaccinated" class. In 37 cases, or 12·2 per cent. of the total number of all classes attacked, the disease proved fatal. Of the 230 persons of the "vaccinated" class attacked, 10 or 4·4 per cent. died; whilst of the 73 persons of the "unvaccinated" class attacked, 27 or 37·0 per cent., died. In the "vaccinated" class small-pox attacked 3 persons under 5 years of age, of whom none died; 9 between 5 and 10 years of age, of whom 1, or 11·1 per cent., died; 100 between 10 and 20 years of age, of whom 2, or 2 per cent., died; 66 between 20 and 30 years of age, of whom 4, or 6·1 per cent., died; and 51, aged 30 years and upwards, of whom 3, or 5·9 per cent., died. In the "unvaccinated" class small-pox attacked 14 persons under 5 years of age, of whom 8, or 57·1 per cent., died; 16 between 5 and 10 years of age, of whom 4, or 25·3 per cent., died; 29 between 10 and 20 years of age, of whom 7, or 24·1 per cent. died; 8 between 20 and 30 years of age, of whom 4 died; and 6 aged 30 years and upwards, of whom 4 also died. The West Sheffield district is dealt with on page 110. The total small-pox attacks reported to the health department to have occurred during the epidemic in the West Sheffield sub-district to the end of March 1888 were 464 in number, and of these 324 were of the "vaccinated" as against 140 of the "unvaccinated" class. In 61 cases, or 13·1 per cent. of the total number of all classes attacked, the disease proved fatal. Of the 324 persons of the "vaccinated" class attacked 19, or 5·9 per cent., died, whilst of the 140 persons of the "unvaccinated" class attacked 42, or 30·0 per cent., died. In the "vaccinated" class small-pox attacked 5 persons under 5 years of age, none of whom died; 14 between 5 and 10 years of age, of whom 1, or 7·1 per cent., died; 164 between 10 and 20 years of age, of whom 6, or 3·7 per cent., died; 89 between 20 and 30 years of age, of whom 6, or 6·8 per cent., died; and 49 aged 30 years and upwards, of whom 6, or 12·2 per cent., died; thus showing in the vaccinated an increasing liability to a fatal termination with increasing age. In the "unvaccinated" class small-pox attacked 23 persons under 5 years of age, of whom 7, or 30·4 per cent., died; 25 between 5 and 10 years of age, of whom 8, or 32 per cent., died; 57 between 10 and 20 years of age, of whom 17, or 29·8 per cent., died; 28 between 20 and 30 years of age, of whom 7, or 25 per cent., died. Above 30 years of age only 6 unvaccinated persons were attacked, and of these half died. The Ecclesall district is dealt with on page 131. The total cases of small-pox reported to the health department to have occurred in the Ecclesall sub-district during the epidemic to the end of March 1888 were 924 in number, and of these 793 were of the "vaccinated" as against 131 of the "unvaccinated" class. In 84 cases, or 9·1 per cent. of the total of all classes attacked, the disease proved fatal. Of the 793 persons of the "vaccinated" class attacked 36, or 4·5 per cent., died, whilst of the 131 persons of the "unvaccinated" class attacked 48, or 36·6 per cent., died. In the "vaccinated" class small-pox attacked 14 persons under 5 years of age, of whom none died; 41 between 5 and 10 years of age, of whom 2, or 4·9 per cent., died; 285 between 10 and 20 years of age, of whom 2, or 0·7 per cent., died; 272 between 20 and 30 years of age, of whom 15, or 5·5 per cent., died; and 179 aged 30 years and upwards, of whom 17, or 9·5 per cent., died. In the "unvaccinated" class small-pox attacked 22 persons under 5 years of age, of whom 12, or 54·5 per cent., died; 25 between 5 and 10 years of age, of whom 4, or 16 per cent., died; 43 between 10 and 20 years of age, of whom 13, or 30·2 per cent., died; 33 between 20 and 30 years of age, of whom 16, or 48·5 per cent., died; and 8 aged 30 years and upwards, of whom 3 died. The figures for the Nether Hallam district appear upon page 151. The total cases of small-pox reported to the health department to have occurred in Nether Hallam during the epidemic to the end of March 1888 were 812 in number, and of these 694 were of the "vaccinated" as against 118 of the "unvaccinated" class. In 61 cases, or 7·5 per cent. of the total number of all classes attacked, the disease proved fatal. Of the 694 persons of the "vaccinated" class attacked, 31 (including one person who had suffered from small-pox in childhood), or 4·5 per cent., died; whilst of the 121 persons of the

"unvaccinated" class attacked. 33 (including two persons who had previously suffered from small-pox in childhood), or 27·3 per cent., died. In the "vaccinated" class small-pox attacked nine persons under five years of age, of whom none died; 34 between 5 and 10 years of age, of whom also none died; 271 between 10 and 20 years of age, of whom 5, or 1·8 per cent., died; 236 between 20 and 30 years of age, of whom 13, or 5·5 per cent., died; and 142 aged 30 years and upwards, of whom 13, or 9·1 per cent., died. In the "unvaccinated" class small-pox attacked 19 persons under five years of age, of whom 8, or 42·1 per cent., died; 30 between 5 and 10 years of age, of whom 4, or 13·3 per cent., died; 39 between 10 and 20 years of age, of whom 7, or 18 per cent., died; 20 between 20 and 30 years of age, of whom 6, or 30 per cent., died. Above 30 years of age only 10 unvaccinated persons were attacked, and of these half died. That gives the fatality that was observed in the different sub-districts of Sheffield, and in Sheffield itself.

1990. (*Mr. Picton.*) You have not given us the figures for Upper Hallam?—I will give you the figures for Upper Hallam if you like to have them, but they are so small that I did not put them in. They appear upon page 163. The total small-pox attacks reported to have occurred in Upper Hallam during the epidemic to the end of March 1888, were 13 in number, and of these 12 were of the "vaccinated" as against one of the "unvaccinated" class. Of the 12 vaccinated persons attacked one, aged 40 years, died. The one unvaccinated person attacked recovered. There were 26 unvaccinated people living in that district over an area as large as about four or five London parishes.

1991. (*Dr. Collins.*) What is the explanation of the corrections that have been made?—It was to make them uniform with my census data by omission of children under one month. In Table CII., on page 192, I have taken the estimated population of the Registrar General to facilitate comparison of the Health Office data as to attack-rates and mortality-rates, over the whole period from the commencement of the epidemic to the 31st of March 1888, with similar data from my census. The population is the estimated population of the Registrar General, and it is distributed according to age, in the proportions found living at the Census of 1881. The numbers of vaccinated and unvaccinated respectively are calculated on the basis of my vaccination census,—on the proportions that were found to be living in the borough of Sheffield at the time of that vaccination census.

1992. (*Chairman.*) There is a constant proportion, at all the different ages, of vaccinated to unvaccinated?—Yes; the attacks that are given here are the attacks over the whole period as taken from the Health Office data, and the deaths are the actual deaths that occurred also during the whole period of the epidemic up to the 31st of March. In Table CIII. the rates calculated on these figures are given. When you contrast these rates with our census rates given in Tables XCI. and XCIII. on pages 172 and 174, it will be found that they present certain discrepancies and certain correspondences. The proportions of persons attacked in the "vaccinated" and "unvaccinated" classes vary to a considerable extent in the two separate series, and the "fatality" also varies. But owing to the fact that the deaths have all been checked after personal inquiry alike for the Health Office and the census series, the mortality in vaccinated and unvaccinated bear practically the same ratio one to the other on the Health Office as they do on the census data. I have entered very fully on pages 193 and 194 into the differences that are observed between the two sets of data and into the reasons, so far as I could ascertain them, for those differences. I do not know whether it will be necessary to go into that now.

1993. Probably your reference to the pages on which that explanation is to be found will be sufficient?—Then I have drawn up on pages 194, 195, 196, and 197 a series of comparisons of the ratios between vaccinated and unvaccinated persons as regards attacks and deaths respectively in reference to the Health Office data, and the estimated population which is given in Table CII.

1994. On an estimate of the proportion of vaccinated to unvaccinated derived from the census?—Yes.

1995. (*Mr. Savory.*) These vaccinated cases of course include cases of re-vaccination?—Exactly so; all cases of re-vaccination are included in the "vaccinated" class.

1996. Have you any evidence to show the proportion of the re-vaccinated to the vaccinated?—Yes, that I shall come to at a later period. Taking for what they are worth, these estimates of population and the corresponding estimates as to the "vaccinated" and "unvaccinated," I have drawn up a statement first of all as to vaccination in its relations with small-pox in Sheffield as a whole, with the following result:—

At all ages.

Vaccinated.	*Unvaccinated.*
Of 307,966 vaccinated persons in the estimated population as a whole, 4,995, or 1·62 per cent., were attacked by small-pox.	Of 6,556 unvaccinated persons in the estimated population as a whole, 1,028, or 15·68 per cent., were attacked by small-pox.

So that, relatively to their numbers, and apart from influence of age, for each individual vaccinated person suffering from small-pox, 9·7 unvaccinated persons were attacked by that disease.

1997. (*Mr. Picton.*) Does this exclude children under one month?—Yes.

1998. (*Mr. Meadows White.*) Is this an actual figure or is it an estimate founded upon the per-centage which you have discovered?—Both classes of figures are estimated.

1999. Then that 6,556 is estimated by the per-centage which you had previously discovered by the census?—Yes.

2000. And that per-centage which you had previously discovered by the census was excluding infants under one month?—Yes.

2001. (*Dr. Collins.*) Were the infants excluded from the population as well as from the attacks of small-pox?—The fatal cases and the attacks were excluded.

2002. I understand you to say that unvaccinated children who were attacked by small-pox, or who died of small-pox, are excluded?—They are excluded from the attacks and from the deaths, but are not excluded from the population; they are included in the population. The number would be so small that it would not be worth excluding; so they are not excluded from the population though they are excluded from the attacks and the deaths.

2003. (*Mr. Picton.*) And they are not reckoned in column 4 of Table CII.?—They are excluded from that altogether.

2004. (*Mr. Savory.*) Can you give us the total number of infants under one month that were attacked?—The total number that died was 22. The number is so small that they were not excluded from the population, but they are excluded from what I am reading at the present moment.

2005. (*Mr. Picton.*) It is very important that we should clearly understand this. You refer to Table CII. in which appears the figure 314,522, and you say that that does include infants under one month?—Yes.

2006. In column 4 does the 6,556 include infants under one month?—Yes, certainly. Those are actual figures of the population, not attacks and deaths.

2007. Then that figure is included again on page 194?—No, not in the number of attacks or deaths.

2008. (*Dr. Bristowe.*) Children under one month of age are uniformly omitted throughout the whole of this report, are they not?—No, not uniformly. I have omitted them in what I read to-day; they were not omitted in the fatality tables of my report.

2009. (*Sir Edwin Galsworthy.*) But in the population they are uniformly included?—They are uniformly included in the population:—

At all ages.

Of 307,966 vaccinated persons in the estimated population as a whole, 4,995, or 1·62 per cent., were attacked by small-pox.	Of 6,556 unvaccinated persons in the estimated population as a whole, 1,028, or 15·68 per cent., were attacked by small-pox.

So that, relatively to their numbers, and apart from influence of age, for each individual vaccinated person suffering from small-pox, 9·7 unvaccinated persons were attacked.

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At ages 0–5.

Of 38,306 vaccinated infants in the estimated population as a whole, 97, or 0·25 per cent., were attacked.	Of 2,275 unvaccinated infants in the estimated population as a whole, 218, or 9·57 per cent., were attacked.

So that, relatively to their numbers, for each individual vaccinated infant aged 0–5 years suffering from small-pox, 38 unvaccinated infants were attacked.

At ages 5–10.

Of 39,982 vaccinated children in the estimated population as a whole, 241, or 0·60 per cent., were attacked	Of 319 unvaccinated children in the estimated population as a whole, 184, or 57·70 per cent., were attacked.

So that, relatively to their numbers, for each individual vaccinated child aged 5–10 years suffering from small-pox, 96 unvaccinated children were attacked.

At ages 10–15.

Of 37,825 vaccinated persons in the estimated population as a whole, 782, or 2·07 per cent., were attacked.	Of 270 unvaccinated persons in the estimated population as a whole, 184, or 68·10 per cent., were attacked.

So that, relatively to their numbers, for each individual vaccinated person aged 10–15 years suffering from small-pox, 32·9 unvaccinated persons of similar age were attacked.

At ages 15–20.

Of 31,101 vaccinated persons in the estimated population as a whole, 1,240, or 3·99 per cent., were attacked.	Of 323 unvaccinated persons in the estimated population as a whole, 196, or 60·62 per cent., were attacked.

So that, relatively to their numbers, for each individual vaccinated person aged 15–20 years suffering from small-pox, 15·2 unvaccinated persons of similar age were attacked.

At ages 20–30.

Of 51,384 vaccinated persons in the estimated population as a whole, 1,566, or 3·05 per cent., were attacked.	Of 1,014 unvaccinated persons in the estimated population as a whole, 168, or 16·56 per cent., were attacked.

So that, relatively to their numbers, for each individual vaccinated person aged 20–30 years suffering from small-pox, 5·4 unvaccinated persons of similar age were attacked.

Aged 30 and upwards.

Of 105,632 vaccinated persons in the estimated population as a whole, 1,054, or 1·00 per cent., were attacked.	Of 2,325 unvaccinated persons in the estimated population as a whole, 77, or 3·31 per cent., were attacked.

So that, relatively to their numbers, for each individual vaccinated person aged 30 years and upwards suffering from small-pox, 3·3 unvaccinated persons of similar age were attacked.

2010. (*Chairman.*) How do you get the number of the population at the different ages; is that an estimate?—As I have explained, that is got by taking the proportion found to exist at the census of 1881, and assuming it to have remained constant. If the population be divided into two groups, under and over 10 years of age respectively, the following results are obtained:—

Under 10 years of age.

Vaccinated.	*Unvaccinated.*
Of 78,288 vaccinated children in the estimated population as a whole, 338, or 0·43 per cent., were attacked by small-pox.	Of 2,794 unvaccinated children in the estimated population as a whole, 402, or 14·38 per cent., were attacked by small-pox.

So that, relatively to their numbers, for each individual vaccinated child suffering from small-pox, 33·4 unvaccinated children were attacked.

Age 10 years and upwards.

Of 225,942 vaccinated persons in the estimated population as a whole, 4,642, or 2·05 per cent., were attacked.	Of 3,932 unvaccinated persons in the estimated population as a whole, 625, or 15·90 per cent., were attacked.

So that, relatively to their numbers, for each individual vaccinated person aged 10 years and upwards, suffering from small-pox, 7·7 unvaccinated persons of similar age were attacked.

Then, with regard to fatality, that, of course, is not based upon estimates, but upon actual figures which were obtained from the Health Office as to attacks and deaths.

At all ages.

Vaccinated.	*Unvaccinated.*
Of 4,995 vaccinated persons in the total population of Sheffield attacked by small-pox, 243, or 4·7 per cent., died of that disease.	Of 1,028 unvaccinated persons in the total population of Sheffield attacked by small-pox, 320, or 31·1 per cent., died of that disease.

So that, relatively to their numbers, and apart from the influence of age, for each individual vaccinated person suffering from a fatal attack of small-pox, 6·6 unvaccinated persons were fatally attacked.

At ages 0–5.

Of 97 vaccinated infants in the total population of Sheffield attacked by small-pox, 1, or 1·0 per cent., died.	Of 218 unvaccinated infants in the total population of Sheffield attacked by small-pox, 91, or 41·8 per cent., died.

So that, relatively to their numbers, for each individual vaccinated infant from 0–5 years suffering from a fatal attack of small-pox, 41·8 unvaccinated infants were fatally attacked.

At ages 5–10

Of 241 vaccinated children in the total population of Sheffield attacked by small-pox, 6, or 2·5 per cent., died.	Of 184 unvaccinated children in the total population of Sheffield attacked by small-pox, 39, or 21·2 per cent., died.

So that, relatively to their numbers, for each individual vaccinated child aged 5–10 years suffering from a fatal attack of small-pox, 8·5 unvaccinated children were fatally attacked.

At ages 10–15.

Of 782 vaccinated persons in the total population of Sheffield attacked by small-pox, 12, or 1·5 per cent., died.	Of 184 unvaccinated persons in the total population of Sheffield attacked by small-pox, 36, or 19·6 per cent., died.

So that, relatively to their numbers, for each individual vaccinated person aged 10–15 years suffering from a fatal attack of small-pox, 13 unvaccinated persons of similar age were fatally attacked.

At ages 15–20.

Of 1,240 vaccinated persons in the total population of Sheffield attacked by small-pox, 26, or 2·1 per cent. died.	Of 196 unvaccinated persons in the total population of Sheffield attacked by small-pox, 56, or 28·6 per cent., died.

So that, relatively to their numbers, for each individual vaccinated person aged 15–20 years suffering from a fatal attack of small-pox, 13·6 unvaccinated persons of similar age were fatally attacked.

At ages 20–30.

Of 1,566 vaccinated persons in the total population of Sheffield attacked by small-pox, 85, or 5·4 per cent., died.	Of 168 unvaccinated persons in the total population of Sheffield attacked by small-pox, 64, or 38·1 per cent., died.

So that, relatively to their numbers, for each individual vaccinated person aged 20–30 years suffering from a fatal attack of small-pox, 7 unvaccinated persons of similar age were fatally attacked.

Aged 30 and upwards.

Of 1,054 vaccinated persons in the total population of Sheffield attacked by small-pox, 113, or 10·7 per cent., died.	Of 77 unvaccinated persons in the total population of Sheffield attacked by small-pox, 34, or 44·1 per cent., died.

So that, relatively to their numbers, for each individual vaccinated person aged 30 and upwards suffering from a fatal attack of small-pox, 4 unvaccinated persons of similar age were fatally attacked.

If the persons attacked be divided into two groups, under and over 10 years of age respectively, the following results are obtained :—

Under 10 years of age.

Vaccinated.	*Unvaccinated.*
Of 338 vaccinated children in the total population of Sheffield attacked by small-pox, 7, or 2·1 per cent., died.	Of 402 unvaccinated children in the total population of Sheffield attacked by small-pox, 130, or 32·4 per cent., died.

So that, relatively to their numbers, for each individual vaccinated child under 10 years of age suffering from a fatal attack of small-pox, 15·4 unvaccinated children were fatally attacked.

Aged 10 years and upwards.

Of 4,642 vaccinated persons in the total population of Sheffield attacked by small-pox, 236, or 5·1 per cent., died.	Of 625 unvaccinated persons in the total population of Sheffield attacked by small-pox, 190, or 30·4 per cent., died.

So that, relatively to their numbers, for each individual vaccinated person aged 10 years and upwards suffering from a fatal attack of small-pox, 6 unvaccinated persons of similar age were fatally attacked.

I propose to summarise in exactly the way that I did with regard to the census data, the attack rate and death rate of the estimated population. Taking the health office data and the estimated population under 10 years of age, the attack rate bore the following proportions in the case of the vaccinated and the unvaccinated: 4·3 in the vaccinated to 143·8 in the unvaccinated, or in other words, as 1 to 43; meanwhile the deaths under 10 years of age were as ·1 in the vaccinated to 46·6 in the unvaccinated, or as 1 to 466. The attacks over 10 years of age bore the relation of 20·5 in the vaccinated to 159 in the unvaccinated, or as 1 to 7; and the death-rate bore the relation of 1 in the vaccinated to 48 in the unvaccinated. At all ages the attack rate bore the relation of 16 in the vaccinated to 157 in the unvaccinated, or as 1 to 9, and the death-rate bore the relation of ·8 in the vaccinated to 48·8 in the unvaccinated, or as 1 to 61. These run very closely with the numbers which have been already given for the total population as ascertained from our census. Before leaving the health office data there is a point to which I should like to draw attention. Taking the fatality and the mortality figures we can form some kind of notion of the relative incidence of attack and of death on the several districts, and I wish to compare that with the fatality of small-pox in the districts. The object of the comparison is to ascertain if possible what effect the density of population of a district had upon the death-rate, the attack rate, and the fatality of small-pox therein. I now hand in a table showing the estimated population for the borough of Sheffield and each of its sub-divisions, the number of small-pox attacks and small-pox deaths, together with the rates per thousand of the population in each instance. Attack and death of unvaccinated infants under one month are excluded. That is for all classes, vaccinated and unvaccinated. (*The table was handed in. See Appendix IV., Table E; page* 249.) I also hand in another table showing for the same classes the fatality rates which obtained in each of the sub-districts. (*See Appendix IV., Table F; page* 249.)

2011. (*Professor Michael Foster.*) These fatality rates are based on the health office data?—Yes.

2012. The fatality from the census results differs a good deal, does it not, in the various localities?—It does not differ very much, I think, when it comes to be worked out.

2013. Your total fatality for Attercliffe, according to the health records, is 10·1 per cent., and according to your census results it is 12·6 per cent.?—Yes, that is on the total population. The numbers vary a little but the relations do not greatly vary.

2014. According to your census records, Attercliffe comes third as to fatality; with the health records it is thrown down?—It is thrown down below the average of the borough. In illustration of what I am about to say now I hand in a diagram which shows for the whole period of the epidemic, and severally for all classes for vaccinated and for unvaccinated, the small-pox attack rates (which are shown in the lighter shading), and the small-pox death-rates (darker shading) in the borough of Sheffield, and in each of its sub-divisions. (*The diagram was handed in. See Appendix IV., Diagram G; facing page* 248.) The dotted lines show the rate of the borough for attacks and for deaths respectively. Taking "all classes" it will be seen that the attack rate is above the rate for Sheffield, in North Sheffield, Sheffield Park, and West Sheffield; that in Brightside it is equal to the borough rate, and that it is below that of the borough in the other sub-districts. Very much the same is seen in the case of the "vaccinated." In the case of the "unvaccinated" the attack rate is above that of the borough in four of the Sheffield sub-districts. They are the four districts to which I have specially referred as having greater density of population; and in addition two of these districts were specially affected by the hospital influence. Taking deaths, the deaths in "all classes" follow very much the same lines as the attacks, but in the "vaccinated" they differ slightly, only two districts are above the borough, namely, North Sheffield and West Sheffield. In the "unvaccinated" it is the same four sub-districts again, the four central districts of Sheffield, which are over the borough. Now I hand in another diagram which shows for the whole period of the epidemic and severally for "all classes," for "vaccinated," and for "unvaccinated," the fatality (that is the case mortality) of small-pox in the borough of Sheffield and in each of its sub-divisions. (*The diagram was handed in. See Appendix IV., Diagram H; facing page* 248.) Here it will be seen that taking "all classes" we have a difference of rank to that previously observed. In the district that I have already stated to have been one of the worst districts, the North Sheffield district, the fatality for "all classes" is very slightly above that of the borough, whilst amongst the "unvaccinated" it is actually very much below the fatality for Sheffield. Then, again, taking the "unvaccinated" you will see that the fatality was very high in what I have already stated to be the best part of Sheffield, the Ecclesall district; the fatality there was very much above that of the borough; the three districts in which it was above the borough being Ecclesall, South Sheffield, and Attercliffe. Then, again, in West Sheffield where there was the highest death-rate and the highest attack-rate of all the districts we there have a fatality considerably below the fatality for the whole borough. The object of these diagrams is mainly to show that although you have a greater attack rate where you have a greater density of population (always assuming the influence of the hospital to have been equal), and you have a corresponding greater mortality in those districts, still the fatality is not affected to the same degree; in fact, the fatality in this particular epidemic has been lower in the more overcrowded districts than in some of the better class districts; the fatality has been above the average in some better class districts, in the districts of less density.

2015. (*Sir Edwin Galsworthy.*) Do you refer to districts from which the cases come?—As to cases treated in hospital I always refer to the district from whence they were originally admitted.

2016. (*Sir James Paget.*) Is there any difference in the fatality of the cases in the hospital from those out of it?—I am coming to the hospital fatality directly.

2017. (*Chairman.*) Does that conclude the heading of "health office data"?—Yes.

2018. Then will you pass now to the data derived from the hospital experience?—Yes. These data were obtained from a different source altogether to any that have gone before; they are taken entirely from the hospital registers which were kept by the medical officers in charge of the various hospitals. On page 207, Table CXII., I have given the types of disease in persons of all ages in the "re-vaccinated," "vacci-

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nated," and "unvaccinated" classes respectively treated in each hospital, together with the fatality in each class. "In the Borough Hospital, Winter "Street, 1,144 persons were treated for small-pox "during the period from the admission of the earliest "cases on the 24th March 1887 to 31st March 1888. "Of these 864 were stated to be of the 'vaccinated' and 280 of the 'unvaccinated' class respectively." I do not take into account in this anything with regard to the quality of the vaccination. I am taking the ordinary divisions of "vaccinated" and "unvaccinated." "In 71, or 8·2 per cent., of the persons "of the 'vaccinated' class and in 93, or 33·2 per cent., "of the persons of the 'unvaccinated' class treated "the disease proved fatal. Of the 864 persons, all ages, "of the 'vaccinated' class the type of the disease was "varioloid or discrete in 706, or 81 per cent. (varioloid "293, or 33·7 per cent., discrete 413, or 48 per "cent.), and coherent or confluent in 119, or 13·8 per "cent. (coherent 107, or 12·4 per cent., confluent 12, "or 1·4 per cent.), whilst with respect to 39, or 4·5 "per cent., the records were incomplete. Of the 280 "persons, at all ages, of the 'unvaccinated' class the "type of the disease was discrete in 80, or 17·8 per "cent. (none in this class of varioloid type), and "coherent or confluent in 230, or 82·2 per cent. "(coherent 175, or 62·6 per cent., confluent 55, or "19·6 per cent.). In the borough hospital, Lodge "Moor, 104 persons were treated for small-pox during "the period from the opening of the hospital on 8th "March 1888 to 31st March 1888. Of these 80 were "stated to belong to the 'vaccinated' and 24 to the "'unvaccinated' class. In 7, or 8·7 per cent., of the "persons of the 'vaccinated' class, and in 4, or 16·7 "per cent., of persons of the 'unvaccinated' class, the "disease proved fatal. Of the 80 persons of all ages "of the 'vaccinated' class the type of the disease was "either varioloid or discrete in 49, or 61·3 per cent., "and coherent or confluent in 26, or 32·5 per cent., "whilst with respect to 5, or 6·2 per cent., the records "were incomplete. Of the 24 persons at all ages of "the 'unvaccinated' class the type of the disease was "discrete in 3, or 12·5 per cent., and coherent or con-"fluent in 17, or 70·9 per cent., whilst with respect to "4, or 16·6 per cent., the records were incomplete. "In the Sheffield Union workhouse hospital 398 persons "were treated for small-pox from the opening of the "hospital on 20th August 1887 to 31st March 1888, "and of these 275 were stated to be of the 'vaccinated' "and 123 of the 'unvaccinated' class, respectively. "In 23, or 8·4 per cent., of the persons of the 'vacci-"nated' class, and in 38, or 30·9 per cent., of persons "of the 'unvaccinated' class, the disease proved fatal. "Of the 275 persons at all ages of the 'vaccinated' "class the type of the disease was varioloid or discrete "in 212, or 77·2 per cent., and coherent or confluent "in 54, or 19·6 per cent., whilst with respect to 9, or "3·2 per cent., the records were incomplete. Of the "123 persons at all ages of the 'unvaccinated' class "the type of the disease was discrete in 28, or 22·8 "per cent., and coherent or confluent in 95, or 77·2 "per cent. In the Ecclesall Bierlow Union work-"house hospital 152 persons were treated for small-"pox during the period from the opening of the "hospital on 26th July 1887 to 31st March 1888, and of "these 132 were stated to belong to the 'vaccinated' "and 20 to the 'unvaccinated' class. In 9 or 6·8 per "cent. of the persons of the 'vaccinated' class, "and in 11, or 55 per cent. of persons of the 'un-"vaccinated' class, the disease proved fatal. Of the "132 persons at all ages of the 'vaccinated' class, the "type of the disease was varioloid or discrete in 108, "or 82 per cent., and coherent or confluent in 24, or 18 "per cent. Of the 20 persons of all ages of the 'un-"vaccinated' class the type of the disease was dis-"crete in 1, or 5 per cent., and coherent or confluent "in 19, or 95 per cent. The proportions of attacks of "small-pox of differing type in 'vaccinated' and 'un-"vaccinated' persons respectively at all ages treated "in the four hospitals are shown graphically in "Diagram XX.,"—and this diagram I now hand in. (*See Appendix IV., Diagram J: facing page* 248.)

2019. (*Dr. Collins.*) Were there no cases of hæmorrhagic small-pox?—Yes, there were a few, but very few, hæmorrhagic or malignant. When they did occur they were included along with the confluent. In Table CXIII., on page 209, I have given the character of the attack of small-pox in persons of the "vaccinated" and "unvaccinated" classes respectively, at all, and at certain age-periods, treated in each hospital in Sheffield during the 13 months ended the 31st of March 1888, as follows:—

Hospital.	Condition as to Vaccination.	Age Periods.	Total Cases with regard to which Type of Disease was recorded.	Type of Disease.				Proportion per cent. of Total Cases.				Total Cases with regard to which Type of Disease was not recorded.
				Varioloid.	Discrete.	Coherent.	Confluent.	Varioloid.	Discrete.	Coherent.	Confluent.	
Column 1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.
Borough Hospital, Winter Street.	Vaccinated	Under 10 years of age	27	22	5	—	—	82	18	—	—	1
		10 years and under 20	343	171	151	20	1	50	44	5·8	0·2	12
		20 " " 30	291	76	166	44	5	26	57	15	2	10
		30 and upwards	164	24	91	43	6	15	55	26	4	16
		All ages	825	293	413	107	12	34·5	50	13	1·5	30
	Unvaccinated	Under 10 years of age	67	—	13	50	4	—	19	75	6	—
		10 years and under 20	140	—	32	85	23	—	22	61	17	—
		20 " " 30	58	—	4	36	18	—	7	62	31	—
		30 and upwards	15	—	1	4	10	—	7	27	66	—
		All ages	280	—	50	175	55	—	18	62	20	—
Borough Hospital, Lodge Moor.	Vaccinated	Under 10 years of age	—	—		—		—		—		—
		10 years and under 20	39	28		11		71·9		28·1		2
		20 " " 0	21	13		8		62·0		38·0		1
		30 years and upwards	15	8		7		53·3		66·7		2
		All ages	75	49		26		65·3		34·7		5
	Unvaccinated	Under 10 years of age	5	—		5		*		*		—
		10 years and under 20	6	1		5		*		*		2
		20 " " 30	4	—		4		*		*		2
		30 years and upwards	5	2		3		*		*		—
		All ages	20	3		17		15·0		85·0		4

Figures too small to give rates of value.

Hospital.	Condition as to Vaccination.	Age Periods.	Total Cases with regard to which Type of Disease was recorded.	Type of Disease.				Proportion per cent. of Total Cases.				Total Cases with regard to which Type of Disease was not recorded.
				Varioloid.	Discrete.	Coherent.	Confluent.	Varioloid.	Discrete.	Coherent.	Confluent.	
Column 1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.
Sheffield Union Workhouse Hospital.	Vaccinated	Under 10 years of age	24	21		3		88		12		—
		10 years and under 20	118	96		22		81		19		—
		20 „ „ 30	68	54		14		79		21		4
		30 and upwards	56	41		15		73		27		5
		All ages	266	212		54		80		20		9
	Unvaccinated	Under 10 years of age	25	9		16		36		64		—
		10 years and under 20	51	13		38		25		75		—
		20 „ „ 30	27	1		26		4		96		—
		30 and upwards	20	5		15		25		75		—
		All ages	123	28		95		23		77		—
Ecclesall Bierlow Union Workhouse Hospital.	Vaccinated	Under 10 years of age	15	12		3		80·0		20·0		—
		10 years and under 20	59	54		5		91·5		8·5		—
		20 „ „ 30	31	24		7		77·4		22·6		—
		30 years and upwards	27	18		9		66·6		33·3		—
		All ages	132	108		24		82·0		18·0		—
	Unvaccinated	Under 10 years of age	4	—		4		*		*		—
		10 years and under 20	6	1		5		*		*		—
		20 „ „ 30	9	—		9		*		*		—
		30 years and upwards	1	—		1		*		*		—
		All ages	20	1		19		5·0		95·0		—
Total Hospitals in Sheffield.	Vaccinated	Under 10 years of age	66	60		6		91·0		9·0		1
		10 years and under 20	559	500		59		89·4		10·6		14
		20 „ „ 30	411	333		78		81·0		19·0		15
		30 years and upwards	262	182		80		69·5		30·5		23
		All ages	1,298	1,075		223		82·8		17·2		53
	Unvaccinated	Under 10 years of age	101	22		79		21·8		78·2		—
		10 years and under 20	203	47		156		23·2		76·8		2
		20 „ „ 30	98	5		93		5·1		94·9		2
		30 years and upwards	41	8		33		19·5		85·5		—
		All ages	443	82		361		18·5		81·5		4

* Figures too small to give rates of value.

I also hand in a diagram showing the proportion of cases of small-pox of different types which occurred in persons of the "vaccinated" and "unvaccinated" classes respectively at all, and certain specified, ages in the Winter Street and Sheffield Union Workhouse Hospitals. (*The diagram was handed in. See Appendix IV., Diagram K: facing page* 248.) The main thing that the table and diagram show is that the further the age from infancy the worse the type of small-pox in the vaccinated; that you get an increase in both the rate of fatality and an increase in the rate of the severity of attack.

2020. (*Mr. Meadows White.*) Before passing from that, every one of the marks upon these diagrams is a case of small-pox, I take it?—Yes.

2021. The diagrams only show proportions?—Yes, and the type of disease in each case.

2022. (*Dr. Collins.*) Each square represents 100, I understand, though there may not have been 100 cases?—There may not.

2023. So that each small square would not necessarily mean one case?—In some instances it means a great many more than one; in some it shows less than others, it merely shows the proportion.

2024. (*Mr. Meadows White.*) It shows the proportion per hundred cases?—Yes.

2025-6. (*Chairman.*) Now, passing to Table CXVI. on page 215, will you proceed to deal with that?—That table shows the fatality from small-pox per cent. of admissions in each hospital, and in all the hospitals in Sheffield. "From an examination of that table it will "be seen that there is a general correspondence "between the fatality rates which obtained in the "several hospitals at the different age periods. The "figures with regard to the Lodge Moor and Ecclesall "Bierlow Hospitals show the chief variations, but in "the case of these hospitals the figures are very small. "From the summary of the figures with regard to all "the hospitals, it appears that of the total of 1,798 "cases of small-pox, 256, or 14·2 per cent., proved "fatal. Of the total number of cases, 1,351 were of "the 'vaccinated' as against 447 of the 'unvaccinated' class. Of the 1,351 persons of the 'vaccinated' class admitted, 110, or 8·1 per cent., died; "whilst of the 447 'unvaccinated' persons admitted, "146, or 32·7 per cent., died. Of 1,351 persons of "the 'vaccinated' class admitted, 67 were under 10 "years of age, and of these 1, or 1·5 per cent., died; "573 were aged 10 but under 20 years, and of these "13, or 2·3 per cent., died; 426 were aged 20 "but under 30 years, and of these 42, or 9·9 per "cent., died; and 285 were aged 30 years and "upwards, and of these 54, or 19 per cent., died.

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"The whole of the persons of the 'vaccinated' class "who died had been vaccinated in infancy only, with "one exception, and the figures show a greater liability "to fatal termination with increasing age. Of 447 per- "sons of the 'unvaccinated' class admitted, 101 were "under 10 years of age, and of these 34, or 33·7 per "cent., died; 205 were aged 10 but under 20 years, "and of these 56, or 27·3 per cent., died; 100 were "aged 20 but under 30 years, and of these 41, or 41 "per cent., died; and 41 were aged 30 years and up- "wards, and of these 15, or 36·6 per cent., died." In the hospitals of course all the patients were under the same conditions; they were not being treated in differ- ent class houses, some in good ones and some in bad ones, but they were all being treated under the same nursing and with the same general surroundings, and, as I note here in the report, "except during the first "few months of the epidemic, very few of the milder "cases found their way to the hospitals, and conse- "quently the proportions of severe and fatal cases "were larger there than amongst the population as a "whole." Then I have treated here in my report difference of type of the disease in vaccinated and unvaccinated persons in the same manner as I have treated difference of incidence of attack and of death with regard to the census figures and to the health office figures for the general population. I do not propose to give that fully but simply, in the same manner as with regard to the census tables, to read part of the lower line in each case. Taking the cases treated in hospital, at all ages (I am reading from page 216): "For each individual vaccinated person "suffering from an attack of confluent small-pox, 4·7 "unvaccinated persons suffered from that type of the "disease." I may here note that I am with confluent including also the coherent, these being the two more severe types of small-pox. Then taking chil- dren under 10 years of age: "For each individual "vaccinated child aged under 10 years suffering "from an attack of confluent small-pox, 8·7 un- "vaccinated children suffered from that type of the "disease." Taking persons from 10 to 20 years of age: "For each individual vaccinated person aged from "10 to 20 years suffering from an attack of confluent "small-pox, 7·2 unvaccinated persons of similar age "suffered from that type of the disease." Taking per- "sons from 20 to 30 years of age: "For each individual "vaccinated person aged from 20 to 30 years suffering "from an attack of confluent small-pox, 5 unvacci- "nated persons of similar age suffered from that type "of the disease." Taking persons aged 30 and up- wards: "For each individual vaccinated person aged "upwards of 30 years suffering from an attack of con- "fluent small-pox, 2·8 unvaccinated persons of similar "age suffered from that type of the disease." Then, dealing in the same way with the fatality of the cases in hospital:—taking all ages: "For each individual vacci- "nation person suffering from a fatal attack of small- "pox, 4 unvaccinated persons died of that disease." Taking children aged 0–10: "For each individual vacci- "nated child 0–10 years of age suffering from a fatal "attack of small-pox, 22·4 unvaccinated children died "of that disease." Taking persons from 10 to 20 years of age: "For each individual vaccinated person 10–20 "years of age suffering from a fatal attack of small- "pox, 12 unvaccinated persons of similar age died of "that disease." Then, as to persons aged from 20 to 30: "For each individual vaccinated person 20–30 "years of age suffering from a fatal attack of small- "pox, 4·1 unvaccinated persons of similar age died "of that disease." Taking persons aged 30 years and upwards: "For each individual vaccinated person aged "30 years and upwards suffering from a fatal attack "of small-pox, 1·9 unvaccinated persons of similar age "died of that disease." That concludes what I have to say with regard to the hospitals.

2027. I believe you have next some data respecting particular classes of the population?—Yes; the parti- cular classes to which I would wish to refer are the troops, police, postmen, and attendants at the small- pox hospitals. They had all of them been subject to measures of vaccination and re-vaccination which did not apply to the general population, and three of these classes—members of the police, the postmen, and the attendants at the small-pox hospitals—were brought into contact with small-pox in a way in which other classes of the population were not. I am referring now to page 205. Taking first the troops: "The average strength "of the troops stationed in Sheffield during 1887–88 "has been about 830 of all ranks. The whole of these, "in accordance with the Army Regulations, had at "one time or another been re-vaccinated. Up to the "31st March 1888, 12 men, or 1·4 per cent. of the "total strength, contracted small-pox, and of these 1, "or 0·12 per cent., died." Now, with regard to every one of these men, the principal medical officer in charge showed me the sheets in which they keep a record of everything that happens to a man after he enters the service, and in each instance the re-vaccina- tion had been unsuccessful—that is the statement on the sheets. In every case I say, with one exception, that exception is the first man upon the list; his sheet I did not see because the man had been removed to some other district, and I could not get at the sheet; but the medical officer in charge stated that the re-vac- cination had been unsuccessful in the case of that man also. All the soldiers who were attacked were stated to have been vaccinated in infancy. In four cases the disease was confluent in character. The men were not confined to barracks during the epidemic, but were allowed free access to their friends in the town. Then with regard to the police: "There are 372 men of all "ranks in the Sheffield Borough Police Force, and of "these, up to the 10th of February 1888, 10 constables, "all of whom had been vaccinated in infancy, con- "tracted small-pox. None of these men had been "re-vaccinated. On the 10th February 1888 the "chief constable issued a general order directing the "re-vaccination of every man in the force, and since "that date to the present time no constable had con- "tracted the disease."

2028. (*Dr. Collins.*) Was there no death?—There was no death amongst the police. The police in carrying out their ordinary duties were of necessity frequently brought into close relation with infected persons and things. There is an instance given of that in the note appended to the death table on page 29; one of the men who contracted small-pox gave me the infor- mation—his wife died of small-pox after he had him- "self contracted the disease: "Sergeant W., together "with Sergeant B. (both of whom had been vaccinated "in infancy only), and Police Constable W. (who "had been re-vaccinated a few weeks previously) "went to make inquiries at a house in Dunfields. "Here they found a woman washing clothes, and "noticing an unpleasant smell they elicited the fact "that the clothes she was washing had 'come from off "'a man who had died of small-pox.' The police "retreated, but both the sergeants about a fortnight "afterwards suffered from virulent small-pox, for which "they were treated in the Borough Hospital. The "constable, although similarly exposed to infection, "escaped altogether." Now the sergeant who gave me all this information gave me also a piece of infor- mation which perhaps might be of interest to the Commission; it was that while he was in the hospital he formed an estimate for himself with regard to vacci- nation and want of vaccination;—by taking note of every patient admitted to the ward in which he himself was under treatment. In each case in which, while he was there, the doctor having examined a patient found that there was no mark upon him, that he was an unvaccinated case, confluent small-pox followed.

2029. (*Chairman.*) It followed where there was no mark?—Yes, it followed where there was no mark. And he said that while he was in that particular ward no case of confluent small-pox followed upon admis- sion in the case of a vaccinated person. Then next I take the postmen (page 206). "There are 290 men and boys "employed on the permanent staff of the Sheffield "Post Office. The whole of these, in accordance with "the Post Office Regulations, had been re-vaccinated "before engagement. It is scarcely necessary to point "out that the duties of the letter carriers, telegraph "boys, &c. continually bring them into personal "contact with infected persons and things, yet "up to the present date (August 1888) no member of "the permanent staff of the Sheffield Post Office has "contracted small-pox." Of course postmen come into communication very much with small-pox houses; but it is to be noted that the above regulations do not apply to shopkeepers keeping also district post offices, and amongst them there were several cases of small-pox. I have not referred to that in the report, but there were several cases of small-pox amongst the district post- masters or their families, who were not under the same regulations as the postmen. Fourthly, I take the attendants in small-pox hospitals. "During the year "ended 31st March 1888 four hospitals were used in "Sheffield for the treatment of acute cases of small- "pox. The total bed accommodation in these four "hospitals was 315, and 1,798 patients suffering from

" acute small-pox were treated in them during the " year. The Totley Hospital, which was used for con- " valescent small-pox patients only, had accommoda- " tion for 60 patients, and here 491 patients, trans- " ferred from the Borough Hospital in Winter Street, " were treated during the five months ended 28th " February 1888."

2030. (*Mr. Meadows White.*) Is that exclusive of the 1,798 patients?—It is exclusive of the 1,798 patients; convalescents were removed from one hospital, and sent to another. "The total attendants in personal contact " with the sick in these four hospitals were 140 in " number. In addition there were 21 other persons, not " themselves necessarily in actual contact with the sick, " though in constant communication with attendants on " small-pox cases. Of these 161 persons, 18 (11·2 per " cent.) had suffered from small-pox prior to 1887–88" (of the 18, 16 had been re-vaccinated subsequent to their attack by small-pox), and none of the 18 contracted " small-pox during the present epidemic; other 62 " (38·5 per cent.) had been vaccinated in infancy only, " and of these 6 (9·7 per cent.) contracted small-pox, " and one died. The five " non-fatal cases were " slight in character. Of the remaining 81, all of " whom had been successfully re-vaccinated, not one " contracted small-pox." The facts ascertained with regard to each hospital are shown in Table CXI. on page 206.

2031. (*Sir Edwin Galsworthy.*) What is the cubic space allowed per bed there, do you suppose?—The cubic space varied considerably at different hospitals. The cubic space in the Winter Street Hospital is given on page 268. During 1887–88 when the hospital was considerably crowded the amount of cubic space was 1,450 feet per bed. In the borough hospital, Lodge Moor, the cubic space was 2,000 feet per bed; that is given on page 270. In the Sheffield Union Workhouse Hospital, which is given on page 271, in the permanent wards, which were overcrowded during part of the epidemic, the cubic space was 1,072 feet per bed, and 715 cubic feet.

2032. That was at the time when it was what you call overcrowded?—Yes, that was when it was overcrowded. In the huts at this Workhouse it varied; in the first hut there was an air space per bed of 586 cubic feet, in the second hut there was an average air space of 1,138 cubic feet, in the third hut there was an average air space of 619 cubic feet, and in the fourth hut there was also an average of 619 cubic feet per bed. I see there is one case given on page 272, that of the Ecclesall Bierlow Union Workhouse hospital, where the average cubic space per bed was 701 cubic feet in the old hospital, and 624 cubic feet in the new hospital.

2033. (*Chairman.*) Is that all you have to say with regard to the different classes of population?—That is everything with regard to the different classes of population.

2034. Then the remaining head, I believe, is the result of certain personal inquiries?—Yes; personal inquiry in connexion with re-vaccination, second small-pox, small-pox deaths, and with regard to the quality of vaccination in children.

2035. What are the points to which you propose to refer?—The first point to which I should wish to draw attention is the particulars with regard to re-vaccination. On page 199 are given the total cases that were reported from all sources, from the beginning of the epidemic in February 1887 to March 31st 1888, as having suffered from small-pox after successful re-vaccination. I have already explained the manner in which these figures were obtained, and the different sources of information from which we obtained the number of re-vaccinated persons. The number was 352. "This " number includes all cases reported to the census " enumerators, to the health office, or to me personally, " either by private persons in answer to my appeal " made through the public press, or by medical men " in response to the circular letter addressed to each " practising in Sheffield." These are cases of attacks after re-vaccination. "The general results of the per- " sonal inquiry made with regard to each of these 352 " persons are given in Table CVI. Of the total number, " 23 or 6·5 per cent., had removed and could not be " traced, and in consideration of the small proportion " of the persons actually inspected who were found to " have suffered from small-pox after genuine successful " re-vaccination, I have excluded the 23 who could not " be traced from the calculations. Each case, however, " will be found noted in the sub-district tables. Of the 329 " who were inspected it was ascertained that 36, or 10·9 " per cent., had not been attacked by small-pox; that 9, " or 2·7 per cent., had never been vaccinated at all; that " 4, or 1·2 per cent., had been unsuccessfully vacci- " nated; that 30, or 9·1 per cent., had been vacci- " nated for the first time during the incubative stage of " small-pox; that 90, or 27·4 per cent., had been vacci- " nated in infancy only; that 48, or 4·6 per cent., had " been re-vaccinated unsuccessfully; that 70, or 21·3 " per cent., had been re-vaccinated during the incu- " bative stage of small-pox; that 16, or 4·9 per cent., " had been re-vaccinated after recovery from small- " pox, and that 26 only had been re-vaccinated suc- " cessfully prior to the incidence of small-pox. In " addition to those inspected, one person who had " been successfully re-vaccinated was fatally attacked " by small-pox in 1887. The number of persons who " were found to have been attacked by small-pox after " successful re-vaccination from the commencement " of the epidemic to the 31st March 1888 in the whole " borough was thus 27 in all." Of each of the 27 cases which had been successfully re-vaccinated there is a full account given underneath the various sub-district tables—they will be found in the notes always. In the table, with regard to Attercliffe, on page 31, there are four cases given; the first one had been vaccinated in infancy and had been re-vaccinated in Huntingdonshire direct from a cow, in 1874: " He has four well-foveated " secondary scars, quite equal to the primary scars. " He had a slight attack of small-pox in 1888, a few " pocks on his back only; he made a good recovery " and is not pitted." The only other case in that dis- trict was that in Note D.: " Hannah R., who had been " vaccinated in infancy, had, prior to being re-vacci- " nated, been nursing some cases of small-pox. She " was re-vaccinated by the public vaccinator and has " one faint scar one-sixth inch in area at the point of " re-vaccination. She had a severe attack of discrete " small-pox but made a good recovery and is not " pitted."

2036. (*Sir Edwin Galsworthy.*) In note A. what was the age at re-vaccination?—He was aged 31 when attacked; he had been re-vaccinated at 17 years of age. Then notes to Table XXIV. on pages 50 and 51 are given. In the Brightside district there were six per- sons who had suffered from small-pox after re-vaccina- tion performed 4, 10, 14, 16, 17, and 32 years prior to the attack. The first one is " Mrs. S., aged 35, vacci- " nated in infancy, re-vaccinated in 1871; stated to " have had small-pox without eruption in 1888, fever " only." The next case is No. 18, " Mrs. C., who was " vaccinated in infancy, had only one faint scar, was " revaccinated in London in 1884, and had two im- " perfect secondary marks; she had a severe attack " of small-pox in 1888."

2037. (*Chairman.*) It is hardly necessary to take notice of each individual case?—I will summarize them. "Of the 27 cases that had been successfully re-vacci- nated" (page 200), " the operation had been performed " in one case in 1856, in two in 1863, in one in 1864, in " one in 1869, in three in 1871, in one in 1872, in three " in 1874, in two in 1876, in one in 1878, in one in " 1881, in one in 1882, in two in 1884, in two in 1885, " in one in 1886, and in two in 1887. In one case the " date of re-vaccination could not be ascertained, but " in this there were no marks of re-vaccination, whilst " in a second case re-vaccination had been successfully " performed on two, and in a third on three occasions. " In 19 of the 27 re-vaccinated persons attacked by " small-pox, the disease was of an extremely mild " character and not followed by any pitting. In " two persons who were re-vaccinated in 1882 and " 1884 respectively, there was a copious small-pox " eruption, but no pitting ensued; in three other " cases the attack was severe in character, and " in two of these it was followed by slight pitting " (one re-vaccinated in 1876 and the other re-vac- " cinated successfully on two occasions); the third " (re-vaccinated in 1882) was badly pitted." An account of the fatal case will be found in footnote A. to Table XXXI., page 65, and it is that of an ex- soldier, aged 39, who had been successfully re-vaccina- ted in 1869: " he had only three small faint vaccina- " tion cicatrices, and it is not known whether these " were the result of primary or secondary vaccination. " He was treated for small-pox in the Borough " Hospital, Winter Street, and his wife states that 36 " hours prior to his death, he, when delirious, got out " of the window of the ward and escaped from the " hospital. He had on neither shoes nor stockings, in " fact, nothing except his night-shirt. In that state " he ran over half a mile in the pouring rain." The

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two remaining persons were both re-vaccinated in 1887, and on referring to the notes made after personal inquiry with regard to each of them (see note B. to Table XLII., and note D. to Table LXXII. of my report) it will be seen that it is very doubtful whether either of them was a genuine case of small-pox. I think I had better read the notes with regard to each of these cases, because they were cases re-vaccinated during the epidemic, and were alleged to have had small-pox after their recent revaccination. Note B. to Table XLII. page 87 is: "Elizabeth J., aged 18, 44, Hampton "Street, vaccinated in infancy at the Nether Hallam "public vaccination station, three primary cicatrices "of good class, aggregate area over one square inch. "Re-vaccinated in September 1887, by private "practitioner, two well-marked secondary cicatrices, "one third square inch in area. Suffered from "small-pox in February 1888; very mild attack, "'eight spots in face, one on a leg, and one on an "'arm.' Did not feel ill." That was her own statement to me. Table LXXII. is the next, that is on page 140, note D.: "Elizabeth A. H. (aged 29) "vaccinated in infancy by public vaccinator. Has "three well-marked cicatrices; aggregate area three "quarters square inch; re-vaccinated October 1887; "has one secondary cicatrix, area one-sixth square "inch. Alleged to have suffered from small-pox in "December 1887. *Eruption only on right hand*, no "spots anywhere else. Had erysipelas of face at the "same time." My own opinion of the case was that it was not small-pox at all, but as it was stated to have been small-pox I included it as it might possibly have been small-pox. With the view of ascertaining the proportion of attacks of small-pox in persons who had been re-vaccinated I have in Table CVII. given the total number of such persons reported to be living in the several sub-districts at the time of the census, distinguishing re-vaccinations performed prior to 1887 from those performed during 1887-88. Table CVII. shows the number of persons reported to the census enumerators to have been successfully re-vaccinated in the borough of Sheffield and in each sub-district, together with the number of persons who were attacked by and who died from small-pox after successful re-vaccination during the 13 months ended March 31st, 1888; re-vaccinations performed prior to 1887 and during 1887-88 being distinguished. From this table it will be seen that 64,431 persons, or 23 per cent. of the total population enumerated, were reported to the census enumerators to have been re-vaccinated, and that up to the end of March 1888, 27, or 0·04 per cent. of the total re-vaccinated persons, had been attacked by small-pox, and 1, or rather more than 0·001 per cent., had died.

2038. (*Dr. Collins.*) Were the 64,431 successfully re-vaccinated or re-vaccinated without result?—I cannot say whether they had been successfully re-vaccinated or not. I only give it on the statement of the persons themselves that they had been re-vaccinated. There is no question that by the end of the epidemic the total number of persons who had been re-vaccinated had become very much larger than this. This does not take in all re-vaccinations up to the end of the epidemic; the number of persons who up to the end of the epidemic, had been re-vaccinated privately, was extremely large. I was told that one chemist alone sold 5,000 tubes of lymph for re-vaccination purposes in the course of one week.

2039. (*Mr. Meadows White.*) You mean that they were re-vaccinated subsequently to the census being taken?—They were re-vaccinated subsequently to the census being taken. "Of the total number of persons reported "to be re-vaccinated, 8,198 were re-vaccinated prior "to 1887, and of these 25, or 0·30 per cent., were "attacked by, and 1, or 0·01 per cent., died of, small-"pox." That is the man I was speaking of just now, the man who got out of hospital. "The remaining "56,233 were stated to have been re-vaccinated during "1887-88, and of these 2, or 0·004 per cent., were "doubtfully attacked by small-pox, and none died." The actual numbers enumerated are given in Table CVII. and you find also that there are various sub-district entries under the heading of "Re-vaccination."

2040. (*Chairman.*) You have next some results to give with regard to second attacks of small-pox?—With regard to second attacks of small-pox in Table CVIII., page 202, there is given the total number of persons living in Sheffield and in the several sub-districts who were reported by the census enumerators to have suffered from small-pox prior to 1887, together with the number of those who suffered from a second attack (fatal or non-fatal) during the recent epidemic. "From "this table it appears that 18,292 persons, or 6·6 per "cent. of the enumerated population of the borough "of Sheffield, were stated to have suffered from small-"pox prior to 1887, and that in 23, or 0·13 per cent., "second attacks occurred during the recent epidemic, "of which 5, or 0·3 per cent. of this 18,292, proved "fatal. A detailed account of each of the 23 cases "will be found in the subsections referring to the "several sub-districts. 13 of the 23 had been vacci-"nated in infancy, whilst the remaining 10 had never "been vaccinated. In 14 the second attack of small-"pox was very mild and was not followed by pitting. "Two persons, aged respectively 35 and 20, who had "suffered from attacks of small-pox in 1865 and 1872, "had second attacks more severe in character though "not followed by pitting. A person, aged 44, who had "had a severe attack of small-pox in 1870, followed by "blindness, had a second attack, also severe in cha-"racter and followed by much additional disfigure-"ment. A person, aged 19, who had suffered from "small-pox in 1871, had a second attack, which was "severe in character, and followed by considerable "pitting. Other five persons died of their second "attack of small-pox."

2041. (*Dr. Collins.*) That would give a fatality of about 20 per cent., would it not?—Yes, it would be about that in that case, it was 23 to 5.

2042. (*Chairman.*) You have also some statement to make, have you not, with regard to vaccinated children under 10 years of age?—That was another matter as to which I made personal inquiries. On page 186 there is a summary with respect to attacks of small-pox in vaccinated children under 10 years of age reported either to the census enumerators, or to the health department from the commencement of the epidemic to March "31st, 1888. In the borough of Sheffield 645 children "under 10 years of age were reported to have suffered "from small-pox subsequent to successful vaccination "during the period from the commencement of the "epidemic to the 31st March 1888. This number in-"cludes all children reported either by the census "enumerators, or separately to the Health Office. "The general results of a personal inquiry with regard "to each of these 645 children, are given in Table "XCIX., page 187. Of the total number reported, "67, or 10·4 per cent., had removed and could not be "traced. I have, however, in the tables giving the "number of attacks, both as regards census and "health office returns, assumed that all these 67 "children having small-pox had been successfully "vaccinated. Of the 578 children personally inspected "it was ascertained that 48, or 8·3 per cent., had not "suffered from small-pox, that 40, or 6·9 per cent., "had never been vaccinated at all, and that 11, or 1·9 "per cent., had been unsuccessfully vaccinated in "infancy; and that 28, or 4·8 per cent., had been vac-"cinated for the first time during the incubative stage "of small-pox, and that 451, or 78·1 per cent., had "suffered from small-pox, notwithstanding successful "vaccination."

2043. (*Mr. Meadows White.*) That 451 includes the 67, does it not?—No, it does not include the 67, but the 67 are included in the table. "Of the 451 children in-"spected who had suffered from small-pox after "successful vaccination in infancy 7, or 1·6 per cent., "were under one year of age; 22, or 4·9 per cent., "were aged one but under two years; 109, or 24·2 "per cent., were aged two but under five years; and "313, or 69·4 per cent., were aged five but under 10 "years; thus showing an increased liability to attack "with increasing age. Of the 451 vaccinated children "329, or 73 per cent., had been vaccinated by public "vaccinators resident in Sheffield, 29, or 6·4 per cent., "by public vaccinators resident elsewhere, 80, or 17·7 "per cent., by private vaccinators resident in Sheffield, "and 10, or 2·2 per cent., by private vaccinators resi-"dent elsewhere. The person who had performed the "operation in three cases, or 0·7 per cent. of the whole, "could not be ascertained." I may say generally that this portion of my report, that is my inquiry with regard to children, had specially for its object the ascertainment of the effect of the quality of vaccination. "In 7 instances, or 1·55 per cent. of the "451, the attack of small-pox proved fatal; in 22, or "4·9 per cent., the attack was stated to have been "severe in character, and in 12 of these cases there "was some subsequent pitting. In 422, or 93·55 per "cent., the disease was stated to have been mild in

"character, and in 11 of these cases only was there "any subsequent pitting. An examination of the sub-"district returns, in which I show the actual results "with regard to each child inspected, will at once "show the extremely trivial nature of the attack in "the great mass of these mild cases." I may say that in the great majority of the mild cases the child was never confined to bed at all, it was playing about the house and in many cases not even confined to the house, and, in the large majority of cases, the parents had actually counted the number of pocks occuring during the attack; in some cases there were two or three up to 12 and 20 or 30, they were separate pocks and the numbers so counted by the parents are given in the district tables. "In Table C., on pages 188-9, will be "found an analysis of the results obtained after per-"sonal inspection of the 451 vaccinated children who "suffered from small-pox with respect to the quality "of the vaccination performed by public and private "vaccinators respectively, and to the character of the "attack of small-pox in children whose vaccination "was of differing quality. Of the 358 children vacci-"nated by public vaccinators, 15, or 4·2 per cent., had "either no visible cicatrix or one cicatrix only; 36, or "10 per cent., had two cicatrices; 110, or 30·7 per "cent., had three cicatrices; and 197, or 55·1 per cent., "had four or more cicatrices. Of the 90 children in "whom the operation had been performed by private "vaccinators, 22, or 24·4 per cent., had no visible "cicatrix or one cicatrix only; 39, or 43·4 per cent., "had two cicatrices; 26, or 28·9 per cent., had three "cicatrices; and three, or 3·3 per cent., only had four "cicatrices. The three children in whose case the "vaccinator could not be identified had each three "cicatrices. The character of the vaccination observed "in children attacked by small-pox where the opera-"tion had been performed by public and private "vaccinators respectively, bears out the indications in "previous sections of this report as regards the "superior quality of the work done by the former," as judged by the standard I have already stated. "In "considering the effect of vaccination of differing "quality on the character of the attack of small-pox, "I have classified the attacks under the headings of "'mild,' 'severe,' and 'fatal,' accepting the state-"ments of relatives or friends with regard to each. "Speaking generally, 'mild' may be regarded as "varioloid or discrete, and 'severe' as coherent or "confluent. Of the 37 children under 10 years of age "in whom there was no visible vaccination cicatrix or "one cicatrix only (the 37 were made up of 8 with "no visible mark, and 29 with one mark; in the 8 "were comprised 5, and in the 29 were comprised 4, of "the severe cases), in 28, or 75·7 per cent., the attack "of small-pox was stated to have been mild, but in "3 of these there was some subsequent pitting, whilst "in 9, or 24·3 per cent., the attack was severe, and in "6 cases was followed by pitting. Of the 75 children "in whom there were two vaccination cicatrices, in "66, or 88 per cent., the attack of small-pox was stated "to have been mild, but in 3 of these there was some "subsequent pitting, and in 9, or 12 per cent., the "attack was severe, and in 2 cases was followed by "pitting, whilst in 3, aged respectively 7, 7, and 8 "years, the attack proved fatal. Of the 139 children "in whom there were three vaccination cicatrices, in "132, or 95 per cent., the attack of small-pox was "stated to have been mild, but in 2 only was there "any subsequent pitting, and in 7, or 5 per cent., the "attack was severe, and in 2 cases was followed by "pitting, whilst in 3 cases, aged respectively 3, 5, "and 8 years, the attack proved fatal. Of the 200 "children in whom there were four or more vaccina-"tion cicatrices, in 195, or 97·5 per cent., the attack "of small-pox was stated to have been mild, though "in four of these there was some subsequent pitting; "in 5, or 2·5 per cent., the attack was severe, and in "2 cases it was followed by pitting, whilst in one "child, aged 6 years, the attack proved fatal." I may say that in carrying out the inspection I saw a considerable number of other children who had not been vaccinated, and I was personally very much struck with the appearance of those unvaccinated children who had had small-pox. In most cases they were very deeply pitted, and two or three children whom I saw were quite blind as the result of the attack of small-pox that they had had. It may perhaps be desirable here to refer to the quality of vaccination as performed by public and private vaccinators as it was found by inspection of the work done by each class, and you will find a summary of that on page 185. I inspected the work done by public and private vaccinators, taking the standard of the Local Government Board for comparison.

2044. (*Chairman.*) It will be enough merely to refer to that?—Then bearing upon the relation of the differing qualities of vaccination to attack of small-pox, there are a number of facts given on pages 212 to 214; with diagram XXII., which show the relations of the type of small-pox to the number of primary vaccination cicatrices as observed in the two borough hospitals and the Ecclesall Bierlow Union Hospital.

2045. Then there are some records of personal inquiries as to small-pox deaths at all ages?—That was another matter in which personal inquiry was made with regard to each case. A summary of the results of that will be found on page 197 with regard to the vaccinated class.

2046. (*Mr. Meadows White.*) When you have said throughout your examination "personal inquiry," you have meant your own personal inquiry?—My own personal inquiry, or in a few instances of inquiry by my colleague Dr. Low, who was associated with me for a short time. "From the commencement of the "epidemic in February 1887 to March 31st, 1888, 246 "persons of all ages who were believed to have been "vaccinated in infancy died of small-pox in the borough "of Sheffield. A general summary of the results "of a personal inquiry made with reference to each "of these fatal cases is given in Table CIV. (page "198), in which they are considered under four head-"ings: (1) condition as to re-vaccination; (2) person "by whom the primary vaccination had to be per-"formed; (3) character of the vaccination; and (4) "previous health of the deceased. (1) Re-vaccination. "Of the total cases, 229, or 93·1 per cent., had been "vaccinated in infancy; 11, or 4·5 per cent., had been "unsuccessfully re-vaccinated; 5, or 2 per cent., had "been re-vaccinated during the incubative stage of "small-pox; whilst 1, or 0·4 per cent., only had been "re-vaccinated successfully prior to the incidence of "his own fatal attack of small-pox." It may perhaps be convenient to the Commission if I refer to the pages upon which a detailed account of every death is given in the sub-districts. The results of personal inquiry with regard to vaccinated deaths will be found in the following tables:—For Attercliffe, Table XIII., page 29. For Brightside, Table XXII., page 45. For North Sheffield, Table XXXI., pages 65 and 66. For Sheffield Park, Table XL., page 84. For South Sheffield, Table XLIX., page 99. For West Sheffield, Table LVIII., page 113. For Sheffield Workhouse, Table LXII., page 121. For Ecclesall, Table LXX., pages 133 and 134. For Nether Hallam, Table LXXIX., page 153. For Upper Hallam, Table LXXXVI., page 164. A summary of them is given in Table CIV., page 198. Of the total deaths in vaccinated persons: "In "95, or 38·6 per cent., no information could be "obtained; in 41, or 16·7 per cent., vaccination had "been performed by one or other of the public vacci-"nators resident in Sheffield; in 6, or 2·4 per cent., by "public vaccinators resident elsewhere; in 24, or 9·8 "per cent., by private vaccinators resident in Shef-"field; and in 80, or 32·5 per cent., by private "vaccinators resident elsewhere. As regards the "character of the vaccination in the case of 70 "deaths, or 28·5 per cent., of the whole, the charac-"ter of the vaccination could not be ascertained." By "character" I mean the number of vaccination marks—not the quality of them, but simply the num-ber. "In 13, or 5·3 per cent., no vaccination marks "were said to have existed; in 13, or 5·3 per cent., "there was one cicatrix only; in 56, or 22·7 per cent., "there were two cicatrices; in 80, or 32·5 per cent., "there were three cicatrices; in 13, or 5·3 per cent., "there were four cicatrices; whilst in 1, or 0·4 per "cent., there were said to have been more than four "cicatrices. Then with regard to the previous health "of the deceased, the previous health was stated to "have been satisfactory in 129 cases, or 52·4 per cent. "of the whole. In 12 instances, or 4·9 per cent., in "which the previous health was stated to have been "satisfactory, the attack was complicated by child-"birth, and in 12 others the deceased were alleged to "have been of intemperate habits. In 79, or 32·1 per "cent. of the whole, the previous health was stated to "have been unsatisfactory in varying degrees, whilst "with regard to 14, or 5·7 per cent., no information "could be obtained." Then with regard to personal

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inquiry into the deaths of persons of the unvaccinated class a general summary is given in Table CV., on page 199, and the details with regard to each case are given, as regards Attercliffe, in Table XIV., page 30; for Brightside, in Table XXIII., pages 48 and 49; for North Sheffield, in Table XXXII., pages 68 and 70; for Sheffield Park, in Table XLI., page 86; for South Sheffield, in Table L., page 100; for West Sheffield in Table LIX., pages 114 and 115; for Sheffield Workhouse on page 120; for Ecclesall, in Table LXXI., pages 136 and 137; and for Nether Hallam, in Table LXXX., page 155. Then, continuing on page 198: "From the commencement of the epidemic "in February 1887 to March 31st, 1888, 343 deaths "took place in the unvaccinated class in the borough "of Sheffield." That, of course, includes infants under a month. "As to vaccination, of the total cases, "390, or 87·5 per cent., had never been vaccinated; "24, or 7 per cent., had been vaccinated for the first "time during the incubative stage of small-pox; 17, "or 4·9 per cent., had been unsuccessfully vaccinated; "and 2, or 0·6 per cent., were stated to have been "insusceptible of vaccination, one of these having been "unsuccessfully vaccinated on three, and the other on "four occasions. The reasons given for non-vaccina-"tion in the 300 persons on whom the operation had "admittedly never been performed were: In 32 cases, "or 10·7 per cent., non-vaccination was stated to be "due to ill-health; in 13, or 4·3 per cent., to frequent "removals; in 14, or 4·7 per cent., to ill-health in "infancy and subsequent neglect; in 6, or 2 per cent., "to ill-health in infancy and subsequent opposition of "the persons themselves; in 1, or 0·3 per cent., to oppo-"sition of parents and subsequent neglect; in 3, or 1 "per cent., to fear of the alleged evil effects of vaccina-"tion; in 3, or 1 per cent., to the fact that the persons "were born abroad in countries where vaccination was "not compulsory; in 1, or 0·3 per cent., to the opposi-"tion of the deceased to vaccination; in 3, or 1 per "cent., to the fact that the deceased had suffered "from a previous attack of small-pox in infancy; in "61, or 20·3 per cent., to the opposition of parents to "the performance of the operation; in 127, or 42·4 per "cent., no special reason was alleged, except that "vaccination had been neglected, and in 36, or 12 per "cent., the deceased had been considered by the "parents to be 'too young' to be vaccinated." From a consideration of these figures it will be seen that with regard to 68, or 22·7 per cent., of these persons (32, ill-health, 36, "too young,") the reasons for non-vaccination were more or less justifiable. The previous health of the deceased was stated to have been satisfactory in 210, or 61·3 per cent., of the total fatal cases. In four instances, or 1·2 per cent., in which the previous health was stated to have been satisfactory, the attack was complicated by childbirth, and in 8 others, or 2·3 per cent., the deceased were alleged to have been of intemperate habits. In 77, or 22·4 per cent. of the whole, the health was stated to have been unsatisfactory in varying degrees; 22, or 6·4 per cent., were infants under one month of age, whilst with regard to others, 22, or 6·4 per cent., no information could be obtained. From a comparison of the figures with regard to the previous health of persons of the vaccinated and unvaccinated classes respectively, who died from small-pox, it will be seen that amongst the vaccinated, 52·4 per cent. were stated to have enjoyed good health prior to attack, whilst amongst the unvaccinated the proportion was 61·3 per cent., after deduction of infants under one month of age, thus showing that, as regards the state of health prior to attack, the unvaccinated had a slight advantage.

Adjourned till Friday next at 1 o'clock.

Twelfth Day.

Friday, 25th October 1889.

PRESENT:

THE RIGHT HON. THE LORD HERSCHELL IN THE CHAIR.

Sir JAMES PAGET, Bart.
Sir W. GUYER HUNTER, K.C.M.G., M.P.
Sir EDWIN HENRY GALSWORTHY.
Mr. WILLIAM SCOVELL SAVORY.
Dr. JOHN SYER BRISTOWE.
Dr. WILLIAM JOB COLLINS.
Mr. JOHN STRATFORD DUGDALE, Q.C., M.P.
Professor MICHAEL FOSTER.
Mr. J. ALLANSON PICTON, M.P.
Mr. SAMUEL WHITBREAD, M.P.
Mr. F. MEADOWS WHITE, Q.C.

Mr. BRET INCE, *Secretary*.

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MR. FREDERICK WILLIAM BARRY, M.D., Sc.D., further examined.

2047. (*Chairman.*) I believe that in addition to the evidence which you have already given you have some tables which you desire to put in showing the age-share of small-pox mortality during the epidemic of 1887–88 and during the four previous epidemics?—That is the case. On page 203 of my report is a table, Table CIX., in which the actual number of deaths from small-pox in 1887–88 is given as well as the deaths in the epidemics of 1871–72, 1868–69, 1863–64, and 1857–58. They are given there at various age-periods. I have in a previous part of my evidence referred to certain changes in the age share of death from small-pox and other diseases between two separate periods. Table CIX. goes into rather more detail and gives the facts as to age at death for the four previous epidemics and for the epidemic that we are considering. From epidemic to epidemic certain changes in the administration of the vaccination law had taken place, which it is rather important to note. In this table I show also the share in every 100 small-pox deaths borne by persons under 10 years of age and over 10 years of age respectively. The change in the age-incidence of fatal small-pox in the present as compared with former epidemics is very noticeable. The table is as follows:—

Ages.	Deaths registered from Small-pox.					Small-pox Deaths, 1887–88.	
	1857–58.	1863–64.	1868–69.	1871–72.	1887–88 (to 31st March).	Of "Vaccinated" Class.	Of "Unvaccinated" Class.
Column 1.	2.	3.	4.	5.	6.	7.	8.
Under 1 year	130	113	113	197	76	—	76
1 to 2 years	79	104	73	80	7	—	7
2 „ 5 „	130	172	164	182	32	1	31
5 „ 10 „	131	62	71	156	45	6	39
10 „ 15 „	12	11	9	35	48	12	36
15 „ 20 „	13	8	19	56	82	26	56
20 „ 25 „	19	17	15	84	98	46	52
25 „ 30 „	13	16	10	62	54	41	13
30 „ 35 „	8	4	11	52	47	33	14
35 „ 40 „	10	6	7	27	38	28	10
40 „ 45 „	4	3	3	17	22	19	3
45 „ 50 „	1	1	2	6	14	10	4
50 „ 55 „	1	2	1	2	13	12	1
55 „ 60 „	2	1	—	6	2	2	—
Over 60 years	2	2	2	5	12	10	2
	470	451	421	615	169	7	153
	85	71	79	352	430	239	191
All ages	555	522	500	967*	599	246	344
In every 100 small-pox deaths share borne by persons: Under 10 years of age	85	86	84	64	27	3	44
In every 100 small-pox deaths share borne by persons: Over 10 years of age	15	14	16	36	73	97	56

* These figures are for the epidemic period of 1871–72; I do not take account of small-pox deaths which occurred early in 1871, or late in 1872.

With regard to the whole borough, Diagram XIX., which is given on page 204, and a copy of which I now hand in, shows this graphically, and it will be seen, on reference to it, that taking the age-share in the first three epidemics there was no change of any particular moment. (*See Appendix IV., Diagram L: facing page* 248.) The share under 10 years of age in 1857–58 was 85 as against 15 over 10 years of age; in the 1863–64 epidemic it was as 86 to 14; and in the 1868–69 epidemic it was as 84 to 16. So that practically there was no change. In the next epidemic, that of 1871–72, it will be observed that a considerable change had taken place; the age-share under 10 years of age being in that epidemic as 64 to 36; and during the epidemic of 1887–88 there is a very much greater change; in fact, the figures are almost reversed from the earlier figures; they then became 27 under 10 years of age to 73 over 10 years of age. This would point to some withdrawal of infants from the susceptibility to fatal small-pox; and on a reference to the various district tables, and the diagrams illustrating them, it will be found that the diminution of children's share of death is uniform, with slight differences, throughout all the districts of Sheffield. The diagrams to which I refer are Diagram II., on page 33, with regard to Attercliffe; Diagram IV., on page 54, with regard to Brightside; Diagram VI., on page 75, with regard to North Sheffield; Diagram VIII., on page 89, with regard to Sheffield Park; Diagram X., on page 103, with regard to South Sheffield; Diagram XII., on page 118, with regard to West Sheffield; Diagram XIV., on page 142, with regard to Ecclesall; and Diagram XVI., on page 159, with regard to Nether Hallam. I hand in a diagram combining them all into one, and you will see at once the correspondences and the differences as regards the matter to which I have just referred. (*See Appendix IV., Diagram M: facing page* 248.) Upon dividing the deaths in the last epidemic between the vaccinated and the unvaccinated, in the lower part of the diagram (Diagram L.), which I have handed in, it will be seen that the greatest change has taken place in the vaccinated class, the age-share being as 3 under 10 to 97 over 10; whilst in the unvaccinated class it is as 44 to 56. The same thing will be seen on reference to the sub-district diagrams and is shown here in a single diagram where they are all collected together. (*The diagram was handed in. See Appendix IV., Diagram N: facing page* 248.) The changes in the vaccination administration to which I refer as having taken place were these: that up to 1868–69 the Vaccination Acts were very badly enforced in Sheffield; that at an inspection held under the instructions of the Privy Council about 1863, it was found that of the children in the schools, 13 per cent. were not vaccinated, and that 68 per cent. were indifferently vaccinated. During the epidemic of 1868–69 considerable pressure was brought to bear on the vaccination authorities by the Privy Council under the Act of 1867, and at that time a vaccination officer was appointed at a salary of 90*l.* a year, and there was at once a considerable increase in the proportion of vaccinations.

2048. (*Mr. Meadows White.*) Have you the date of the appointment?—I have not the exact date; it would be 1868 or 1869. The quality of the vaccination at once improved after that and the quantity of vaccination improved very much; for whereas in the first inspection, the one that I refer to as being held in 1863, public vaccinations were found to average less than 50 per cent. of the births, at a later inspection in 1870 they were found to amount in different years to 60–80 per cent. of the births. Then, again, in consequence of the Act of 1871, infant vaccination was still further enforced with the result that at the present time, as I have already stated, a very small proportion of the children in Sheffield have escaped vaccination.

2049. (*Chairman.*) Have you any explanation to suggest with regard to the increase in the number of deaths at the greater ages?—You have a larger number of the inhabitants who are further removed from their first vaccination and who have an increased susceptibility in consequence. Of course we are not dealing with mortality but simply with age-share of death; that has no reference to numbers living and is not in proportion to the population in any way.

2050. (*Sir James Paget.*) Could you give the proportion to population at different ages in the successive years?—I have not given it for these epidemics, but I have given it for two separate periods in Table CXLII., on page 266.

2051. (*Chairman.*) That is a division of them into ages under 5 and between 5 and 10, and over 10 years?—Yes.

2052. (*Mr. Meadows White.*) That table gives the mean death-rates per 100,000 of the population between the decennial periods (A.) 1861–70, and (B.) 1876–83, 1886–87?—Yes. The population for period (A). is taken from the Registrar-General's figures for the de-

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cennial period 1861–70 given in the Supplement to the Thirty-fifth Annual Report; and the figures recorded during the census of 1881 are adopted for period (B.). From this Table CXLII. you will see that the death-rate of persons over 10 years has not actually altered very much. In the first period (A.) the death-rate is 11 per 100,000, and it is 10 per 100,000 in the second period (B.).

2053. (*Sir James Paget.*) The proportions to population have not been recorded for the number of cases of small-pox over 30 and under 30 years of age?—I have not taken those ages out separately.

2054. (*Professor Michael Foster.*) Can we find anywhere what was the proportion of the population over 10 and under 10 years of age in 1887–88?—Yes, that is given in the summary. You get that from Table CII. on page 192.

2055. That table must be consulted in reference to the increase of the total deaths after 10 years among the unvaccinated class in 1887–88 as compared with the total result in either 1871–72 or 1868–69? The proportion of those over 10 years of age to the total population is not only greater among the vaccinated class, but is also greater among the unvaccinated class in the epidemic of 1887–88, as compared with the total results in all previous years in your Diagram XIX.?—Diagram XIX. only refers to share of small-pox deaths; it has nothing at all to do with rates of mortality.

2056. Your point is, of course, that the share above 10 years of age to the share under 10 years of age is very much greater in the vaccinated class in the epidemic of 1887–88 than the share in all cases of over 10 to under 10 years of age in the other previous epidemics?—Exactly so.

2057. But that change in the relative proportions is shared by the unvaccinated as well as by the vaccinated?—It is to some extent.

2058. In estimating the value of that one must refer to the relative shares in the total population of those respective ages?—Quite so.

2059. Do you think that the relative share among the unvaccinated is to be explained entirely by the relative shares in the total population?—I do not quite clearly understand the point of your question.

2060. Your argument is, is it not, that there has been a transference in the mortality from under 10 to over 10?—There has been a transfer in share of death; not much in rates of mortality.

2061. The transference in that share is also to be observed amongst the unvaccinated, is it not?—Yes, certainly, to some considerable extent.

2062. And I suppose the share in the mortality is to a certain extent dependent upon the share in the population?—It is dependent on the numbers living at each age in the population. Of course that has been changed. The relative number of the unvaccinated at the present time is very much less than it was in the previous epidemics.

2063. (*Sir James Paget.*) I observe that in your record concerning the cases of re-vaccination you found an exceedingly small number that could be said to have been re-vaccinated successfully?—A very small number among those I investigated.

2064. Out of 329 who were inspected, I see by reference to page 200 that only 26 had been re-vaccinated successfully prior to the incidence of small-pox?—Quite so.

2065. May we therefore believe that, whatever advantage was found on the side of the vaccinated, was in the case of those who had been, with the exception of the 26, vaccinated once?—Yes, I think you may regard the majority of the re-vaccinated I inquired about as having profited little by their so-called re-vaccination.

2066. (*Chairman.*) I understood that the 27 were not all that you found to be re-vaccinated, but that out of those who were said to have been attacked by small-pox you only found 27 that had been successfully re-vaccinated?—There were only 27 attacks of small-pox in the persons found to have been re-vaccinated.

2067. It was not that that was the total number who had been successfully re-vaccinated in Sheffield?—Not by any means.

2068. Twenty-seven is all that had been successfully re-vaccinated and attacked by small-pox?—Those 27 had been re-vaccinated before they were attacked.

2069. (*Sir James Paget.*) Have you the total number of those who had been re-vaccinated?—The total number reported to have been re-vaccinated was 64,431. That is given in Table CVII. Of those, 8,198 were reported to have been re-vaccinated some years previously.

2070. Still it would afford a considerable indication that a certain amount of protection remains from a single vaccination?—If you deduct the whole of those who were re-vaccinated from the total that were vaccinated, you get the figures 204,743 as having been only once vaccinated. If you take rate of attack and rate of death on this number, you will find that it practically makes no change at all in the attack rate and the death-rate among the vaccinated.

2071. (*Chairman.*) How many of the 204,743 would be over, say, 10 or 15 years of age, because the re-vaccinations would not commence until after that date?—I have not got that separately, but it could be easily got out from the tables.

2072. It would be very much more than the 64,431?—Nearly the whole of the 64,431 would be over that age.

2073. But the population who had come to what we may call a re-vaccination age would largely exceed the 64,431?—Very much. The population over 10 years of age was over 196,000.

2074. (*Sir James Paget.*) Then we may believe that a large number of those who were vaccinated once do yet retain a certain measure of insusceptibility even at a later age?—Certainly.

2075. (*Mr. Meadows White.*) I think you have spoken of the inference to be drawn from the diagrams (Diagrams G. and H.) which you put in on the last day as to the effect of sanitary surroundings upon the chances of an attack of small-pox?—The point that I raised there was this, namely, that as regards what are commonly called sanitary circumstances, at any rate, over-crowding affected the attack-rate, and consequently affected the death-rate; but that apparently it did not affect the fatality rate—that is to say, the proportion of deaths to attacks.

2076. In other words, you take the proportion shown by Ecclesall; was not that a rate of fatality above the mean of the borough?—Ecclesall in fatality is near to the borough rate, whereas it is the lowest of the districts as regards attack rate.

2077. Ecclesall being in point of sanitary surroundings probably the best and healthiest sub-district?—Yes.

2078. As I understand it the three sub-districts in which the fatality rate is above the mean are Attercliffe, South Sheffield, and Ecclesall?—That is with regard to the unvaccinated.

2079. (*Professor Michael Foster.*) On the result of your census Ecclesall is the district with the lowest fatality?—As regards mortality, yes. I have not the two sets of rates separately here.

2080. Attercliffe on your census results is very striking because it is the lowest in point of incidence of total population and yet the fatality was third highest on your census results?—Yes, as regards rates of mortality amongst vaccinated.

2081. I think it is partly due to the fact that the numbers in Attercliffe were small in your census and were very much increased in the health record?—That is the case; Attercliffe was one of the late districts to become infected.

2082. Your census results are not so trustworthy there because they are drawn from a smaller number?—Quite so.

2083. (*Mr. Meadows White.*) As I understand, that is one of the inferences that you intended to draw from Diagram H.?—The chief inference that I intended to draw from that diagram was that fatality did not follow the sanitary circumstances.

2084. You gave the date when the Sheffield Water Company was transferred to the Corporation; do you know when the Sheffield Water Company was first established and when the water supply became improved?—I see at the foot of page 224 I state that "the whole of the centre of the town has received its "supply from the public waterworks for many years" (I believe it was somewhere about the year 1840 that it commenced), "but the 'west end' of Sheffield, including "Broomhill, did not receive it until 1864–65. Walkley "and the neighbouring part of Nether Hallam were

" supplied in 1867–68, Crookes in 1870–71. The supply " has been constant throughout the borough since " October 1870."

2085. With regard to the information which you have given as to vaccination from your census, you relied chiefly upon the statements of the relatives?—Almost entirely.

2086. Did you check it at all by reference to the registration returns?—They were not checked in any way except in so far as personal inspection was concerned.

2087. Did you compare the two sources of information at all?—No comparison was made between them.

2088. I understood that in your judgment the most trustworthy mode that you could adopt was to obtain the information from near relatives?—Yes, from the relatives.

2089. What reason have you for that; are the registration returns imperfect?—Registration returns only deal with children, as a rule, under three years of age, from two to three years, and they do not go back more than 15 or 16 years. The birth sheets are sent monthly from the registrar to the vaccination officer, and it is his duty to see that all children above three months of age have a notice served upon them reminding them that they are in default under the Vaccination Acts. He has to keep those books and make returns to the Local Government Board; I am not perfectly certain of this, but I think the six-monthly return is made seven months after the period to which it refers, and the supplemental return is made 13 months after the completion of the particular year concerned; after the two years are over he does not perhaps trouble himself very much to make up the returns.

2090. In other words, you would not find that full information from the registration returns that you desired?—No.

2091. (*Dr. Collins.*) Such registration returns would exist as far back as 1871, would they not?—I am afraid that I cannot answer that question. I have given abstracts of them going back for the 10 years; I do not remember precisely to what date they go back.

2092. (*Mr. Meadows White.*) How do you obtain the proportion on page 194 of 6,556 unvaccinated persons in the population?—As I have already explained, I think in my evidence, these proportions between the vaccinated and the unvaccinated are the same as those that we found at our census.

2093. (*Chairman.*) You found in your census that the vaccinated throughout the borough formed a given proportion of the whole and the unvaccinated a given proportion, and you applied those proportions to the population?—To the estimated population of the Registrar-General.

2094. (*Mr. Picton.*) With regard to this register of vaccinations, is it not the case that the Act of 1871 prescribed the present system of registration and required that every child successfully vaccinated should be registered?—I am afraid that I am not sufficiently conversant with the Act to give you a precise answer to that. I know what is done in practice: that a certain number are removed out of the district, and those, of course, very rarely get returned even when they are successfully vaccinated.

2095. But you know that if a boy, for instance, is to be received into a school which requires proof of vaccination, the parents can get the register of his vaccination? — Certainly from the vaccination registers.

2096. Then I should like to know why you did not make any attempt to compare the information of parents or neighbours with the vaccination registers?—The whole of the figures are given here.

2097. But name by name, I mean?—My inquiry was a very long one as it was: I was there something like six months, and I should probably have been there something like six or eight years if I had stopped to compare the information with the register.

2098. You had ample assistance, I suppose?—I had assistance with regard to the census; I had no assistance in my own work except from Dr. Low as regards certain of the personal inspections.

2099. The total deaths from small-pox during the epidemic of 1887–88 are given variously as 590 or 597; which is the correct figure?—590 is the corrected figure. On page 7 there is a note from which you will see that " the total deaths from small-pox reported by " the Registrar-General to have occurred in Sheffield, " during the 13 months ended the 31st of March 1888, " were 597 in number, or seven more deaths than are " recorded above. Of these seven deaths three were " infants under one week of age who have been ex- " cluded from the calculations on account of their " extreme youth " (one of them, I may say, died at the age of three minutes), " other three deaths, viz., those " of an infant aged seven months, a child aged eight " years, and an adult aged 41 years have been omitted, " as after inquiry I was satisfied that none of them " had suffered from small-pox " (and I refer to each of those specially on pages 113, 165, and 114); " the " remaining death was that of a man who contracted " small-pox in the Handsworth district outside the " borough, but who died after his removal to the " Sheffield Union Workhouse Hospital."

2100. That is to say your returns have been compiled in a manner somewhat different from those of the Registrar General?—I took the Registrar General's returns, and corrected them so far as these seven deaths are concerned.

2101. In Table CXX., on page 226, you give the mortality statistics for the borough of Sheffield for the 27 years 1861–87; those, I presume, are the returns of the Registrar-General?—They are for the years 1871–87.

2102. For purposes of comparison would it not be fair also to take the return of the Registrar-General for this epidemic of 1887–88?—No, not when you are making comparisons between one part of the epidemic and another. I have taken the Registrar General's figures when I have compared them with previous years, but not when I have compared one part of the epidemic with another part of the epidemic in 1887–88.

2103. I do not quite understand; will you explain your meaning a little more fully?—Limiting myself to the epidemic of 1887–88, I have used corrected figures, but where I have compared that epidemic with previous years I have used the Registrar-General's figures.

2104. I want to compare the Registrar-General's figures in this epidemic with the Registrar-General's figures in other epidemics?—I may point out that the seven cases that I have referred to constitute such a very small number that it will not really have any effect on the rates.

2105. On page 226 we find, I think, four epidemics, each of which extended over parts of two years; is not that correct?—Yes, that is correct; 1863–64, 1868–69, 1871–72, and the beginning of the 1887–88 epidemic.

2106. The first epidemic, 1863–64, shows 525 deaths, does it not?—Yes.

2107. The 1868–69 epidemic shows, I think, 400 deaths?—500, I think.

2108. The 1871–72 epidemic shows 1,007 deaths, I think?—It does.

2109. The 1887–88 epidemic shows 597 deaths taking the same figures?—The Registrar-General's figures are not given for the year 1888; they are not dealt with at all there.

2110. But they are in this note?—Yes, quite so, in the note at page 7.

2111. Then the last epidemic appears to have been the worst, except the great one of 1871–72, does it not?—May I ask whether you are referring to the total number of deaths or to the death rate?

2112. The total effect on human life?—The number of deaths was largest in the 1871–72 epidemic.

2113. After that do you notice a marked cessation?—There is a very marked cessation after 1871–72.

2114. Have you formed any opinion as to the reason for that?—To some extent it would be due to the want of susceptible material. Much of it would be used up in the 1871–72 epidemic.

2115. You would agree, then, with evidence that we have already had from Dr. Hopkirk, that a very great epidemic of itself will bring a cessation afterwards?—Certainly for a period.

2116. Do you find from your experience in compiling these figures that small-pox has affected the death-rate generally in Sheffield?—Do you refer to the present time?

2117. I refer to the previous epidemics. We have a table on pages 226–227, and I want to know whether

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you find that according to that table small-pox has affected the general death-rate? I will put it in this way, which will be perhaps plainer: From 1861 to 1873, or 13 years inclusive, does it appear that small-pox has been above the average six times in the 13 years?—Six times certainly. There are six sets of figures in thick type.

2118. Does the general death-rate fall below the average or down to the average in any of those years?—The deaths from all causes do not fall below the average for any of those years; they are always above the average for those years.

2119. Does the rise and fall of the small-pox rate coincide generally with the rise and fall of the general mortality rate?—It does often, I think.

2120. Take columns 15 and 16, what is the rise of small-pox mortality in column 16 from one year to the next, that is, from 1861 to 1862?—In column 16 the small-pox incidence in 1861 was 0·04, in 1862 it was 0·09. In the one case you are dealing with seven deaths, and in the other case you are dealing with 18 deaths; you have not a rise in the "all causes" rate brought about by small-pox in that instance.

2121. But the general mortality rises nearly one per 1,000 in the next year, 1862?—Certainly, but that is due to other causes, not to the small-pox.

2122. In 1863 the total mortality rises to 30·3, does it not, and the small-pox mortality to 1·82?—Yes, and in that year you had other diseases epidemically prevalent.

2123. Does the growth of the rate of small-pox to nearly 2 per cent. account for the rise of the general death-rate to nearly 5 per cent.?—No, but it is one of the factors in that rise.

2124. There is a fall in the small-pox mortality in 1865 by ·56 per 1,000, and the general death-rate there falls in about the same proportion. Taking the next year, 1865–66, you have a slight decline in both. In the next year, 1867, have you not a rise in the general death-rate?—There is a rise in the general death-rate in 1866.

2125. And there is a slight decline in the small-pox mortality, is there not?—Certainly.

2126. In the year 1867 there is a slight rise in the small-pox mortality, is there not?—Yes, a slight rise.

2127. And there is a considerable fall in the general mortality, is there not?—Yes, there are 53 deaths in 1867 from small-pox; but measles, scarlatina, and whooping cough are below the average.

2128. In the next year, 1868–69, they would appear to agree tolerably well; that is the case, is it not?—Yes.

2129. In 1869–70 there is a fall of rather more than 2 in 1,000 in the general mortality, and a very slight fall in the small-pox incidence, is there not?—Between 1869 and 1870 there is a fall of ·44 in the small-pox incidence.

2130. In the next year there seems to be a fair amount of agreement between them. Then we come to the year of the epidemic. In 1872, small-pox mortality rises to its greatest incidence, 2·45; that is so, is it not?—Quite so.

2131. And the general death-rate falls from 1871 to 1872 by nearly 2 per 1,000, not quite 2 per 1,000; that is the case, is it not?—Quite so.

2132. There is a marked divergence there and that in the years of epidemic?—Yes, there was no other considerable epidemic running on at that time.

2133. Then would it be right to say, looking at each year, that the rise and fall of deaths from small-pox coincides precisely with the rise and fall of general mortality?—Certainly not; there are so many factors included in the general death-rate; any one factor will not account for it.

2134. That is to say, we cannot at all make sure that a reduction in deaths from small-pox will reduce the general mortality?—Certainly not; it does not follow at all.

2135. Can we assume with confidence that the diminution in the number of deaths from small-pox will in any particular year diminish the general mortality?—You certainly cannot assume that unless you can assume that the other deaths remain the same as they were the year before.

2136. Is it not the fact that small-pox will often take the place of other diseases?—You may have small-pox epidemic in one year, whereas in another year you have scarlet fever or measles or some other disease epidemic.

2137. Looking down these columns, 14, 15, and 16, from 1873 to 1887, or 15 years inclusive, is it the case that small-pox is below the average in every year but one, namely, the last?—In every year except the last year.

2138. Is the general death-rate below the average in every year?—No, it is above the average in six of the years from 1873 to 1887, but is greatly below the average of the 12 preceding years.

2139. If I ask you whether the rise and fall correspond you will give me the same answer?—They do not correspond exactly.

2140. Would you consider Sheffield a well-vaccinated town?—I should consider Sheffield a well-vaccinated town, certainly.

2141. At the time when the epidemic broke out, were there not less than 5 per cent. of the births unaccounted for?—Less than 5 per cent. of the births were unaccounted for.

2142. In the preface to your report on page xv we are told that on an inquiry made less than 1 per cent. of the children of school ages were found unvaccinated?—That is in Dr. Buchanan's introduction, is it not?

2143. Were you able to verify that?—Those figures are taken from the census; that would be between the ages of 5 and 15.

2144. Then we may take it that the vaccination law was carried out in Sheffield as well as it is anywhere in the country?—I should say, on the average, it is carried out in Sheffield as well as in any other town except, perhaps, Leeds.

2145. (*Mr. Meadows White.*) At that time?—At that time. Of course I can only speak for Yorkshire; I do not undertake to speak for the rest of England.

2146. (*Mr. Picton.*) I suppose you know that the diminution of small-pox at the beginning of this century is generally attributed to the spread of vaccination?—I am afraid that I cannot enter into that. I have not studied the question of previous epidemics; I can speak only with regard to Sheffield.

2147. Is not the law based upon the assumption that perfect vaccination would secure almost entire immunity from small-pox?—I have not understood that to be so; though, of course, I know that vaccination gives a certain amount of immunity from small-pox.

2148. Is this Sheffield case the only case known of a well-vaccinated town being visited with a severe epidemic of small-pox?—That I cannot say; I have not read up the literature of the subject.

2149. You have no experience of any other case than Sheffield?—Personally I have had the slight experience which I referred to in my first day's evidence. I have had experience with regard to Cyprus and with regard to Gateshead and to Walker-on-Tyne.

2150. Have you known any other case of a well-vaccinated town visited with a severe epidemic of small-pox?—Not with a severe epidemic, from my own personal observation.

2151. After your experience of Sheffield, then, and your other experience, are you of opinion that it can be maintained that a firm administration of the vaccination law will prevent epidemics?—I can say that the administration of the law, so far as it was carried out in Sheffield, did not prevent an epidemic there.

2152. You have not drawn any conclusion from your experience there?—I cannot draw any conclusion further than that it did not prevent the epidemic there.

2153. Do you think that if it will not prevent epidemics a firmer administration of the law will ensure safety to all who are vaccinated?—It would ensure a very large measure of safety to the vaccinated at Sheffield.

2154. Should I put rightly the claim that you think to be established by the facts of the Sheffield epidemic in this way; that the claim is limited to this, that the unvaccinated will take the disease in a larger proportion than the vaccinated, will generally have it worse, and will die in a greater proportion?—They will also spread the disease probably more than the others. The experience of Sheffield shows that a larger proportion of the unvaccinated had small-pox of the worst type.

2155. That claim is in effect, is it not, a claim to a superior mode of medical treatment giving a better chance to those who adopt it?—It may be put in that way.

2156. To what in your opinion, after your examination of the town of Sheffield, is the epidemic to be ascribed?—That is a very difficult question to answer off-hand; it is one which involves a very great many considerations; but the earliest spread was certainly due to the mild character of the early cases and to their being unrecognised, with the subsequent establishment of a large number of centres of the disease. Then, again, as soon as the small-pox began to be aggregated in the hospital we had the particular influence of the hospital.

2157. It is evident from this report that you have studied carefully the whole physical conditions of the town?—I have inspected it in the usual way in which we carry out an inspection.

2158. We have a meteorological table at the end of the report on page 295 (I am sorry we have not more of it); might I ask you why that table was confined to such a brief period as the period from May to the end of July?—The reason why it was confined to that particular period was because that was the period during which the beginning of spread from the hospital took place.

2159. Is not the rainfall in Sheffield usually pretty considerable; it is not one of the driest parts of England, is it?—The rainfall is not, I should say, above the average, but I have no complete figures with regard to the rainfall.

2160. You observe that May 1887, according to this meteorological table, was a very dry month, was it not?—It rained on 14 days out of 31, but the rainfall was slight, certainly.

2161. But if you look down the column it is very slight, and, indeed, fractional; very rarely does it amount to a tenth of an inch?—There were six-tenths on one day I see.

2162. Does not June appear to have been a very dry month?—June was certainly a very dry month; it only rained on four days.

2163. Does not July also appear to have been a dry month?—July was also a dry month; it rained on nine days. The rain was just under an inch.

2164. We have not any further tables; can you tell us from your recollection whether the rainfall in the latter part of that year was above or below the ordinary amount?—I cannot; I did not get returns for the latter part of the year.

2165. Are you aware that according to authorities in the Sheffield Health Office the amount of rainfall was beneath the average during the autumn of 1887 and January 1888?—I really do not know the facts with regard to that.

2166. The effect of a dry season would be to create a difficulty in flushing the sewers, would it not?—Certainly, you would not get the ordinary amount of surface water going into the sewers.

2167. Did you hear any complaints that there were exceedingly bad smells from the sewers during the period when the epidemic was most rapidly spreading?—I do not think there were more complaints during that period than there usually are in Sheffield. They generally have a good many smells from their sewers in Sheffield.

2168. Did you hear it said by anyone at all likely to know that excremental filth and other nuisances were lying in the sewers to a considerable depth unremoved by any flow of water?—You mean extra deposits in the sewers. I did not hear that there were any more during that period than at any previous period. There are always in Sheffield a number of deposits in the sewers. As I have already stated the privy middens are connected with the sewers, and that always leads to excremental filth getting into the sewers in a decomposed state.

2169. May I call your attention to page 221 of the report, from which I should like to read this passage: In paragraph (*b*) you say, "The old sewers, of which "a large number have not yet been superseded, are in "many instances of faulty construction, and in some "parts the sewage is said to be still conveyed in old "rubble drains. The ventilation of the older sewers "is extremely defective, and the means for their in-"spection, and the arrangements for flushing are "imperfect. Many 'dead ends' are still in existence. "The private drains are very varied in their con-"struction, and although much has been done during "recent years to secure the disconnexion of houses "from the drains, there are a large number of houses "throughout the borough in direct communication "with them by means of sink pipes. The danger "arising from this direct communication between the "interior of the houses and the drains is intensified in "the districts where, owing to the connexion of the "privy middens with the sewers, the sewers them-"selves are continually receiving putrescent filth." Do you consider that the state of things described there constitutes in itself a danger?—Would you mind my finishing that paragraph, because I think it has a bearing on the question: "As a rule the private "drainage arrangements are most defective in the "houses of the midd le and professional classes, these "houses, unlike artizan dwellings, being frequently "furnished with baths, lavatories, and waterclosets, "and the waste pipes from the first two being as a "rule discharged into the soil pipes, which are gene-"rally very imperfectly ventilated."

2170. But with regard to that in a wide, open neighbourhood do you think that the nuisance from loaded and congested sewers, would be as great as in a close and poverty-stricken neighbourhood?—No, certainly not. The question that you want answered is this, as I gather, whether the people were exposed to the emanations from the sewers in their houses.

2171. I do not confine my question to that; I am supposing the state of things which is described in those sentences that I have quoted, viz., an accumulation of filth in dead ends, as they are called, and in imperfectly flushed drains or sewers; and I am asking whether that would not offer facilities for the spread of any zymotic disease?—It would be likely to do so for some diseases if the improperly-constructed drains had ventilating openings into the streets. In the old parts of the town, where the sewers are worse ventilated, you have not the openings into the streets and you have not got the connexion between the sewers and the interior of the houses.

2172. With defective sewers such as are here described would not the soil itself around be infected?—Certainly, to some extent the soil would become filth laden.

2173. And the evil effect of that would not be dependent upon the connexion of house drains with the street drains?—Certainly not.

2174. Would the nuisance thus created by congested and imperfectly flushed and badly constructed sewers be worse in dry weather than in wet weather?—It would be worse in dry weather.

2175. Then from the next paragraph on page 221 I should like to quote some words. We are told there that "If the entire population of the borough is, in "accordance with the Registrar-General's estimate, "taken at about 320,000, and assuming that the 4,137 "waterclosets each serve for the use of the inmates of "two houses, say, for 40,000 people, we may conclude "that at least 280,000 persons are provided with no "other closet accommodation than that afforded by "midden privies, and it has been estimated that the "actual area occupied by the middens themselves in "the borough amounts to considerably over 12 acres. "These middens are almost without exception con-"structed on faulty principles. As a general rule, "the midden pit is sunk to a depth of three or more "feet below the surface of the ground, and has privies "erected on either side of it. In Sheffield it is usual "for each midden to have from two to four privies dis-"charging into it, but in some of the older parts of "the town the pits are of great size, and have from "8 to 10 or even 12 privies in connexion with them." Do you consider that that state of things would offer facilities for the spread of any zymotic disease?—Certainly; I refer, of course, to any zymotic disease that is spread by filth.

2176. But you do not think that it would offer any facilities for the spread of small-pox?—Not to the same extent as it, and the circumstances commonly associated therewith, would afford facilities for the spread of some other diseases.

2177. But do you think that it would afford any facilities for the spread of small-pox?—Certainly it might afford some facility.

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2178. With regard to the general levels of the town, in what direction does the drainage flow?—The sewers generally flow north-east towards and through Attercliffe.

2179. Which is the highest part of the town?—There are several high parts; it is a town essentially hilly, and you have several hills; in fact, you have a large number of drainage districts. They all drain the same general way, but I cannot say how many drainage districts there are.

2180. Is not Attercliffe a low district?—Attercliffe is a low district certainly, probably the lowest district in the town.

2181. And old Sheffield, three townships of it, at any rate, slopes, does it not, north-east and east?—No. North and West Sheffield stand high, and the inhabited part of the Park stands high. The southern part of South Sheffield lies low; the north part is fairly high.

2182. How does Nether Hallam lie?—Nether Hallam is very hilly; some of it is low and some of it is high. Taking it altogether, I should say that it was at a very considerable elevation.

2183. And how is Upper Hallam situated?—Upper Hallam varies. It is an enormously large district.

2184. Is it a suburban district?—It is purely country; it has only something like 2,000 to 3,000 inhabitants.

2185. Does it stand high?—Parts of it stand very high and parts of it stand very low.

2186. (*Chairman.*) What is the part that is included in the town?—There is no part really included in the town.

2187. But is the part nearest the town high or low?—That is very high.

2188. (*Mr. Picton.*) Can you tell us in what part of the town these old rubble sewers and "dead ends," as they are called, are mostly found?—I cannot tell you about the rubble sewers; I only give that on the statement of the borough engineer that there were supposed to be a number of rubble sewers still left in. The dead ends, and so on, are pretty general, I believe, over the town, and are not confined to any particular district.

2189. Are they not more frequently found in the older parts of the town?—I believe not; I believe the older parts of the town have been more carefully attended to in the matter of main sewerage improvement than some of the other parts.

2190. Will you be kind enough to look at Map II. in the report facing page 276, and will you suppose those concentric circles to be bisected by a line running due north and south. Supposing the top of the map to be due north, what is the character of the eastern half included within these circles as regards the density of population, as regards the poverty of the houses, and as regards sanitary arrangements generally?—That comprises practically Sheffield North and Sheffield West. There is in the report a description of those given which I have already read.

2191. Is the western half of the circle that you have drawn (I am including now the largest circle) of a different character from the eastern half as to population and openness?—Certainly it is not anything like so crowded as the eastern half.

2192. Would you just glance rapidly at the following maps; turn to Map X., for instance. The epidemic dealt with in Map IX. is already beginning to spread; do you observe that the general direction there is eastwards?—It is certainly towards the east.

2193. And so it is in Map XII., is it not?—Certainly; I think you may say that it runs through the whole of the maps.

2194. But when you come to Map XIV. does it not begin to spread north-eastwards along the line of the river there?—No, I think it spreads more in Map XIII. along the river. You mean towards Attercliffe? Towards Attercliffe it is beginning to spread.

2195. And in Map XV. you observe the same spread?—I observe a very much larger spread towards the south than there is towards the north.

2196. Then turning to Map XVI., does it not spread towards Attercliffe there?—I should say that it was pretty equal there. It is spreading to the east generally, and into Sheffield Park as well, and to the south.

2197. How is it in Map XVII.?—In Map XVII. it is still south and south-south-east.

2198. In Map XVIII. does it not become thicker?—In Map XVIII. it is getting to be general.

2199. In Map XIX. for December 1887 do you observe the spread in the Attercliffe district?—Yes, certainly.

2200. In Map XX. also does it not continue to spread, and, in fact, up to the end of the epidemic?—It is spreading, of course, on the line of the greatest aggregation of population and of houses.

2201. In fact, if we look at these maps generally we find, do we not, that the spread of the epidemic was not entirely but mainly confined to those districts which are shaded?—To the populous parts of the town generally.

2202. To what reason do you attribute that? Do you attribute it only to the facility of contagion?—To the facility for contagion afforded by aggregation of population.

2203. To nothing else?—There are a great many factors, of course, in operation to produce small-pox spread, but that, I should say, is certainly the main factor where population is dense.

2204. Do you observe that it spreads along the line of drainage?—No, I do not observe that at all. In going through the maps one by one we found that it was spreading in the earlier maps in the other quarters, southwards, for instance, which is in the opposite direction to the line of drainage.

2205. South Sheffield is low, is it not?—The upper part of South Sheffield is high. It is only the lower part of South Sheffield that is low, by the Bramall Lane Cricket Ground.

2206. Would you not think that the drainage would be sluggish there?—But the fall of the sewers would be in the opposite direction to the spread of the small-pox.

2207. But it runs towards the north-east, does it not?—It runs towards the north-east, but the infection is spreading from the centre in nearly the opposite direction.

2208. I asked you at the beginning to consider that circle as being bisected by a line running north and south. Is it not observable that the spread is almost entirely to the right, that is, to the east?—May I ask whether you are referring to the whole circles, the total 4,000 feet?

2209. Yes?—It spreads certainly in the direction of the chief population, which lies to the east side of the circle.

2210. But do you notice that the western half of the circle is kept comparatively, I do not mean wholly, free?—Yes, you have a large belt there in the first circle to the west side of the hospital without any houses at all. The map that you have in the second series, on a larger scale, was drawn by the borough surveyor from an actual new survey that is perfectly correct.

2211. Are you referring to Map XXXIX.?—Yes.

2212. But that only gives the innermost circle?—Quite so. I say that there is a large belt there without any houses at all on the west side of the hospital.

2213. Is your point, then, that the existence of this recreation ground would keep the infection from leaping over from the fever hospital?—It would certainly help to some extent having that large space. You have also a deep valley on the N.W. side. But my point is that west of the hospital the population is small and comparatively scattered, and less liable therefore to epidemic small-pox.

2214. Who uses the recreation ground?—I suppose the children of the neighbourhood.

2215. From all the houses?—No, only from just round about there.

2216. They would not be confined to one side of that circle; they would come from those infected houses?—Probably they would; but, as a matter of fact, I do not think that that recreation ground was used very much. At the time of the epidemic they were making new roads across it and there was a lot of rubbish shot there, and it was not very much used. The Weston Park, on the other hand, was used by people from all parts of Sheffield.

2217. How do you suppose the infection to have been communicated from the hospital?—That is a matter which is so complex that I could not speak with any absolute certainty with regard to it. The hospital was badly administered, and I cannot tell you how far the disease was spread by direct infection, or how far infection was spread from the hospital aërially; I cannot distinguish that. The administration was so bad at the time that there were possibilities of the spread being from the hospital by direct personal infection.

2218. But when we find the infection so very predominantly carried in an easterly direction we may fairly ask you whether you have formed any idea of the explanation of that, and the only explanation that you have given hitherto is the existence of this recreation ground?—Certainly not. On the eastward I said you have a larger population, a more thickly aggregated population than you have towards the west.

2219. But if you go beyond that innermost circle you find a large population on the map of Sheffield to the west?—No, not a large population. If you look at the shading you will see that it is sparsely populated. That is the "west end" of Sheffield.

2220. But still these streets would not be laid out without houses in them?—But they are detached villas and scattered houses, a great many of them. Not a few of the streets marked on the map as laid out are as yet unbuilt on. What you are looking at is at the west end of Sheffield.

2221. Then you think that if houses are large enough and have sufficient air in them the proximity of a hospital is of no danger?—No; you have not here got houses close to the hospital.

2222. But they are within the larger circle?—They are certainly some of them within the larger circle, but from the evidence that was given last Friday with regard to the hospital you will observe that the incidence first fell on the central circle, the one close round the hospital. Then that circle became a source of infection itself, and small-pox spread to the next circle and so on from one circle to another.

2223. You say that the midmost circle was the first centre of infection?—That is where there was the first multiple incidence of infection.

2224. Is it not the case in Map II. that Brightside shows more small-pox?—There were no cases in hospital then. That is the pre-hospital period.

2225. Do you believe in the possibility of aërial infection?—I believe that small-pox spread from the Sheffield Small-pox Hospital. How it spread, to what extent it depended upon aërial infection, and to what extent its extension depended upon personal communications, I cannot say.

2226. But you think that it must have depended upon one or both of those causes?—Both factors probably had to do with it.

2227. Do you think then that the friends, that the people brought to the hospital only went to the eastward and not to the westward at all?—All the first cases occurred towards the east, where was the greater population.

2228. Now with regard to the aërial carriage of infection, do you observe that the direction of the wind in the Appendix A., p. 295, and the following pages, is very variable, sometimes blowing from the west and almost as often from an easterly direction. For instance, from July the 2nd to the 16th, which is a period coincident with that in two of your maps on page 297, I think, do you observe that on seven days there were no westerly winds at all, and that on five days the winds were easterly, south, south-east, and east-south-east?—There were a great many westerly winds if you take them at the different hours of the day.

2229. But there were easterly winds on several days?—There were easterly winds at 9 o'clock in the morning on certain days.

2230. But they will convey infection as easily between 9 o'clock and 12 as at any other time, will they not?—But they are very slight, and were not persistent.

2231. It does not take long for the wind to convey infection, does it?—I cannot say, I am sure, how long it takes wind to convey infection. I have no knowledge of how far or how rapidly the wind will convey infection away. It has been said that no wind at all—a condition of calm—has been associated with special spread of small-pox in the immediate neighbourhood of small-pox hospitals.

2232. On the theory of aërial infection would not the fact of the existence of east or south-east or north-east winds at any particular parts of the day facilitate the spread in a westerly direction?—If there were any houses quite close to, it might possibly be so. There are practically no easterly winds; there is no actually east wind; there are some south-east winds.

2233. The south-east winds blow in the direction of the western parts of Sheffield. From the 17th to the 30th of July you observe that on three days, at any rate for a part of the day, there were easterly winds?—The general direction of the wind, taking the whole of the month, was westerly.

2234. I quite grant that, but there were easterly winds capable of carrying infection?—Yes, but the prevalent wind was westerly.

2235. I am quite prepared to adopt that. On page 219 there is a description of North Sheffield which you have given us, to which, however, I should like to refer. I am not quite conversant with the boundaries, but does North Sheffield spread at all to the westward of the hospital?—The boundaries are given on page 2.

2236. You have told us that this is a densely-crowded and, in many respects, poverty-stricken district?—North Sheffield is the most uniformly crowded district in Sheffield.

2237. And your idea is that the only reason for its being specially troubled with the infection was partly that it was near to the hospital and partly that it was more crowded than other districts, so that contagion was facilitated in that way?—Those were two of the most potent reasons.

2238. Do you attach any value to the insanitary conditions?—From evidence given here of the incidence on different districts I think we cannot attach very much importance to any insanitary condition.

2239. You observe that North Sheffield, according to the table on page 7, which, I think, is more complete, stands first in the number of attacks and second in the number of deaths?—Yes; North Sheffield has generally held that position in the previous epidemics.

2240. As being the most exposed to attack?—As being the most exposed to attack and therefore to death.

2241. But it does not show the greatest fatality?—Not during the recent epidemic. This is the first time that West Sheffield has shown the highest death-rate.

2242. West Sheffield appears to be second in the number of attacks and first in the proportion of deaths?—That is so with regard to West Sheffield.

2243. Do you notice that there is a considerable difference between the density of the population in North and West Sheffield?—The part of West Sheffield most affected, that was marked on the map which I gave in before, is densely populated.

2244. But it is a very small district, and on this map it would seem to be densely populated everywhere?—I explained in my previous evidence that the maps in my report are very much reduced, and do not show the gradations that are shown in the map that I have handed in, which showed, as nearly as I possibly could, where the greatest aggregations of dwellings were.

2245. We are told that the number of population per acre is 75 in West Sheffield?—That is taking it over the whole district, but, no doubt, the portion shown on the map as being crowded, has as high a density as North Sheffield.

2246. We cannot tell by these maps very well, but did you find that the incidence of small-pox was confined to one part of West Sheffield or not?—The incidence of small-pox was not confined absolutely to any part. The incidence was greatest on the crowded part.

2247. The same is the case with regard to South Sheffield, and Sheffield Park, the disease seems to cling always to the densely populated parts?—Certainly.

2248. Attercliffe is not so crowded, is it?—A portion of it is crowded.

2249. Is that the part where the disease attained its greatest prevalence?—Yes, it was in that part the small-pox appeared to have followed exactly the same course in its incidence as scarlet fever and measles.

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2250. Sheffield Park has a certain amount of crowded parts, has it not?—The western part of it is as much crowded, I should say, as North Sheffield; in fact, (*pointing to map*) that is one of the densely-populated parts, just the small part of it to the west.

2251. Is all the land vacant to the right of your maps?—Almost all the land to the right of the maps is vacant.

2252. But there were no cases of small-pox at all in that direction?—There were only one or two, I think, which are marked on one of the maps. There are only very few houses there.

2253. Upper Hallam, you tell us, is a suburban district entirely?—A purely rural district.

2254. Will you tell us again how many unvaccinated were found in Upper Hallam?—I find at page 161, Table LXXXIII., there was a total population of 2,631 in Upper Hallam which was scattered over a very large area. Of that population of 2,631, 2,605 were vaccinated; amongst them there were 12 attacks and one death. There were 26 unvaccinated persons, of whom one was attacked, but did not die.

2255. Would you expect in a healthy district that the unvaccinated should be last to be attacked?—The unvaccinated was not the last to be attacked. As I explained the other day, there were only 26 unvaccinated people living in that district, scattered over a very large area. And the 13 houses invaded there contained only one unvaccinated person, he was attacked—the other unvaccinated persons probably never came into contact with small-pox at all.

2256. The table to which you have just referred gives the whole population of Upper Hallam as 2,631. Is that the census population?—Yes, that was the population found at our census; the estimated population was 2,644.

2257. There would appear to be a difference between the population given in the census and the estimated or real population of the district?—The estimated population is not the real population; it is wholly a hypothetical one, and in several of the sub-districts it is very probable that the estimated population is considerably over the real amount: I have referred to that in the notes.

2258. Take page 23, for instance, where it is said: "Of "the 28,064 persons of all ages returned as vaccinated," and "of the 582 persons of all ages returned "as unvaccinated;" those two figures do not make up the whole population, do they?—Yes, the total population that was enumerated in Attercliffe was 28,646.

2259. That is not the whole population of the district, is it?—As far as we know it is the whole population of the district; it is about 2,000 more than was enumerated in 1881.

2260. If you will refer to page 7 you will find that the population of Attercliffe is given as 36,092, those figures being authoritative figures, I suppose?—That is calculated on the assumption that the population of Attercliffe had increased since 1881 at the same ratio that it had increased between 1871 and 1881, but that I understand is not the case; it has, it is believed, not increased at the same ratio.

2261. Still there would be a margin of people unenumerated in the census?—Certainly a margin, but I think the margin is a very small one.

2262. You do not think it is as large as would appear from these figures?—Certainly not.

2263. Did you find any instances of people who were anxious not to be questioned?—There were a few; I have given the numbers.

2264. As a general rule is it not the fact that people who object to vaccination are afraid of being questioned?—Of course, some of them,—they do not wish to incriminate themselves in the matter of their children.

2265. Suppose that this margin of unenumerated people largely consisted of those opposed to vaccination, would not that seriously affect your per-centages?—No, it would not affect them to any appreciable extent; even if you doubled your unvaccinated population, it would not get rid of the great disproportion between the rates of the vaccinated to the unvaccinated.

2266. It would lessen the proportion?—It would lessen the proportion, but it would not greatly affect the rates of the vaccinated.

2267. In the whole population of Sheffield there is a considerable difference between the census and the estimated population, is there not?—Certainly, a very considerable difference. I have referred to that in a note on page 169, where I say, "Assuming the popu- "lation to have increased since 1881 at the same ratio "as it did during the decennial period 1871–80, the "population in the middle of 1887 would be 316,288. "It is, however, doubtful whether this is the case, as "upon an examination of the registration statistics it "will be found that the birth-rate calculated upon "this estimate would be 32·9 per 1,000, whereas the "average birth-rate for the 20 years 1861-80 was over "40 per 1,000."

2268. Still there is an unknown margin of people that were unenumerated?—Certainly there is an unknown margin, the question is as to its dimensions.

2269. On page 205 we have the statistics of the troops and the police in Sheffield; do you not consider that the troops as a general rule consist of young and strong lives?—Certainly, selected men.

2270. Is not 12 men out of 830, or 1·4 per cent. of the total strength, a considerable proportion to be affected by small-pox?—I do not know that being picked men would prevent them from getting small-pox. I do not know that your being in a bad state of health would predispose you to small-pox.

2271. You do not think that physical weakness or depression would render one more liable to be attacked by small-pox?—I have not had very much experience of that, but I have known a good many cases where remarkably strong persons have taken small-pox, they have been the persons who have been attacked.

2272. Do you think that a strong, healthy man is just as likely to take small-pox as a weak and unhealthy man?—Quite as likely I should say.

2273. You would not say more likely, would you?—Not to my knowledge, but quite as likely.

2274. These men are all required by the military authorities to be re-vaccinated, are they not?—As regards the 12 men that are here stated to have contracted small-pox re-vaccination had been attempted, but, as I explained on Wednesday, in every case the re-vaccination had failed.

2275. Are you aware that we have had testimony on the subject of insusceptibility to re-vaccination?—No, I have not seen that previous evidence.

2276. I will refer you to the answer given to question 1837. Dr. Gayton was asked: "I see you say that 'so "'long as he is liable to be affected by vaccination so "'long I imagine is he liable to take small-pox'? "(*A.*) I believe that to be the case. (*Q.*) So that appa- "rently successful re-vaccination would indicate sus- "ceptibility to small-pox? (*A.*) Yes, I think so. (*Q.*) "So that insusceptibility would be better evidence of "protection? (*A.*) I think so." In the opinion of Dr. Gayton insusceptibility to re-vaccination would show insusceptibility to small-pox?—You have to take many things into consideration with regard to these men; most of them are re-vaccinated with stored lymph, and you have not nearly the same chance of being successful with that as you have if it is done from arm to arm.

2277. In 12 cases they were re-vaccinated and in 12 cases it failed?—That does not say they were insusceptible. No one can be regarded as insusceptible who has not been three times unsuccessfully vaccinated.

2278. (*Professor Michael Foster.*) The matter might have been quite useless in every case?—Yes; there is also another thing in the army; it is an old custom for men to suck their re-vaccinated places—that was a very well-known thing at Sheffield.

2279. (*Mr. Picton.*) It would indicate then that the system of re-vaccination in the army is very imperfect?—I can only speak to these particular cases.

2280. Here 12 men who were attacked out of 830 are found to have been re-vaccinated?—I could not speak for the whole army; I could only speak to these particular cases who had not been re-vaccinated since their re-vaccination failed.

2281. (*Dr. Collins.*) Did you speak for the whole army when you said that they are generally re-vaccinated with stored lymph?—I believe at Sheffield they were in the majority of cases.

2282. Did you ascertain in each of these cases that they had been re-vaccinated with stored lymph?—No;

but the medical officer in charge told me that they used stored lymph usually; there was no record whether the re-vaccination was with stored lymph in these particular cases or from arm to arm.

2283. (*Sir James Paget.*) Were those 12 the only men attacked out of the 830?—Yes.

2284. (*Mr. Picton.*) Of the police 10 out of 372 contracted small-pox?—Yes.

2285. All those men had been vaccinated though not re-vaccinated?—They had been vaccinated in infancy.

2286. Is not that a considerable proportion to take small-pox, 10 out of 372?—I do not think so considering the duties they have to do.

2287. I shall have to refer to some of the cases in Table 14 on page 30. First, there appear to be a number of children under one month put in these tables although in the calculations the infants under one month are excluded?—Yes, so that you might be able to refer to every case. I give the whole details with regard to every case.

2288. Do you think it is quite accurate to put in all these children?—To put them into these tables, certainly. This is simply a record of the results of my inquiries; there are no calculations based on the numbers in these tables.

2289. You have yourself made inquiries with regard to all these cases?—Yes.

2290. Those under one month you do not consider affect the question at all as to the value of vaccination?—No.

2291. Do you consider that those under three months affect the question?—Certainly they do.

2292. The law only requires children to be vaccinated after three months?—Quite so; if in the presence of the epidemic they had been vaccinated when they were a fortnight old, they probably would not have been attacked at all.

2293. Would that seem to you to indicate a necessity for a change in the law?—That I am not prepared to say. I am not prepared to give an opinion with regard to any alteration in the law.

2294. You told us that children under three months probably took small-pox because they were not vaccinated?—Yes.

2295. In some of these cases the testimony that we have from other sources differs from that given by the relatives. Take No. 5, Emily F., the health of that child is said to have been good, from whom did you obtain that information?—That is page 30. I obtained that from the father; and you will observe there is a note with regard to that case, that the child "was born in Rotherham. There were in this family "two other children born in Sheffield, both of whom "were unvaccinated, and proceedings were about to "be taken to compel the father to have them vacci-"nated when E. F. was taken ill. The father imme-"diately had them both vaccinated, and informed the "vaccination officer that if he had 10 more children "he would give no further trouble, but have them "vaccinated as early as possible."

2296. Are you aware that Emily F. was treated for other complaints immediately before the small-pox?—No, there was no statement to that effect.

2297. Not that she was consumptive?—No, certainly not; she was only eight years of age.

2298. Did you hear any complaints of sewer gas affecting her in bedroom?—No; everything that I heard is stated here. Any statement made to me I put down on these sheets.

2299. Now take No. 20, Ernest B., the health of that child is stated to have been delicate. Are you aware that that child was left for two days in a room with the window open?—No, I was not told that at the time.

2300. Take No. 22, Rose E. C., that is a child two months old; did you ascertain the circumstances under which that child took the small-pox?—No.

2301. I am informed that the mother was seized with small-pox, and the child continued at the breast unweaned, whereupon it sickened with small-pox and died. Do you think that the death in that case was owing to non-vaccination?—Yes, if the child had been vaccinated when a fortnight old it would not have taken small-pox in all probability.

2302. Were there no cases of children vaccinated at that age who took small-pox?—No cases that I came across where they had been vaccinated so short a time before—successfully vaccinated, of course, I mean.

2303. Will you turn to Table XXIII., No. 6, Robert C., did you ascertain what was the health of the mother at the time?—There is a note with regard to that case: "This child was vaccinated when nine days old, the "day before the appearance of small-pox eruption. "He was apparently healthy when born. The mother "developed small-pox the day after his birth." That infant is omitted from the statistics.

2304. Still these deaths are attributed to the want of vaccination?—Certainly not. I eliminated all cases of under a month. I lay no stress whatever on cases under one month of age.

2305. Then I will not refer to them. Will you turn to No. 10, Mary F.? This is a case in which there is some uncertainty. Do you remember from whom you got the particulars of that case?—From the medical attendant; we could not find any relative.

2306. Are you aware that there was a neighbour who attended upon her and nursed her?—No, I do not know anything further than what is set down here.

2307. Are you aware that this woman who attended upon her and nursed her said she saw the marks upon her arm when she was waiting upon her?—No, I cannot tell you anything further than is stated here.

2308. I suppose this woman would be too old to enable us to get confirmation or otherwise of this?—Yes. She was born before 1871.

2309. Now take No. 11. Are you aware that "Hannah P." was nursed through her illness by her sister, who was not vaccinated?—No.

2310. You are not aware, therefore, that her nurse did not take small-pox?—No.

2311. Now go to No. 16, "Joseph H. C."?—That is a thirteen-day child.

2312. Are you aware that in that case the mother was vaccinated in her childhood, and she took small-pox?—A great many who were vaccinated in their childhood took small-pox.

2313. Now take No. 17, "Allen L." You observe that the postponement of vaccination in that case was owing to ill-health. Do you remember what the nature of the ill-health was?—No.

2314. You are not aware that it was a tendency to consumption?—No, I did not know that; it is stated that the child was delicate—that was all the information I got.

2315. Then take No. 18. Does the entry "ill-health" mean that the public vaccinator refused to operate because of ill-health?—I could not say whether the public vaccinator or a private vaccinator refused, or, indeed, that the vaccination of the child had been medically postponed.

2316. You are not aware that the public vaccinator absolutely refused?—No.

2317. Will you turn to No. 24, "Isaac H., one month." Would that case be included?—Yes; for it was between one and two months of age.

2318. Are you aware that in that case the mother had small-pox slightly?—No.

2319. I mean at the time when the child was born?—The child was only ill three days, I see.

2320. You are not aware of the condition of health of the mother?—No.

2321. Was she asked as to her health?—No; but the child was only taken ill three days before its death.

2322. Now take No. 26, "Albert S. C." I think the health there is reported "good"?—The health there is reported "good," on the authority of the father.

2323. You did not see the mother?—No.

2324. The mother would be likely to know better than the father, would she not?—I do not know whether she would or not.

2325. You are not aware that the mother states that the child suffered severely from inflammation of the lungs and congestion of the brain and was given up on the Sunday by two medical men as hopeless when there was no sign of small-pox?—No; the statement that the previous health of the child was good is given on the authority of the father.

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2326. The child was vaccinated seven days before its death, was not it?—The statement was that it was never vaccinated; that was the statement that was given to me.

2327. Now take No. 32, "John William G." There the entry is that the child was vaccinated three times unsuccessfully by a private practitioner?—Yes.

2328. Are you aware that the mother states that this child was vaccinated in infancy?—It was vaccinated three times unsuccessfully; that is, it was vaccinated in infancy unsuccessfully; it was vaccinated on three occasions by their own doctor.

2329. Are you aware that the mother states that the child was vaccinated successfully in infancy and re-vaccinated three times unsuccessfully?—No, she stated that it was vaccinated three times unsuccessfully.

2330. It would be possible to appeal to the register there?—If the child was born in Sheffield it would.

2331. Will you look at No. 46 (I pass over others that might be referred to), "Beatrice N.," a child five months old. The length of time that she was suffering from small-pox was six weeks; is not that an uncommonly long time?—It is a long time, but it was discrete small-pox followed by pneumonia; the latter was the illness that caused the child's death; it began with small-pox and went on with pneumonia.

2332. Did not the child die of small-pox?—It died from the results of small-pox; the sequelæ of small-pox at any rate.

2333. You said it was ill from small-pox?—No; it took small-pox and then died eventually of pneumonia.

2334. Will you look at No. 43, "Emily P."; did you hear any statement that that woman had been vaccinated in infancy?—No; the information in that case I got from the medical officer to the workhouse; he stated that there were no signs of vaccination; that is one of the few cases that were certified by the doctor, where I had to take the doctor's evidence.

2335. Now take No. 44, the case of a child one month old, Harry M. It is stated that this child was not vaccinated. Was it the mother you got the information from?—Yes, that is what the mother stated. If she had stated that the child was vaccinated I should have put it down vaccinated.

2336. Will you turn to Table XXXII. on page 68 (I am only taking selections—many others might be taken), take No. 13, Lucy C. That is a case which is alleged to have been one of delicacy in infancy, and afterwards neglect. Would not delicacy in infancy and neglect afterwards conduce to her taking small-pox and dying of it?—The neglect referred to is neglect to get the child vaccinated. It is the reason given for non-vaccination; it does not mean that the child was neglected in the ordinary sense.

2337. Are you aware that the child suffered from fits?—I do not know what it suffered from. The statement was that it was delicate in infancy. I may have the nature of its previous ailments on the card. I have not the cards with me. The sister stated that the child was delicate in infancy.

2338. Are you aware of the reason for the postponement of vaccination?—No.

2339. You were not informed that it was postponed by medical advice?—I assume it to have been so; that it had been postponed originally on account of ill-health.

2340. Now No. 20, Joseph Victor S. In the column headed "If not vaccinated, reason given for non-vaccination," the reason given is "delicate." Are we to infer from that that there was medical authority for postponement of vaccination?—No, it is the allegation in that case of the mother.

2341. Were you told that Dr. Skinner postponed vaccination because of ill-health?—I cannot remember whether I was told that or not. In that particular case I was told that the child was delicate, and the entry is "delicate."

2342. Now take No. 32, Eliza B. That child is said to have been unvaccinated?—Yes; previous health delicate.

2343. The sister-in-law told you that?—Yes.

2344. You did not see anyone else but the sister-in-law?—No. Some of these cases were very difficult to trace; and in that case the sister-in-law was the nearest relative, and I got the information from her and from the medical officer of the hospital.

2345. You are not aware that another relative asserts that she was vaccinated in infancy?—No, I am not.

2346. Now take No. 34, Tom P.; you did not see the parents in that case?—No.

2347. You are not aware that both the father and mother say that that young man was vaccinated?—No. I had the statement of the medical officer of the hospital that there were no marks in that case.

2348. Now No. 36, Ellen B.; there your information was that the previous health was good?—Yes.

2349. You got that from a neighbour?—Yes.

2350. You were not able to see any relative?—No.

2351. And you were not told by anyone that the child was suffering from a complaint of the bowels?—No; if I had been told that of course I should have entered it.

2352. Now as to No. 37, Jane Hannah H., there are queries in some of the columns, you were not able to get the information to enable you to make entries in those columns?—No, that is the case in which it was more difficult to get information than in any case in the whole list.

2353. You did not hear that the case was vaccinated unsuccessfully in infancy at Scarborough?—No.

2354. An unsuccessful vaccination would not be entered in the register of vaccinations, would it?—No, an unsuccessful vaccination would not be entered at all, that is to say, not in the vaccination officer's register. There are two sets of registers, the public vaccinator's register, and the vaccination officer's register; the public vaccinator's register is the one in which the public vaccinator enters every case that comes to him for vaccination. The vaccination register of the district is one in which entries are made of every child born, and then subsequent entries are made by the vaccination officer of the district with regard to vaccination in each case.

2355. (*Dr. Collins.*) You could only get a record of an unsuccessful vaccination from the public vaccinator's registers?—You could not necessarily obtain it from the public vaccinator's registers. If it had been done by the public vaccinator you might get the information, but if it had been done by a private practitioner there would be no record.

2356. (*Chairman.*) The public vaccinator is not bound to keep a register, is he?—Only of the cases he vaccinates as public vaccinator.

2357. (*Dr. Collins.*) A vaccination, if performed by the public vaccinator, would appear whether successful or unsuccessful in his register?—It ought to appear.

2358. (*Chairman.*) Where is the provision about the public vaccinator keeping a register?—It is one of the Orders of the Local Government Board.

2359. (*Mr. Picton.*) It would be possible to get either confirmation or contradiction of the allegation about this girl, No. 37?—You might get a confirmation or a contradiction of it; it would not alter the fact as entered here, that it was an "unvaccinated" case; it would not alter the numbers at all.

2360. You do not agree that unsuccessful vaccination shows any insusceptibility to small-pox?—In an infant, no; unsuccessful vaccination arises from many circumstances.

2361. Is not it the fact that a considerable proportion of these that are entered as deaths in the unvaccinated class, were of delicate health, independently of small-pox?—There is a reference to that in the report on page 199, where it says: "From a comparison of "the figures with regard to the previous health of "persons of the 'vaccinated' and 'unvaccinated' "classes, respectively, who died from small-pox, it "will be seen that amongst the 'vaccinated' 52·4 per "cent. were stated to have enjoyed good health prior "to attack, whilst amongst the 'unvaccinated' the "proportion was 61·3 per cent. after deduction of in-"fants under one month of age, thus showing, that as "regards the state of health prior to attack, the un-"vaccinated had a slight advantage."

2362. That paragraph, of course, is based on information received from inquiries at the houses?—Yes;

both as regards the "vaccinated" and the "unvaccinated."

2363. That information was not always given by the parents?—In the majority of cases it was given by the parents.

2364. By one parent?—Yes, I have stated exactly here what was stated to me.

2365. (*Dr. Collins.*) You went to Sheffield in January 1888?—Yes.

2366. And you told us to-day that your previous acquaintance with epidemics of small-pox was very slight?—Confined to two previous epidemics; small epidemics in Walker-on-Tyne and in Gateshead and as well an outbreak in Cyprus.

2367. You told us that you had not made yourself acquainted with the literature of the subject?—I have not made myself acquainted with the literature of the subject.

2368. I gather from page 294, that in the elaborate account of the outbreak at Sheffield you have given us, you have endeavoured "to give a complete history of "the behaviour there of the small-pox and, as well, a "wholly unbiassed account of every important con- "dition capable of being thought of as having in- "fluenced the disease, whether in its extensions or in "its limitations"?—Yes, I state that, and then I go on to say: "How far this object has been attained "I must leave others to judge."

2369. Shortly after your arrival at Sheffield in January 1888, as the result of a personal conference with the local authorities, you advised or recommended that a public notice should be issued, did you not?—Yes.

2370. Will you read that notice?—I had nothing to do with the drawing up of that notice. If you refer to page 12 you will see the notice in a footnote. This form of public notice jointly issued by the Sheffield Boards of Guardians and Town Council in January 1888 was as follows:—

"SHEFFIELD UNION.

"*Small-pox.*

"Small-pox is the most infectious disease of all "diseases.

"To those who are not properly protected by vacci- "nation it is also the most deadly of all infectious "diseases.

"The only certain protection from small-pox is vacci- "nation and re-vaccination.

"Out of three thousand cases of small-pox that "occurred in Sheffield not one single successfully re- "vaccinated case has been reported as having died.

"If everybody in Sheffield had been re-vaccinated "two months ago there would not now be a single case "of small-pox in the town.

"In many cases the protective power of vaccination "becomes gradually weakened, so that it has not its full "effect; and in some this protective power is, after a "time, entirely lost. Therefore, if you have not recently "been successfully re-vaccinated lose no time, but go to "your doctor or to the public vaccinator and have your- "self re-vaccinated. This, if done in time, will ensure "your safety.

"If you have any unvaccinated children, have them "vaccinated at once.

"In the meantime avoid exposing yourself to the "infection of small-pox. Do not enter a house infected "by small-pox; have no communication with those "living in such a house, and especially do not allow "them to enter your house.

"THEODORE THOMSON,
"Medical Officer of Health."

Then follows statement as to the arrangements made for vaccination and re-vaccination in the several districts.

2371. May I take it that that notice was issued with your approval?—I had nothing whatever to do with the wording of the notice.

2372. Under the heading of "result of personal "conference with the local authorities" it is said "it "was further recommended that public notices to this "effect should be signed by the medical officer of health "on behalf of the town council and by the clerks to "the respective boards of guardians in each district to "show the co-operation of the various authorities"?—It was recommended that public notices, "stating "in simple language certain necessary precautions "against small-pox, and giving intimation of the time "and place when vaccination and re-vaccination would "be performed free of charge" should be prepared and signed; that is really what was done. The joint board asked the medical officer of health to draw up the notice and issue it.

2373. Was it at your suggestion or with your approval that a notice of that character was issued and posted?—That public notices should be issued giving the precautions against small-pox, that was my suggestion. I did not enter further into it than that.

2374. Did you approve of the issue and posting of that circular?—I had nothing to do with its terms. I saw it after it was issued.

2375. You did not express your disapproval of it?—I did not express either approval or disapproval of it.

2376. With regard to the vaccination census, I suppose I may take it that the ratios of attack and death in the vaccinated and unvaccinated populations respectively are based upon the figures which have been derived from your vaccination census?—Exactly so.

2377. So that the accuracy of the ratios which appear in parallel columns throughout the report would be dependent on the accuracy of the returns of population?—Yes, their absolute accuracy.

2378. The populations contained in the vaccination census?—Quite so.

2379. During the period of the epidemic from March 1887 to March 1888 vaccination and re-vaccination were very extensively practised in Sheffield, were they not?—They were, especially in 1888.

2380. It appears that there were 2,348 primary vaccinations performed by the public vaccinators during that period (Table VI., page 15)?—That is in Ecclesall; that is only one of the districts.

2381. Can you give me the summary for the whole; can you give me the number of primary vaccinations that took place in Sheffield during the period of the epidemic from March 1887 to March 1888?—I will get them out for you, and will distinguish the primary vaccinations under one year and the vaccinations over one year.

2382. Will you also give me the number of re-vaccinations during the same period from March 1887 to March 1888?—Yes.

2383. Those figures would not include the re-vaccinations by private practitioners?—No.

2384. The total number of re-vaccinations during 1887–88 are given as 55,630?—That would be the number as ascertained at the census.

2385. So that I understand during the period of the epidemic from 1887 to 1888 the vaccinated population was considerably recruited, and the unvaccinated population was considerably diminished?—That would be so to a certain extent; to a considerable extent by the end of the epidemic.

2386. May I ask you by whom the vaccination census was prepared?—It was prepared in my office.

2387. I mean by whom was the vaccination census conducted?—By men employed by the guardians; they were usually clerks in offices; some of them were accountants.

2388. Were not the vaccination officers employed?—The vaccination officers acted simply as superintendents in their respective districts; they had nothing to do with the actual enumeration.

2389. The census was conducted under the control of the vaccination officers, I understand?—It was in one of the Unions. In Sheffield Union the vaccination officers acted as superintendents in their districts; it was not merely because they were vaccination officers that they were taken for that purpose; the vaccination officers were the sub-district registrars, and consequently had had the superintendence of the Imperial Census of 1881 in that capacity.

2390. Were the officers who were charged with conducting this vaccination census, whether vaccination officers or not, also instructed, to secure as far as possible the discovery of all unvaccinated children?—Certainly that was one of their duties, that was the primary object of the house-to-house inquiry, the census was a secondary affair. Their house-to-house visitations were utilised for the purpose of making the census.

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2391. If there had come to their notice any cases of unvaccinated children over three months and under 14 years of age it would have been their duty to set the law in motion?—Not the men who visited. They reported the cases to the vaccination officers, and it was the vaccination officers' duty of course to take steps to secure the vaccination of such children. Of course they had no power to compel the vaccination of persons over 14 years of age.

2392. So that practically information given to those who were conducting the census as regards non-vaccination would incriminate those who had in their houses children over three months and under 14 years of age unvaccinated?—It would bring unvaccinated children of whatever age under the notice of the Vaccination Authority.

2393. And, as a matter of fact, you told us that in a certain number of houses there was a positive refusal to give any information at all?—I gave the number of houses in which there were refusals.

2394. I think you have told us to-day, and apparently the report of the medical officer of health of Sheffield corroborates you, that for some years past vaccination has been well carried out in Sheffield?—Yes, that is the case.

2395. Better than in the average of English communities, I believe, according to Dr. Buchanan?—I believe so, according to Dr. Buchanan's introductory memorandum.

2396. What is the proportion of "unaccounted for" cases in Sheffield?—At page 184 I say, "Of the 107,821 "children born in Sheffield during the last 10 years, "11,503, or 10·69 per cent., died unvaccinated; 91,321, "or 84·7 per cent., were certified to have been successfully vaccinated; 97, or ·09 per cent., were "certified to have been 'insusceptible' of vaccination; 12, or ·01 per cent., were certified to have "had small-pox; and 4,888, or 4·51 per cent., were not "finally accounted for," that includes postponements, removals, and refusals.

2397. Can you give me the proportion of the 4·51 that would be postponements?—I am afraid not; I have not that figure here.

2398. Table XCVII. apparently shows that of the total vaccinations during those years 63 per cent. were performed by public vaccinators, and 37 per cent. by private practitioners?—Yes.

2399. Is that a larger or smaller proportion than obtains in your experience in such large towns as you are acquainted with?—I have not taken the numbers out for any other large towns.

2400. At the end of the preface by Dr. Buchanan, he says, "I have only one more comment and this has "reference to what may appear an omission from "Dr. Barry's report. He says nothing of deaths "resulting from the vaccination of 9,000 children each "year in Sheffield. As regards the last three years "(I have no earlier data) I am able to supply this "omission. No death certificate received from Sheffield "has made any mention whatever of vaccination. The "current rate of the country would give for a population of 300,000 persons 0·5 as the yearly number of "such death certificates." Have you attempted to supply the suggested omission which is referred to there?—I have no information at all on the subject.

2401. You are not aware that the report of the medical officer of health for Sheffield for 1877 says, "three deaths were attributed to erysipelas following "vaccination; the Local Government Board did not "authorize the Medical Officer of Health to take any "action in the matter"?—No, that is a year antecedent to the period, 1878–87, that I am dealing with.

2402. I do not think you have given us the total percentage of cases of small-pox which occurred in vaccinated persons or in the vaccinated class?—That is given on page 171. "Of the 268,397 persons of all "ages returned as vaccinated, 4,151, or 1·55 per cent., "had been attacked by small-pox."

2403. My question was what per-centage of the total number of attacks by small-pox occurred in vaccinated persons? I will put my question in this way: I see in Table XC., columns 8 and 9, that of 4,703 cases of small-pox, 4,151 occurred in vaccinated persons, that would give about 88 per cent.?—I have no doubt that you are correct in the particular instance.

2404. I was asking you just now as to whether, during the period of the epidemic, from March 1887 to March 1888, the vaccinated population had not considerably increased and the unvaccinated population considerably decreased, and I think you told me that that was so to a considerable extent?—That would be the case to a considerable extent, especially in 1888.

2405. I think the vaccination census was not completed till the third week in March 1888; that would be near the period of the termination of the epidemic?—Near the termination of my inquiry; the epidemic, of course, went on some three months

2406. You told us that the epidemic was considerably abating by the end of March?—Yes; but I think there were 90 deaths after I closed my inquiry.

2407. But there had been 474 before that?—590 before that. I mean at the end of the inquiry there had been 590 deaths. Then there were 90 deaths occurred after that.

2408. So that the bulk of the deaths from the epidemic had taken place before the end of March 1888?—Yes.

Adjourned till Wednesday next at one o'clock.

Thirteenth Day.

Wednesday, 30th October 1889.

PRESENT:

THE RIGHT HON. THE LORD HERSCHELL IN THE CHAIR.

Sir JAMES PAGET, Bart.
Sir CHARLES DALRYMPLE, Bart., M.P.
Sir W. GUYER HUNTER, K.C.M.G., M.P.
Sir EDWIN HENRY GALSWORTHY.
Mr. WILLIAM SCOVELL SAVORY.
Dr. JOHN SYER BRISTOWE.
Dr. WILLIAM JOB COLLINS.
Mr. JOHN STRATFORD DUGDALE, Q.C., M.P.
Professor MICHAEL FOSTER.
Mr. JONATHAN HUTCHINSON.
Mr. J. ALLANSON PICTON, M.P.
Mr. SAMUEL WHITBREAD, M.P.
Mr. F. MEADOWS WHITE, Q.C.

Mr. BRET INCE, *Secretary.*

Mr. FREDERICK WILLIAM BARRY, M.D., Sc.D., further examined.

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2409. (*Dr. Collins.*) I think you were telling us when we adjourned last Friday that the period from March 1887 to March 1888 was one of transition in Sheffield as regards the extent of vaccination?—Yes, that was the case. I promised you then some figures, I think, with regard to vaccination. I have made an abstract from the two tables given on pages 14 and 15 of my report, and I have also made an abstract from a table that is given on page 185. I shew in the table the primary vaccinations performed by public vaccinators from April 1887 to March 1888 on children under one year of age, on persons aged one year and upwards; and the total. I have also given the annual average primary vaccinations performed by public vaccinators from 1878 to 1887. I have then given the excess above the average of vaccinations performed by public vaccinators from April 1887 to March 1888, and also the total re-vaccinations performed by public vaccinators from April 1887 to March 1888.

District.	Primary Vaccinations performed by Public Vaccinators, April 1887 to March 1888.			Annual Average Primary Vaccinations performed by Public Vaccinators, 1878-87.	Excess above the Average of Vaccinations performed by Public Vaccinators, April 1887 to March 1888.	Total Re-vaccinations performed by Public Vaccinators, April 1887 to March 1888.
	On Children under 1 year of age.	Persons aged 1 year and upwards.	Total.			
Attercliffe - -	709	471	1,180	664	516	1,966
Brightside and Sheffield Workhouse.	1,176	930	2,106	1,159	947	2,298
North and West -	1,125	803	1,928	1,098	830	4,183
Park and South -	898	141	1,039	917	122	1,357
Ecclesall and Ecclesall Workhouse.	948	247	1,195	1,017	178	3,607
Nether Hallam and Upper Hallam.	756	397	1,153	897	256	3,807
Sheffield -	5,612	2,989	8,601	5,753	2,848	17,218

The number of primary vaccinations performed by public vaccinators in period of epidemic was 50 per cent. above average of previous 10 years, assuming also that the ratio of excess was same amongst private practitioners, the excess of private vaccinations would amount to 1,689, giving a total excess of 4,537.

I find from this that in Sheffield there were 5,612 primary vaccinations performed on children under one year of age between 1st April 1887 and 31st March 1888; and 2,989 re-vaccinations on persons aged one year and upwards; or a total of 8,601; whereas the number of annual average primary vaccinations performed by public vaccinators between 1878 and 1887 was 5,753; so that you had an excess during that period of 2,848. The total number of re-vaccinations performed by public vaccinators from April 1887 to March 1888 is recorded as 17,218.

2410. Was that the total number of re-vaccinations or the total number of re-vaccinations performed by public vaccinators only?—By public vaccinators. These figures all refer to public vaccinators. Thus the number of primary vaccinations at all ages performed by public vaccinators in the period of the epidemic was 50 per cent. above the average of the previous 10 years. Assuming that the ratio of excess was the same amongst private practitioners, the excess of private primary vaccinations at all ages would amount to 1,689, giving a total excess of 4,537 for the whole period.

2411. (*Chairman.*) When you speak of the average is that the average corrected for increase of population?—That is the actual average taken from the vaccination books.

2412. So that it would not necessarily represent 50 per cent. more than the average in its relation to the population, would it?—This refers to children as well as to infants.

2413. I suppose that 10 years ago there were not so many children born in Sheffield as now?—According to the registration returns 1878-87 I think they were about the same. Working them out from year to year the number of children does not differ very much. There would not be quite so many during the first few years as there were during the last few years.

2414. (*Dr. Collins.*) So that I understand that at the end of March 1888, about which time the vaccination census was completed, there were 8,601 more persons vaccinated than there were in March 1887?—No, that does not follow.

2415. Or who had been born and vaccinated during that year?—Of course you must take account of the average amount of vaccination that is always going on in the district. Having done that you have an excess over the average amount of 2,848.

2416. That takes account only of the primary vaccinations performed by public vaccinators?—Exactly so; and, as I have said, the total excess, taking public and private vaccinations together, would be about 4,500 for the whole period.

2417. And I think you told me that the total number of re-vaccinations performed by public vaccinators was 17,218?—Yes, 17,218. Most of those public vaccinators' re-vaccinations took place towards the end of the epidemic.

2418. On page 170 you give the total number of persons re-vaccinated during 1887-88 as 55,630; that, of course, would include those re-vaccinations performed by private practitioners as well as those performed by public vaccinators? — The greater part of those, I should say, would be done by private practitioners.

2419. So that the total number of persons re-vaccinated during 1887-88 was very much larger (55,630) than the total number of re-vaccinations performed by the public vaccinators in that period (17,218)?—Yes, very much larger; but the 55,630 includes the public re-vaccinations.

2420. Can you tell me to what extent during that same period primary vaccinations were performed by private practitioners as well as by the public vaccinators?—I cannot give you the precise figures. Of children under one year of age there were 5,612 primary vaccinations performed by public vaccinators, which would be about the usual annual average per-

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formed by the public vaccinators. Consequently you would have some 3,280 vaccinations under one year, on the ordinary per-centage, performed by the private practitioners.

2421. If the same ratio between the total number of re-vaccinations performed in 1887–88 and the number of re-vaccinations performed by the public vaccinators in 1887–88 obtained with regard to the primary vaccinations there would be very considerably more than 8,601 persons who were vaccinated at the end of the epidemic who were not vaccinated at the beginning, would there not?—Yes; but the ratio of the total re-vaccinations to public re-vaccinations is quite a different affair from the ratio of total primary vaccinations to public primary vaccinations. If you turn to the tables on pages 14 and 15 you will see that the majority of the re-vaccinations performed by the public vaccinators took place in January and February 1888, whereas the re-vaccinations performed by private practitioners were very abundant before that date.

2422. Have you any means of accurately ascertaining to what extent primary vaccination was carried on by private practitioners during 1887–88?—I could only tell you that for the children born during 1887–88.

2423. That would not include primary vaccinations performed upon persons over one year of age who were vaccinated by private practitioners?—No, I am afraid you would not be able to get that figure. I have only, as I have said, been able to make an estimate of that, which I have given you.

2424. At any rate, the number of unvaccinated persons was very considerably diminished in March 1888 compared to what it was in March 1887, was it not?—I should say that it was considerably diminished by the end of March 1888 compared with what it was in March 1887.

2425. And the vaccinated population had been very considerably recruited during the same period?—Of course a transfer would be taking place from one to the other, a transfer of the unvaccinated to the vaccinated class.

2426. The instructions issued to those who were responsible for conducting the vaccination census were, I believe, also to secure, as far as possible, the discovery and vaccination of all unvaccinated children?—Yes, that was one of their duties.

2427. Their duty was to reduce the unvaccinated population to as small dimensions as possible?—Yes, that was the case.

2428. From what appears on page 161, in Upper Hallam apparently that object was so far carried out that while there were 74 persons living in invaded houses only one of those was unvaccinated?—That was what was found at the time of the census you must remember, by which date three-fourths of the Upper Hallam attacks had occurred. Speaking generally the census would record all the unvaccinated children that were found. Those would be reported to the vaccination officers of the districts. But the census returns would not take account of transfer,—effected by its own operations,—in the population of unvaccinated persons to the vaccinated class.

2429. But had not primary vaccination both of infants under one year of age and of persons over that age, and also re-vaccination, been considerably practised prior to the termination of the third week of March 1888?—Certainly; there had been a considerable amount of primary vaccination and of re-vaccination performed before the date of the census. But what I am trying to show you is that the action of these officers in the house-to-house inquiry would not, so far as it promoted vaccination, affect the numbers living of vaccinated and of unvaccinated persons actually recorded by the census.

2430. At any rate, as a matter of fact, in Upper Hallam vaccination had been so far carried out that only one person out of 74 living in houses invaded by small-pox was found to be unvaccinated?—That is the case; but that was in no sense the result of the census, and you are dealing there, of course, with a very small population.

2431. Whereas the number of attacks in the vaccinated was as 12 to 1 in Upper Hallam, inasmuch as the one unvaccinated person took small-pox, the unvaccinated population living in invaded houses attacked would be in that case 100 per cent., would it not?—Yes; and similarly the vaccinated population in Upper Hallam was to the unvaccinated population there as 99 to 1. But the 100 per cent. you mention is not a rate which I have taken anywhere. Where the figures are so very small I have not given any rates. Of course it was 100 per cent. practically, but if you turn over to the next table, Table LXXXIV., on page 162, you will see that there I have stated that "the number of houses "invaded by small-pox in this district is too small to "give figures of value."

2432. The unvaccinated population at the time of the census upon which you assessed the unvaccinated attacks and the unvaccinated deaths was very much smaller, was it not, than obtained during the period of the epidemic, or at any rate at the time of the commencement?—It would be diminishing during the whole epidemic, of course. From the commencement to the end of the epidemic you would have a constant diminution taking place in the number of unvaccinated persons, and, naturally, in the proportions.

2433. And the vaccinated population upon whom you would assess the attack-rate and the death-rate in the vaccinated was proportionately increasing during the same period?—Naturally it must be so. You get a transfer from the one to the other. And of course if attack rates and death rates were to be taken for the period of the epidemic which was subsequent to the diminution in the number of unvaccinated persons brought about by the operations of the census, attacks and deaths among the unvaccinated would be rated on a smaller population than before, with the result that after March 1888 for instance, the vaccinated rates would be relatively somewhat lower, whereas the rates among the unvaccinated would be greatly higher than if taken on the populations found in the respective classes at the census.

2434. In some figures that were furnished to me by the town clerk of Sheffield, which dealt with the epidemic up to the 1st of January 1888, I find that out of 2,198 vaccinated cases, 12 were reported to have been under one year of age, of which one terminated fatally; but on page 170, Table XC., which deals with the epidemic up to March 1888, of 4,151 vaccinated cases, the total number having greatly increased, I find that 11 instead of 12 are returned as vaccinated under one year of age with no death; could you explain the want of correspondence between those two figures?—No doubt, those under one year of age returned to you by the town clerk, like others returned later on to the Health Office comprised a considerable number that had been vaccinated during their incubation of small-pox, or had been unsuccessfully vaccinated. Of course the whole of these cases have been corrected. All the cases under 10 years of age were inquired about by me personally, and you will find an account of every one of those cases given in the district tables.

2435. Then the result of the correction is that while the total number of vaccinated cases increased from 2,198 to 4,151 the total number of vaccinated cases under one year of age during the longer period was reduced to 11 instead of 12?—That is the case.

2436–7. Your large diagram (Diagram G.) shows for the whole period of the epidemic the attack-rate from small-pox in all classes?—Yes, and in the "vaccinated" and "unvaccinated"; also it shows for all three classes the death-rates.

2438. Do you observe that Nether Hallam shows an attack-rate below the mean of the borough?—Yes.

2439. The district of Nether Hallam, I think, occupies nearly one half of the circle of 4,000 feet radius from the hospital, does it not?—It occupies the north-west segment of the circle.

2440. A segment which approaches very nearly to one half?—It is a quadrant only, I should say, the north-west quadrant.

2441. Is not the area occupied by Nether Hallam considerably greater than a quadrant of a circle?—Yes, perhaps it is rather more. The boundaries are rather irregular. I should say that, perhaps, it is rather more than one quadrant. But taking that altogether you have a more or less sparse population over all that district.

2442. Taking Nether Hallam and Ecclesall together, would you not say that they represented very nearly two thirds of the circle?—In area it will represent two thirds possibly, but certainly not in population; and it is population that is in question, not area.

2443. Do you observe that both Ecclesall and Nether Hallam show attack rates from small-pox below the mean of the borough?—Yes, they certainly are below the mean of the borough.

2444. Sheffield Park, I think, is altogether outside of your area?—It is just outside of the hospital area altogether.

2445. Do you observe that Sheffield Park has an attack-rate above the mean of the borough?—Yes; you have a crowded area in Sheffield Park.

2446. With reference to the other diagram (Diagram H.) which you put in which deals with the case mortality or fatality, could you give us any information as to what proportion of the total cases of small-pox in each of these sub-districts was treated in hospital?—I am afraid I could not give you off-hand the proportions. They did not vary greatly so far as I remember, and I can supply the figures if necessary.

2447. It might possibly have some bearing upon the question of fatality, might it not?—Quite so; I perfectly well see the point.

2448. Referring to Table XCI. on page 173, column 14, can you give us any explanation of the apparently exceptionally high attack-rate of 12·5 amongst the vaccinated children under 10 years of age in South Sheffield?—I am afraid I cannot. That is simply what was found there. I think the numbers as regards general population are rather small in that particular case.

2449. (*Chairman.*) The great discrepancy appears to be in the rate of small-pox attacks amongst the vaccinated in invaded houses. In the general rate amongst vaccinated persons it appears in South Sheffield to be very much the same as in other parts?—Yes.

2450. (*Dr. Collins.*) I should have added in invaded houses?—In invaded houses of course you are dealing with very much smaller numbers, and the rates are not so reliable.

2451. On page 180 you say that "relatively to their "numbers, and apart from influence of age, for each "individual vaccinated person suffering from small-"pox 6·2 unvaccinated persons were attacked by that "disease;" that is in the total population, is it not?—That is in the total census population.

2452. And on page 181, with reference to the invaded houses, you say that "relatively to their numbers, "apart from the question of age, for each individual "vaccinated person suffering from small-pox 3·3 unvac-"cinated persons were attacked by that disease"?—That, again, is at all ages.

2453. So that apparently the ratio showing the immunity is halved by the fact of living in invaded houses?—That is the case, certainly, as regards attack; and as regards immunity from death, the facts are similar, the ratio in the general population of vaccinated to unvaccinated being 1 to 64, whereas in invaded houses the ratio was 1 to 33.

2454. Referring to Table XCVII., on page 185, with reference to the vaccinations performed in the borough of Sheffield during 1878–87, &c., 63 per cent. of all the vaccinations apparently were performed by public vaccinators?—Yes, 63 per cent. were performed by public vaccinators and 37 per cent. by other medical men.

2455. Turning to Table XCIX., on page 187, with reference to the children under 10 years of age who suffered from small-pox after successful vaccination, in columns 14, 15, and 16 you give the per-centages vaccinated by the public vaccinators: (*a*) of the district, (*b*) of other districts of Sheffield, and (*c*) of districts outside Sheffield. Those together make 79·4 per cent. of the total?—I daresay that is the correct figure; I have not added them up.

2456. Turning to Table CIV., on page 198, with reference to the fatal cases of small-pox occurring in the vaccinated class, apparently the total is 246, of which 11 had been re-vaccinated though unsuccessfully, five re-vaccinated during the incubative stage of small-pox, one re-vaccinated successfully not during the incubative stage of small-pox, and the remaining 229 had never been re-vaccinated; that is correct, is it not?—That is correct.

2457. (*Mr. Meadows White.*) In the third column ought it to be "unsuccessfully re-vaccinated"?—It should be "unsuccessfully re-vaccinated." There is a misprint in my report in column 3 of Table CIV.

2458. (*Dr. Collins.*) I observed that, and I read it unsuccessfully re-vaccinated. In fact, not one of the 246 were found to be unvaccinated?—Not one, according to the evidence given by the relatives.

2459. (*Mr. Meadows White.*) This table only gives statistics as to the vaccinated?—Only as to the vaccinated, and they were all vaccinated according to the evidence of the relatives.

2460. (*Dr. Collins.*) I find in columns 12 to 18 that in 13 cases no cicatrices were observable; in 13 cases, one; in 56 cases, two; in 80 cases, three; in 13 cases, four; in one case more than four, and in 70 cases the number was not known; that is correct, is it not?—That is correct; these are persons of all ages, be it remembered.

2461. With regard to Table CV., of 343 persons who constituted the total unvaccinated class, apparently 24 had been vaccinated for the first time during the incubative stage of small-pox; 17 had been unsuccessfully vaccinated, 2 were pronounced insusceptible of vaccination, and the remaining 300 had never been vaccinated?—That is the case.

2462. Can you tell me what number of the 300 were under one year of age?—I think it is stated somewhere, and I believe I can find it. You get the total deaths from small-pox in column 10 of Table CII., on page 192. I see that under one year of age there were 53 deaths from small-pox; but that is I see excluding infants under one month.

2463. So that there were 53 of the 300 who were over one month and under one year of age?—Yes.

2464. (*Chairman.*) Do those numbers cover the same space of time, because Table CV. gives the total deaths for the borough of Sheffield as 343, and Table CII. gives the deaths for the borough of Sheffield at all ages as 563?—The 53 seems to be out of a total of 563 and not out of a total of 300.

(*Mr. Meadows White.*) There are 589 deaths in the two tables together.

(*Witness.*) It is only the unvaccinated class that we are dealing with just now.

(*Sir Edwin Galsworthy.*) Still, in Table CII. there are 320 cases, and in Table CV. there are 343 cases.

(*Mr. Meadows White.*) If you look at column 24 of Table CV. you will see that of children under one month of age there are 22.

2465. (*Chairman.*) They are excluded from the 343, are they not?—Yes, in Table CII. they are excluded, but in Table CV. they are not excluded. That explains it. That, of course, is a summary really of the inspections that are given in Table CV.

2466. Then really Table CV. ought to be reduced to 321 instead of 343?

(*Mr. Meadows White.*) The last column of Table CV. shows that there were 22 under one month of age.

(*Witness.*) Yes, the last column, column 24, gives the number. You want to deduct 22 from your 343, not from your 300.

2467. (*Dr. Collins.*) I want to know what number out of the 300 were under one year of age?—I cannot give you the number out of the 300; I can give you the number out of the 343. That is the total that are included in the unvaccinated deaths.

2468. (*Chairman.*) Out of the 343 I suppose it would be 75?—Exactly so; 53 plus 22.

2469. (*Dr. Collins.*) With regard to the number given in column 18 of Table CV., viz., 36 who were considered by the parents to be too young, was any one of those more than a month old?—A considerable number of them were over a month old.

2470. Are you sure of that?—Certainly. I had only 22 who were under a month.

2471. But were there not a large number who were exactly one month old?—This was the statement of the parents; they stated in those cases that they considered the children to be too young. I give here actual statements of the people.

2472. (*Professor Michael Foster.*) Was it the practice to vaccinate in Sheffield before the expiration of one month after birth?—In a good many cases, if there was small-pox about, they vaccinated them as soon as they were born.

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2473. So that that answer might be given in reference to a child?—That answer might be given perfectly well in speaking of an infant under three months of age in the epidemic period.

2474. (*Dr. Collins.*) Turning to page 202, Table CVIII., were those figures, giving 23 as the number of persons attacked by small-pox who had suffered from small-pox before 1887, of whom 5 died, verified so far as you were able to do so personally?—Yes, every case.

2475. So that the mortality, although the figures are small, from second attacks of small-pox was something near 20 per cent.?—About 20 per cent.

2476. On page 204, diagram XIX., referring to the epidemics of 1857–58, 1863–64, 1868–69, 1871–72, has reference, I apprehend, to all fatal cases whether vaccinated or unvaccinated, has it not?—Yes; in fact, all the first part of the diagram, the portion marked (*a*). There are a few deaths, as I have stated in a footnote, page 203, missed out of the diagram for 1871–72. I omitted them from the epidemic period; I did not go over the register twice. I found, later, I had missed out about 40 deaths altogether in the earlier and later periods, but I do not suppose that would make any difference in the ratio of the figures.

2477. Turning back to Table CIX., on the previous page, do you observe that while the share of the mortality borne by children under 10 years of age, speaking of both vaccinated and unvaccinated, in the epidemics of 1857–58, 1863–64, and 1868–69 was 85, 86, and 84 respectively, the share of the children under 10 years of age in the case of the unvaccinated in the epidemic of 1887–88 was only 44?—Exactly so; of the total unvaccinated deaths, 44 per cent. were at ages 0–10 years.

2478. That being the case, do you think it would be just to say that the only reasonable explanation of the shifting of the age incidence of mortality in small-pox is vaccination?—I should say that the shifting of age incidence in the unvaccinated is probably due to vaccination, if not directly yet, at any rate indirectly, by the protection that vaccination would afford to the unvaccinated by preventing, or at least deterring, small-pox from becoming epidemic in the district; because vaccination does in this way enable a good many unvaccinated persons to attain adult life without getting exposed to small-pox at all. Then again, in Sheffield, you have a town where there had been a large amount of adult immigration from the country. In rural Yorkshire we have had no small-pox to any extent for a very considerable number of years. You would have therefore a number of these immigrants,—many of these persons liable to small-pox,—coming into the district and dwelling there without being exposed to any chance of small-pox until this epidemic.

2479. Those reasons collectively would, to your mind, satisfactorily explain the reduction of the unvaccinated children's share of the mortality from something like 84 per cent. to 44 per cent.?—Yes, I think so. You have, of course, to bear in mind a reduction in the pro. portion of unvaccinated persons under 10 years of age actually living in the district during 1887–88 compared with the proportion that existed during previous epidemics as a result of increased extension of infant vaccination.

2480. Was not the unvaccinated population at the period of the epidemic relatively a younger population than the vaccinated? You will observe in column 4 of Table XC., on page 170, that of 5,715 unvaccinated persons, 2,259 were under 10 years of age, that is to say, about 40 per cent.; whereas of the vaccinated out of 268,397, 68,236 were under 10 years of age?—In comparing them you would assume that they were all equally exposed.

2481. I am only asking you to answer this question first: was it, or was it not, the fact that the unvaccinated population was relatively younger than the vaccinated population at the time of the vaccination census in February and March 1888?—There were numerically fewer under 10 years of age who were unvaccinated than there were over 10 years of age.

2482. Were there not proportionately to the total number more of the unvaccinated under 10 years of age than of the vaccinated?—No, you have only 2,259 under 10 years of age to 3,429 over 10 years of age.

2483. Is not 2,259 a larger proportion of 5,715 than 68,236 is of 268,397?—That is to population, as I have already said.

2484. I am taking vaccinated and unvaccinated population?—I am afraid I have misunderstood your point. What I thought you were asking me was, whether taking the two figures, 2,259 and 3,429, the proportion was larger under or over 10 years of age. Of course, the proportion between 2,259 and 68,236 is higher than the proportion of 3,429 to 196,905.

2485. Is it not correct to say that, according to the vaccination census, practically 40 per cent. of the unvaccinated were under 10 years of age, and about 25 per cent. of the vaccinated were under 10 years of age?—No doubt it is a statistical fact.

2486. Did I understand you to give, as the explanation of the reduction of the unvaccinated children's share of the mortality from small-pox, the fact that Sheffield being better vaccinated there was less liability of children to take the small-pox?—That Sheffield being better vaccinated, the population was less liable to small-pox.

2487. Surely these figures only refer to a period when small-pox is prevalent?—When small-pox is prevalent?

2488. They show, do they not, that of a given hundred deaths now-a-days in the unvaccinated 44 are under 10 years of age and 56 are over 10 years of age?—Yes, that is in the unvaccinated.

2489. Whereas in both classes together in 1868–69, 84 per cent. were under 10 years of age and 16 per cent. were over 10 years of age?—Yes.

2490. Do you think that the sole explanation of that change is vaccination?—The sole explanation of that change is comprised in the two reasons that I gave you—vaccination directly and vaccination indirectly.

2491. On page 205 you give the attack-rate amongst the troops as 1·4 per cent. of the total strength, and the death-rate as 0·12 per cent.; and on page 169, I think, you give the attack-rate amongst the total population as 1·7 per cent. and the death-rate as 0·17 per cent., do you not?—Yes. Of course those two are scarcely comparable, because you are dealing with such small figures in the one case and such large figures in the other.

2492. At any rate, the figures do not show a materially less attack-rate and death-rate in the troops than in the general population at all ages?—Not on the comparison you have made; but you are dealing with 12 attacks and one death, which are extremely small figures to deal with.

2493. Taking the case of the police, 372 men, 10 of whom contracted small-pox; that would give an attack-rate of about 2·7 per cent., would it not?—I daresay it would. There again, of course, you are dealing with very small numbers and with men who were especially exposed to infection.

2494. On page 206 it appears that the per-centage of attack amongst the attendants at the small-pox hospital was 9·7 I see. Was that so?—No; that is out of 62 who had been vaccinated in infancy only. That is not out of the total attendants. The total number of attendants was a good many more than that. Out of 62 persons, who formed 38·5 per cent. of the whole, and who had been vaccinated in infancy only, 6, or 9·7 per cent., contracted small-pox, five of the cases were slight and the other was fatal.

2495. Can you give us the per-centage of attacks of the whole?—It is 3·7.

2496. Apparently in the Sheffield workhouse hospital and the Ecclesall Bierlow workhouse hospital the re-vaccination of the attendants was much neglected?—It had been neglected in certain cases.

2497. Out of 48 attendants at the Sheffield workhouse hospital only five had been re-vaccinated?—Only five; none of whom suffered small-pox.

2498. And five who had been once vaccinated took small-pox?—That was the case; five out of forty-three.

2499. And at the Ecclesall Bierlow workhouse hospital out of 21 attendants two only had been re-vaccinated?—Yes, and neither of them were attacked.

2500. And one of the other 19 contracted small-pox?—Yes.

2501. Table CXII., on page 207, broadly shows, does it not, that from 70 to 80 per cent. of the unvaccinated cases of small-pox treated in hospital were confluent and only 20 to 30 per cent. of the vaccinated cases

were confluent?—The actual numbers vary of course in the different hospitals. In the Winter Street Hospital, where the largest numbers were, attack was confluent in 14 per cent. of the vaccinated and in about 80 per cent. of the unvaccinated.

2502. In diagram XX., which I think is one which you handed in, the last square represents the per-centage of confluent cases occurring in the unvaccinated in the Ecclesall Bierlow workhouse hospital?—Yes, that is opposite page 208.

2503. That refers only to 20 cases, I believe, does it not?—I know it refers to a small number, but I guarded against drawing any decided inference from very small numbers. In the instance in question, of the 20 unvaccinated attacks, 19 were of the confluent class.

2504. On page 218 and the following pages you give us the sanitary condition of Sheffield, and I observe that you speak of North Sheffield as the most densely and uniformly populated area within the borough, and you say that many of the houses there are old, badly built, dark, and hardly fit for habitation. I think you said that North Sheffield, West Sheffield, and Sheffield Park were the worst districts as regards the nuisance arising from middens?—Taking the whole four sub-districts of old Sheffield, including South Sheffield, that would apply.

2505. Considering the many defects in sanitation which you have pointed out, do you not think that it is speaking rather euphuistically to say that the town is "not without its faults"?—It had a great many faults I acknowledge, though it was very much improved compared with what it had been previously.

2506. You have told us with reference to the water supply that you consider that that was satisfactory?—The water supply was satisfactory with one exception, there was some lead poisoning.

2507. But as regards quantity do you consider that 14 gallons per head for domestic purposes is an adequate supply?—Well, 14 gallons is not the amount that one would wish to see everybody have.

2508. Can you tell me what is the amount usually laid down by sanitarians as an adequate supply?—I cannot off-hand, but considering that they have no waterclosets I should not say that 14 gallons per head was much below the quantity required. You must remember that waterclosets are extremely few in Sheffield, that you are dealing with a so-called dry-closet town.

2509. Taking into consideration the peculiarities as regard the midden system, do you think that 14 gallons per head would be an adequate quantity?—Yes, 14 gallons of water per head over the town would perhaps suffice I think considering that, as I have already stated, they have not waterclosets.

2510. On page 228 I observe you call attention to the fact of there having been a noticeable diminution in the mortality from small-pox since 1871, and from "fever" and diarrhœa since 1876; could you give us the figures for fever and small-pox respectively for the three periods 1861–69, 1870–78, 1879–87?—I think it is in Table CXXX., on page 249. Those are the death-rates; they are not the gross figures.

2511. Would you kindly read the death-rates from small-pox and fever respectively for the periods 1861–69, 1870–78, and 1879–87 for the borough of Sheffield?—For 1861–69 the death-rate from small-pox was ·64; for 1870–78 it was ·45; and for 1879–87 it was ·12. The death-rate from fever for 1861–69 was 1·20; for 1870–78 it was ·92; and for 1879–87 it was ·31.

2512. And I think the correspondence is tolerably complete, is it not, as regards those two death-rates in each of the sub-districts for the same three periods?—Speaking generally, you may say so, I think.

2513. I observe at the foot of page 250, referring to fever, you say: "The relative proportion in the decrease "in each consecutive period bears a very close "resemblance to those which obtained in the case of "small-pox"?—Yes, that is at all ages, of course.

2514. On page 254, referring to diagram XXXVII., you say: "The conclusions to which a consideration of "the above figures would seem to point are: (1) that "as regards the whole period of 27 years, rates "of mortality from small-pox have been in excess of "that of the borough in those sub-districts of Sheffield, "in which conditions of overcrowding and general "unwholesomeness have been most pronounced; and "(2) that as regards the three several periods of nine "years, there has been a similar excess above the rate "of the borough, of small-pox death-rates, in districts "of pronounced unwholesomeness during the two "periods 1861–69 and 1870–78, whilst in the third "period, 1879–87, correspondence of excess of small-"pox with exceptional unwholesomeness has been "much less conspicuous." Apparently in diagram XXXVII., the want of correspondence between small-pox excess and total mortality excess is to be found notably in Sheffield Park and South Sheffield?—In Sheffield Park and South Sheffield for the period 1879–87, and in Brightside.

2515. That diagram deals with the figures only up to the end of 1887, does it not?—That is all; it does not deal with them up to the end of the epidemic.

2516. But diagram XXXVIII. does deal with them up to the end of the epidemic, does it not?—That takes them up to the 31st of March 1888.

2517. Do you observe there that Sheffield Park and South Sheffield, which did not show a correspondent excess in the previous diagram, do show it in this case?—They do show an excess. Brightside has not, you will see, got up to it.

2518. Brightside was the next in order, I think, after those that show the excess?—It comes the next, and Attercliffe is almost the same as Brightside in 1887–88.

2519. So that if a comparison were instituted between total mortality and small-pox mortality up to the end of March 1888 the correspondence is fairly complete as between those districts which have high general mortality and those which have high small-pox mortality?—Yes, I should expect to find that such would be the case, taking the whole epidemic, because those are the districts in which you have the most crowding together and the greatest opportunity for spread of zymotic disease, such as scarlet fever or small-pox or measles. The object of giving them separately was to show to what extent the early incidence differed.

2520. The footnote on page 257 I observe adds: "As "regards the distribution of the epidemic after March "31st, 1888, until its cessation in August, the medical "officer of health of Sheffield informs me that small-"pox prevailed mainly in the sub-districts which had "been the last to suffer severely before March 31st; "that there was a slight recrudescence in a part "of Ecclesall where small-pox had previously been "severe; and that stray cases occurred during this "period pretty impartially about the borough"?—I have not the figures; I cannot speak further than from the note there.

2521. On page 255, Table CXXXIII., in column 5, "Ratio of sub-district small-pox death-rates to borough "rate; latter = 100," you show that in Nether Hallam and in Ecclesall there was a relative deficiency of 26 and 39 per cent. respectively?—That is correct.

2522. Whereas Nether Hallam and Ecclesall constituted nearly three fourths, or at any rate two thirds, did they not, of the 4,000 feet circle?—As regards area, yes; but not as regards population. Of course in Ecclesall and Nether Hallam you would not expect to get the same per-centage, because they are in great part suburban and are sparsely populated compared with the districts of the Sheffield township. Moreover, they were early and extensively re-vaccinated.

2523. But taking the whole period of the epidemic you do not find an excessive mortality from small-pox in Ecclesall, which you have described as the "west end" of Sheffield, and Nether Hallam, which you describe as being largely a villa neighbourhood, although they occupied a very large area of the 4,000 feet circle round the hospital?—You do not find an excessive death-rate in those districts, taking the whole epidemic; as I have said they are largely suburban.

2524. (*Chairman.*) Can you state from any source what proportion of the population within the 4,000 feet would be in Nether Hallam and Ecclesall?—I am afraid I cannot give that separately. I tried to get it separately, in fact in four quadrants, but I could not obtain the figures.

2525. (*Mr. Picton.*) But it is the fact, is it not, that the most built over districts of Ecclesall and Nether Hallam lie within the 4,000 feet radius?—A portion of Ecclesall does but not Nether Hallam. The most thickly populated part of Nether Hallam is that part going up towards Hillsborough and the barracks.

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2526. (*Dr. Collins.*) The tables on page 258 and the following pages show for the borough of Sheffield the incidence of fatal small-pox and other diseases at different ages during two periods of 10 years. The second period is from 1876 to 1883 inclusive, and the years 1886 and 1887, is it not?—That is so.

2527. During the whole of that period you will observe that out of 287 deaths from small-pox, 278 occurred in the last year only?—Exactly.

2528. If you compare Table CXL., which gives the age incidence of fatal "fever," with Table CXXXV., do you notice that taking the last year 1887 in the case of fatal "fever" the share of children under 10 years of age has fallen to 17 per cent. as against 40 per cent. in the period from 1861 to 1870, and 47 per cent. in the year 1861?—In that particular year it has fallen to 17, and in 1881 it was as low as 19, but taking the whole period it is 31.

2529. But does not the table for small-pox deal with that particular year 1887?—Yes; as to small-pox there was no small-pox to speak of in the earlier years. I should have been ready to deal with it for a larger number of years if I had had the cases.

2530. Would not the comparison be statistically fairer between the last years?—No, I think not. You are dealing with much larger numbers in the case of small-pox than in the case of fever.

2531. You will observe that there is no fatal attack of fever under two years of age in 1887?—There was no fatal attack of fever under the age of two in that year.

2532. Does not the table of fever show a shifting of the age-incidence of fatality in the same direction, though not to the same degree, as in the case of small-pox?—Yes; but that is to be explained, at any rate to a considerable extent, by the improved diagnosis of children's diseases attended by fever. In the early period I have included in these tables the deaths from fever as they appeared in the registers, and they comprised a considerable amount of infantile remittent fever; but infantile remittent fever is not included in the second set of tables.

2533. Do I correctly understand that infantile remittent fever is included in the 10 years 1861-70?—It is included in 1861-70 but it is not included in 1876-87.

2534. Is that classification special to Sheffield, or is it the same in the Registrar-General's figures?—I believe that in the Registrar-General's figures generally it is included in that way.

2535. I find on page 52 of the 50th Annual Report of the Registrar-General for 1888 a statement that, "Deaths of children under five years of age from "remittent fever from 1869 to 1880 are included with "enteric fever"?—Those are the Registrar-General's figures. These are not the Registrar-General's figures that I am dealing with, these are special. I cannot say anything with regard to the Registrar-Generals' figures. I did not understand your question. These figures are figures taken from the local registers that are in Sheffield, not from the Registrar-General's reports at all.

2536. Are they not the same figures that are furnished to the Registrar-General's Office?—The figures are not furnished to the Registrar-General, but copies of the entries in the death registers. These figures were actually taken from the registers in Sheffield.

2537. Do I correctly understand that you have satisfied yourself that the deaths from infantile remittent fever under 5 years of age are included in each one of the years from 1861 to 1870?—I could not answer that question straight off as to 1870. I know they are included in the whole period from 1861 to 1869.

2538. Have you satisfied yourself that the deaths from infantile remittent fever were excluded in each of the years from 1876?—I believe they are excluded in every year from 1876 to 1887.

2539. I think you were able to trace the commencement of the epidemic in Sheffield to, at any rate, two cases, beyond which you were not able to go?—Yes; I could not discover a source of infection antecedent to those cases.

2540. Both of those cases were vaccinated, I think?—Both the first cases were very mild small-pox in vaccinated persons.

2541. Could you give me in order the small-pox death-rate per thousand living, during the whole period in each of the sub-districts in the present epidemic?—That is given on page 7, I think, in the last column of Table III. West Sheffield, 4·56, is the highest; then the next one is North Sheffield, 3·57; the next is South Sheffield, 2·10; the next is Sheffield Park, 2·05; the next is Brightside, 1·60; the next is Attercliffe, 1·58; the next is Nether Hallam, 1·37; then Ecclesall, 1·13; and then Upper Hallam, 0·35.

2542. Now, would you give me the death-rate per thousand from all causes for 1879-87 from page 249, giving the sub-districts in the order of highest mortality downwards?—For the last period North Sheffield, 22·7, is the highest; then West Sheffield, 22·6; South Sheffield, 21·9; Sheffield Park, 21·8; Brightside, 20·1; Attercliffe, 18·8; Ecclesall and Nether Hallam together, 17·8; and Upper Hallam, 13·5.

2543. Now, would you give me the deaths per thousand from general infectious diseases on the same page, including small-pox, measles, scarlet fever, diphtheria, whooping cough, fever, and diarrhœa, beginning at the highest and going down to the lowest?—That begins with North Sheffield again at 5·25; West Sheffield, 4·20; Sheffield Park, 4·18; South Sheffield, 3·68; Brightside, 3·64; Nether Hallam, 3·09; Attercliffe, 2·99, Ecclesall, 2·79; and Upper Hallam, 1·69.

2544. Now, will you kindly give me the deaths under one year of age per thousand births from 1879 to 1887, beginning with the highest rate, and going down in order for each sub-district?—There you begin again with North Sheffield, 193; South Sheffield, 181; West Sheffield, 177; Sheffield Park, 176; Attercliffe, 175; Brightside, 165; Ecclesall, 149; Nether Hallam, 148; and Upper Hallam, 99.

2545. I think you told us that in many of the older parts of the township of Sheffield a large proportion of the dwellings were what are called back-to-back houses?—That is the case.

2546. I think you have investigated the subject of back-to-back houses in Yorkshire and other parts, have you not?—I have made inquiry with regard to back-to-back houses.

2547. In those portions of towns in which the back-to-back houses are relatively in excess, do you find a proportionate increase of certain diseases?—I did in the one town in which I specially investigated this point. I have only figures as to one town, Salford. Of course it is imperfect to this extent, namely, that I have not verified it by the experience of other towns.

2548. Could you give us the result of your investigations in Salford?—I could not give it without reference to my notes. The general result was that I found, so far as Salford was concerned, that there was an increased general death-rate, and an increased death-rate from zymotic diseases in houses without through ventilation.

2549. I find from your report that in the Greengate sub-district of Salford, of which you made four classes, one district having no back-to-back houses, the next 23 per cent. of back-to-back houses, the next 56 per cent. of back-to-back houses, and the worst 100 per cent. of back-to-back houses, you found that the mortality from general infectious diseases increased from 4·5 in the first, to 4·8 in the second, to 6·2 in the third, and to 8·7 in the fourth, per thousand of the population?—I have no doubt that that is perfectly correct.

2550. You told us that it was impossible in these back-to-back houses to get through ventilation?—You cannot get through ventilation in a back-to-back house.

2551. (*Sir Edwin Galsworthy.*) What do you mean by a back-to-back house?—Where the back party-wall is common to two houses.

2552. (*Dr. Collins.*) Is not the building of such houses forbidden under the model byelaws of the Local Government Board?—It is in effect forbidden under the model byelaws.

2553. I think you told us, in answer to Mr. Picton, that you considered that sanitary measures would have some effect as regards the spread and mortality from small-pox?—I have no proof that they have any effect, but I should suppose from what I know of other diseases that sanitary measures certainly have some effect upon small-pox; for instance, to the extent that they influence scarlet fever or measles.

2554. In what way do you suppose that effect would show itself? — There are many things included in sanitary measures. If you take crowding together of houses and crowding of people in houses unprovided with through ventilation, you have, of course, very much more probability of spread by direct infection. Then with regard to spread from midden privies and matters of that kind, if you have infected materials thrown into those middens and thus stored up in the neighbourhood of dwellings, I should say that there is a probability of thus helping the spread of disease.

2555. You would not agree with the opinion that sanitation has nothing whatever to do with the spread of small-pox?—Will you tell me exactly what you mean by sanitation? I say that the particular unwholesome conditions I have referred to have to do with the spread of small-pox exactly in the same way as they have to do with the spread of some other infectious diseases.

2556. Do you consider that the circumstances which govern the spread of fever do not govern the spread of small-pox?—Some circumstances govern the spread of fever much as they govern the spread of small-pox. For instance, if you have typhus fever in one of these back-to-back houses, you will very soon have many persons in the houses stricken with typhus fever.

2557. (*Chairman.*) You say that some of the circumstances which govern the spread of fever govern the spread of small-pox, and some do not, I suppose?—Some do and some do not.

2558. (*Dr. Collins.*) I notice that at the end of the information which concerns each sub-district you give in a diagrammatic form the order in which the fatal cases of small-pox occur in certain epidemics?—Yes, simply as the entries occurred in the registers.

2559. On page 160, for example?—Page 160 gives one sub-district.

2560. The figures given in thick type are unvaccinated fatal small-pox cases, are they not?—No, I do not profess to distinguish vaccinated from unvaccinated in those. They are there distinguished, only in so far as they have been distinguished in the registers.

2561. You say: "In the following statement, the "age of each consecutive fatal case registered during "each of the last four epidemics is given; those stated "to be unvaccinated in the register being distinguished "by thick type?"—"Those stated to be unvaccinated "in the register." A very small number are actually stated in the registers to be either the one or the other.

2562. Have you looked through the order of the figures in each epidemic to ascertain whether in any case the first person was stated to be unvaccinated?—The figures with regard to the vaccinated and unvaccinated there are entirely untrustworthy, because they are given in very few instances. I only put them in this form to show the small number of cases in which there was a statement at all. There is no statement as to whether they are vaccinated; there is a statement as to when they are unvaccinated occurring in the registers, and that is entered in such registers. In some registers in some years it did not occur at all, and had been omitted from the abstracts that had been made of the registers. I think that refers to one particular period, and you will find it stated so. For 1863 and 1864 there were no entries at all of either vaccinated or unvaccinated.

2563. You do not attach much importance to those figures?—No, they are simply there for the purposes of verifying my own figures in the order in which I took them out of the registers.

2564. Do you think that the results of your vaccination census and investigation at Sheffield would lead you to agree with the opinion that vaccination is as protective against small-pox as small-pox itself?—In the figures given on page 202 I see that the per-centage of previous attacks of small-pox in Sheffield was ·13; and on page 169 I see that the attack-rate in those who had been once vaccinated was 1·5. Consequently, irrespective of considerations of age, a previous attack of small-pox, according to the experience of Sheffield, gives more protection than a single vaccination.

2565. Then the protection is 10 times greater apparently in cases of previous small-pox?—It appears to have been so in Sheffield.

2566. (*Sir James Paget.*) I suppose the persons who had had small-pox before were all over 10 years of age, and many of them were 20, 30, or 40 years of age?—There were a few under 10 years of age, but comparatively very few.

2567. (*Chairman.*) Have you any means of saying whether the proportion of the 18,292 who had previously had small-pox were at the time of the epidemic nearer the time of their attack of small-pox than the vaccinated class were to their vaccination? The vaccinated class would all of them be vaccinated in infancy?—Exactly.

2568. The small-pox class would probably, many of them, be adults at the time when they had small-pox?—I think, speaking from memory, that most of the cases I refer to had had their previous attack of small-pox in infancy.

2569. (*Dr. Bristowe.*) Do you know at all how many of those who had small-pox had been vaccinated also?—No, I have not those figures.

2570. I suppose it is possible that a great many of those 18,292 were vaccinated and had the double protection?—Of the 18,292 a certain number had been vaccinated.

2571. (*Dr. Collins.*) Does the experience of Sheffield lead you to the opinion that primary vaccination forms an almost absolute protection against fatal small-pox?—Primary infantile vaccination affords to persons under 10 years of age almost complete immunity from fatal small-pox.

2572. Your vaccination census gave six deaths, I think, only in the vaccinated class under 10 years of age?—Only six deaths. It gave a death-rate of ·009 under 10 years of age in the vaccinated as against 4·4 in the unvaccinated.

2573. Apparently, although there was no death in the vaccinated class, in your vaccination census under one year of age you record 11 cases of attack?—That is in Table XC., page 170; yes, I record 11 cases there.

2574. Amongst those cases of small-pox which terminated fatally in the vaccinated did you find in any such marks of primary vaccination as would be classed in the first standard according to the inspections by the Local Government Board?—I did not see any fatal cases. My inquiry took place after they were dead. The information that I took was simply as to number of vaccination scars. I could not accept the evidence of the parents as to the quality of the vaccination; I simply took it as to the number of marks the patients had on their arms.

2575. (*Chairman.*) What were the data from which you gathered that most of those 18,292 had had small-pox in infancy?—Not the 18,292; I thought your Lordship meant the 23 second attacks. I cannot give the proportion of the 18,292.

2576. I observe that even of the 23 there are only four or five as to whom age is specified, and two aged 35 and 20 respectively had had small-pox in 1865 and 1872, so that one would be 12 years of age and the other four years of age at the time of the former attack. Then another person aged 44 had it in 1870, so that that person would be 25 years of age at the time of the former attack. The only other person mentioned would have been an infant. Those are the only persons whose ages are mentioned out of the 23?—The ages are given exactly for every one of those 23 in the accounts for the sub-districts, and the date of the previous attack is also given.

2577. On what page?—On each of the pages referring to the sub-districts; there is no general table. If you take Brightside, for instance, there were seven cases there. Those are given on page 52, beginning with Alfred G. on the top of the page. When I said that they had had small-pox in infancy I was speaking purely from memory.

2578. (*Dr. Collins.*) Referring to page 170, I think your vaccination census showed 353 cases of small-pox in the vaccinated under 10 years of age?—353, for the most part very mild attacks in the vaccinated class.

2579. All of these, I understand you, except the fatal ones, you personally inspected?—And except also a few that had removed several times; they are included in these numbers.

2580. Did you find upon the arms of any of those such marks as would come within what is described as the first standard?—Yes, certainly; there is an abstract given of the numbers on page 187 at the bottom of the page.

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2581. Will you read it?—"Of the 358 children "vaccinated by public vaccinators, 15, or 4·2 per "cent., had either no visible cicatrix or one cicatrix "only; 36, or 10 per cent., had two cicatrices; 110, "or 30·7 per cent., but three cicatrices; and 197, or "55·1 per cent., had four or more cicatrices. Of the "90 children in whom the operation had been per-"formed by private vaccinators 22, or 24·4 per cent., "had no visible cicatrix or one cicatrix only; 39, or "43·4 per cent., had two cicatrices; 26, or 28·9 per "cent., had three cicatrices; and 3, or 3·3 per cent., "only had four cicatrices. The three children in "whose case the vaccinator could not be identified "had each three cicatrices. Of the 37 children under "10 years of age in whom there was no visible vacci-"nation cicatrix or one cicatrix only (the 37 was made "up of 8 with no visible mark and 29 with one mark. "In the 8 were comprised 5, and in the 29 were com-"prised 4 of the severe cases), in 28, or 75·7 per cent., "the attack of small-pox was stated to have been mild, "but in three of these there was some subsequent "pitting, whilst in 9, or 24·3 per cent., the attack was "severe, and in 6 cases was followed by pitting. Of "the 75 children in whom there were two vaccination "cicatrices, in 66, or 88 per cent., the attack of small-"pox was stated to have been mild, but in three of "these there was some subsequent pitting, and in 9, "or 12 per cent., the attack was severe, and in 2 cases "was followed by pitting, whilst in 3, aged respec-"tively 7, 7, and 8 years, the attack proved fatal. "Of the 139 children in whom there were three vacci-"nation cicatrices, in 132, or 95 per cent., the attack "of small-pox was stated to have been mild, but in 2 "only was there any subsequent pitting, and in 7, or "5 per cent., the attack was severe, and in 2 cases "was followed by pitting, whilst in 3 cases, aged "respectively 3, 5, and 8 years, the attack proved fatal. "Of the 200 children in whom there were four or more "vaccination cicatrices, in 195, or 97·5 per cent., the "attack of small-pox was stated to have been mild, "though in 4 of these there was some subsequent "pitting, in 5, or 2·5 per cent., the attack was severe, "and in 2 cases it was followed by pitting, whilst in 1 "child, aged 6 years, the attack proved fatal."

2582. On page 179, at the foot, I read "the con-"flict between vaccination and small-pox in Sheffield, "as a whole, has been of necessity a complex affair, so "that it is open to anyone to contend that whereas "unvaccinated persons have been generally and "specially exposed there to the infection of small-pox "large groups of vaccinated persons have wholly "escaped such exposure." Will you explain the meaning of that?—The meaning is simply to guard against the contention that the unvaccinated were especially exposed to infection. I do not say they were exposed, or were not so, it is to meet the contention that they were especially exposed; it is open to any-body to contend that. I do not believe for a moment that the unvaccinated were more exposed than the vaccinated.

2583. Why do you think it is open to anyone to contend that?—There are many things open to people to contend.

2584. I think at our last sitting you told me that you would give me the per-centage of the total cases of small-pox occurring in each district which were vaccinated?—Not in each district. What you asked for was the per-centage of cases in the vaccinated and the unvaccinated. I said that in giving you those figures I proposed to add some other figures. The first-named figures alone would not be of much value. The addi-tional figures have reference to the proportion of the population vaccinated and unvaccinated, and also to the proportion of deaths in the two classes.

2585. Upon what figures would that proportion of population be based?—The proportion would be based on the census population.

2586. You told me that the vaccinated population had been largely recruited before the period of the census and the unvaccinated population had been con-siderably diminished?—I did not say "before the census;" I said that up to the end of the epidemic the vaccinated population had been increased—not largely increased—not comparatively largely increased—but that the unvaccinated population had been relatively to their original numbers considerably decreased. In the one case you are dealing with small figures, and in the other case you are dealing with large figures.

2587. Did I rightly understand you to say that there were 8,601 persons primarily vaccinated during the period of the epidemic?—Yes.

2588. Whereas the total unvaccinated population found at the conclusion of your census was 5,715?—Yes.

2589. So that the total number of the population primarily vaccinated, and, therefore, transferred from the unvaccinated to the vaccinated population during the period of the epidemic, was larger than the total unvaccinated population found at the end of your census?—No, because you are not considering the births taking place in the year; there would be 10,000 births occurring in the year, and, as matter of fact, of the 10,000 children born year by year in the town, some 9,000 at least are vaccinated in ordinary routine fashion week by week throughout the year.

2590. Were not all persons included in your census?—All persons were included, certainly. The transfer would be going on from day to day; it would take place naturally; it is not that a large special transfer took place suddenly in that particular year. If you will allow me, I will read these figures giving the proportion of unvaccinated and vaccinated attacks for which you asked, and of unvaccinated and vaccinated deaths at all ages, and also at the two age periods of under 10 years of age and over, 10 years of age which I add on my own account. On the census data at all ages the total attacks were 4,703; of those 4,151, or 88·3 per cent., were vaccinated, and 552, or 11·7 per cent., were unvaccinated. The deaths at all ages were 474, of which 200, or 42·2 per cent., were in the vaccinated, and 274, or 57·8 per cent., in the un-vaccinated. Under 10 years of age the attacks were 581; of these 353, or 60·8 per cent., were in the vaccinated, as against 228, or 39·2 per cent., in the unvaccinated. The deaths at ages under 10 were 106, of which 6, or 5·6 per cent., were in the vaccinated, and 100, or 94·4 per cent., in the unvaccinated. Over 10 years of age there were 4,096 attacks, of which 3,774, or 92·2 per cent., were in the vaccinated, and 322, or 7·8 per cent., in the unvaccinated. The deaths over 10 years of age were 368, of which 194, or 52·7 per cent., were in the vaccinated, as against 174, or 47·3 per cent., in the unvaccinated. Similarly, accord-ing to the health office data, taking the whole of the epidemic to the 31st March 1888, the total attacks were 6,023, of which 4,995, or 83 per cent., were in the vacci-nated, as against 1,028, or 17 per cent., in the unvacci-nated; that is at all ages. The total deaths were 563, of which 243, or 43·2 per cent., were in the vaccinated, and 320, or 56·8 per cent., in the unvaccinated. Under 10 years of age, during the whole epidemic, the total attacks were 740, of which 338, or 45·7 per cent., were in the vaccinated, as against 402, or 56·8 per cent., in the unvaccinated. The deaths under 10 years of age were 137, of which 7, or 5·1 per cent., were in the vaccinated, and 130, or 94·9 per cent., were in the unvaccinated. Over 10 years of age the total number of attacks were 5,267, of which 4,642, or 88·2 per cent., were in the vaccinated, and 625, or 11·8 per cent., in the unvaccinated. The deaths over 10 years of age were 426, of which 236, or 55·4 per cent., were in the vaccinated, and 190, or 44·6 per cent., in the unvacci-nated. Irrespective of faults of the census, even when the small-pox began to be prevalent in the summer of 1887, not less than 95 per cent. of the population was vaccinated against 5 per cent. unvaccinated; and before the great burst of the epidemic in the following winter the population had been considerably altered by the diminution of the unvaccinated. In just the same way the 5,715 persons found unvaccinated at the census had many of them by the end of the epidemic been trans-ferred to the vaccinated class.

2591. Would not it be a just criticism upon the returns as shown by the vaccination census to say that while the attacks and deaths in the unvaccinated were assessed upon a continually diminishing popula-tion the attacks and deaths in the vaccinated were assessed upon a continually increasing population?—Yes, I think it would be a fair criticism to a certain extent. It does not make any particular difference as far as the vaccinated are concerned. The addition of even 10,000 to the vaccinated does not make any appreciable difference in the per-centage rates, though a transfer of 1,000 from the unvaccinated would make a considerable difference to the latter class. But even if we regard the difference, up to the date of the census, between the number of customary infantile vaccinations and the total primary vaccinations actually performed, as some 6,000

or 7,000; and subtract some such figure from the vaccinated class and add it to the 5,715 persons found unvaccinated at the date of the census, the effect would of course be to double the number of unvaccinated persons, and thereby to halve the rates in that class without materially altering the rates among the vaccinated. That, however, would still leave you an enormous difference between the unvaccinated and the vaccinated attack rates and death-rates.

2592. Have you worked that out?—I am prepared to show you by actual figures what the effect would be.

2593. Have not you already told me that there were 8,601 primary vaccinations by public vaccinators alone?—Yes; but I gave you as well an estimate of the total excess. As I have said, you have to bear in mind that there are children being born throughout the whole period.

2594. Still 8,601 at least were transferred from the unvaccinated to the vaccinated population?—No; there would be 10,000 children born during that period, the vaccination of some 9,000 of whom would constitute a constant quantity.

2595. (*Mr. Picton.*) Do you say that none of those born and unvaccinated at the beginning of the epidemic were vaccinated before the census?—Certainly they were. They go to form the constant I have spoken of, and would tend to preserve the normal proportions of the vaccinated and unvaccinated in the general population. The excess of vaccinations during that year was, according to my estimate, something like 2,800.

2596. (*Dr. Collins.*) Your figures only relate to public vaccinations?—I have already given you an estimate as to both public and private vaccinations. In the public vaccinations there is an excess of 2,848, and suppose the private vaccinators were vaccinating in their usual proportion the total excess would be, perhaps, 4,500 to the end of the epidemic on the whole population.

2597. (*Mr. Picton.*) Would not that reduce what may be called the healthy unvaccinated class?—I have already said that it would reduce the unvaccinated class.

2598. The point is, of course, that it appears to be an unfair thing to institute a comparison at the end or towards the end of the epidemic between the vaccinated and the unvaccinated, seeing that an unusual number of people had been vaccinated during that year. The idea is that there was a certain proportion of unvaccinated people over one month at the beginning of the epidemic who were afterwards transferred into the vaccinated class?—Yes, I grant that at once. You have a transfer consisting of the quantity that is constant year by year, and of an additional number about which we are not agreed, which constitutes the special transfer of 1887–88. But the transfer would not be effected—would only be in progress—at the date of the census. In what I am about to give you now, I am going, experimentally, to double the unvaccinated, thereby making the total of that class probably in excess of the number actually obtaining even at the commencement of the small-pox, and much in excess of the number obtaining at the date of the epidemic outburst.

2599. (*Dr. Collins.*) It would be entirely problematical?—Yes, problematical. I am, experimentally, making an addition to the unvaccinated class which would, I believe, be far in excess of the actual number transferred from it by vaccination during the whole epidemic. I will assume for the moment that the unvaccinated were, when most exposed to small-pox, twice as numerous as they were found at the census. Upon this hypothesis the ratio as to attack rates and death rates of vaccinated to unvaccinated would be:—At ages 0 to 10 years, attack 1 to 10, death 1 to 240; instead of 1 to 20 and 1 to 480 respectively as at the census. At ages over 10 years, attack 1 to 2¼, death 1 to 25½; instead of 1 to 5 and 1 to 51 respectively as at the census. And at all ages, attacks would be 1 to 3 instead of 1 to 6; and deaths 1 to 32 instead of 1 to 64 as at the census. This indicates sufficiently the direction of change of ratio effected by one and another amplification of the unvaccinated class.

2600. Do I understand that the table you have given making the allowance appears in the report?—By summarising the two tables on pages 14 and 15 of my report you get it.

2601. You admit that it would be a fair criticism upon your figures to say that allowance should be made for tranference of unvaccinated to vaccinated. Have you made any attempt in your report to make any such allowance?—No, not in so many words, and I maintain that the actual transference is nothing like the amount that I understand you to contend for. I certainly have not said anything about it in my report; I believed the transfer by the date of the census to be inconsiderable, and I regarded it as more than balanced by the "never vaccinated" among the 18,292 persons attacked by small-pox in previous epidemics, who in my census populations have been placed by me in the unvaccinated class. I did not think it necessary to refer to these matters in my report.

2602. On page 46, Table XXII., there is a note (*e*). Will you read it?—"Mary P. (aged 24). Of five other "children in this family, three, aged 11, 15, and 16, "who had been vaccinated in infancy all suffered "from small-pox, the last two were badly pitted. "Two other persons, aged 14 and 20, who had never "been vaccinated, and who slept with the others, did "not contract small-pox."

2603. Did you ascertain that to be correct from your own investigations?—Certainly; I have the card here; that was on the statement of the mother.

2604. From your investigations, did you find any difference as regards the social position of the vaccinated and the unvaccinated?—No, I do not think so; taking the whole epidemic, certainly the majority of attacked would belong to the artisan class, but then, of course, in Sheffield the majority of the population is of the artisan class. I do not think in proportion to the population you would find very much difference. You have to bear in mind that, as regards the higher class population, the great majority of them were re-vaccinated.

2605. Do you think that the large amount of post vaccinal small-pox that occurred in Sheffield was at all traceable to spurious vaccine lymph?—I had no evidence upon that.

2606. Can you tell us the nature of the lymph ordinarily in use in Sheffield?—I did not make any inquiry upon that point.

2607. Can you tell us who would be able to inform us what was the nature of the lymph generally used?—I should think the public vaccinators.

2608. (*Sir Edwin Galsworthy.*) You told us that a previous attack of small-pox is a certain protection against small-pox in the vaccinated; do you consider that re-vaccination is a greater protection from fatality than a first attack of small-pox?—According to the Sheffield experience it was apparently the case.

2609. With regard to what you said about the incidence of small-pox in the neighbourhood of the hospital, did you mean that the hospital spread the disease?—There was a very special incidence in the immediate neighbourhood of the hospital, which could only be accounted for either by direct spread from the hospital or by aërial infection.

2610. Or both?—Or both.

2611. Did you come to any conclusion upon the point?—I could not decide between the two, it was impossible to determine which it was.

2612. You did not form an opinion whether, had the hospital been administered thoroughly well, there would have been the same incidence in the special area?—I could not say at all.

2613. (*Sir Charles Dalrymple.*) Can you state whether there was any prevalent feeling in Sheffield against vaccination previous to the period of the epidemic?—There was no prevalent feeling in Sheffield against vaccination.

2614. (*Sir Guyer Hunter.*) In your report you devote a section to the general sanitary circumstances of Sheffield?—Yes.

2615. Was there any difference in the general sanitary circumstances of Sheffield antecedent to and during the epidemic?—Do you refer to the year immediately preceding?

2616. Say three years previously?—I could not say that there had been any change, the sanitary circumstances were much the same during the last four years.

2617. Were the general surroundings of the vaccinated specially favourable as compared with those of

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the unvaccinated?—I should say they were much the same.

2618. (*Chairman.*) You were asked with reference to the relative severity of the epidemics, and you said that the number of deaths in this epidemic exceeded those of any previous ones to which you referred except that of 1871–72, but the deaths on the recent occasion occurred in a largely increased population?—That was the case.

2619. Have you formed any estimate as to the relative severity of the last epidemic, if you compare the number of deaths with the population at the time of the previous epidemics?—The actual death-rate per 1,000 in the several epidemics are given in Table CXXXII., on page 255. In the epidemic of 1857–58 the death-rate was 3 per 1,000; in the epidemic of 1863–64 it was 2·68 per 1,000; in the epidemic of 1868–69 it was 2·24 per 1,000; in the epidemic of 1871–72 it was 4·16 per 1,000, and in the epidemic of 1887–88 it was 1·86 per 1,000.

2620. Therefore in relation to the population this was much the least severe of the epidemics?—Much less severe than any of the four previous epidemics.

2621. (*Mr. Meadows White.*) You have heard the criticisms upon your census figures which Dr. Collins has suggested. What in reality in your own opinion is the amount of error that that would represent?—That is a very difficult question to answer. I have not really formed any precise idea. It would, taking every source of error into consideration, be nothing like the amount of difference I got when I doubled the numbers.

2622. In many of the groups of cases given in your report and evidence you made personal inquiries?—Yes.

2623. I wish to ask whether from those personal inquiries you were satisfied with the work that the enumerators had done?—I was perfectly satisfied with it from the inquiries I made. While we are upon the subject of personal inquiries I should just like to state something which I omitted to state upon the last occasion. A question arose at the last meeting as to who gave the information as to vaccination, previous health, and the like, with regard to cases in which death had occurred. I have made out a list of the whole of the deaths in both the vaccinated and the unvaccinated, and I find that I got the information from the father or mother—the mother in nearly every case—in 27 per cent. of the vaccinated and in 49 per cent. of the unvaccinated. I was especially careful to get direct evidence in the case of deaths reported as unvaccinated. I got information from the wife or husband in 18 per cent. in the vaccinated as against 4 per cent. in the unvaccinated. I got information from a sister or brother in 7 per cent. of the vaccinated and 8 per cent. of the unvaccinated. I got information from the grand parents in 1 per cent. of the vaccinated and 4 per cent. of the unvaccinated. I got information from a son or daughter in 4 per cent. of the vaccinated and 1 per cent. of the unvaccinated. I got information from an aunt, uncle, or cousin in 1 per cent. of the vaccinated and 2 per cent. of the unvaccinated. I got information from landlady or neighbour, corroborated by the hospital records, in 11 per cent. of the vaccinated and in 7 per cent. of the unvaccinated. Then from the hospital records alone, in 7 per cent. of the vaccinated and 5 per cent. of the unvaccinated. From the medical attendant I got information in 1 per cent. of the vaccinated and 2 per cent. of the unvaccinated. From the vaccination officer or inspector of the health office, in 2 per cent. of the vaccinated and 2 per cent. of the unvaccinated. I depended upon landlady or neighbour, in 20 per cent. of the vaccinated and 16 per cent. of the unvaccinated:—so though there may be some errors in the evidence that was taken, though it is quite possible that a certain number of deaths in the unvaccinated might properly be transferred to the vaccinated class, I am myself convinced that a larger number ought to be transferred from the vaccinated class to the unvaccinated class. I have given the unvaccinated class the benefit of any doubt. Where one informant said that a person who had died had not been vaccinated and another said that he or she had been vaccinated I entered that as a vaccinated case. I wish to state that I have brought with me to-day the actual notes taken by me on my personal inquiries, with a view to answering more precisely than the other day on any special point as to which the Commission desires additional information.

2624. (*Mr. Picton.*) Will you refer to page 65, Table XXXI., No. 5, Henry W., shoemaker, is said to have been in the army in 1869; was he re-vaccinated?—Yes, he was re-vaccinated in the army.

2625. This man died before the publication of that notice which said that not a single re-vaccinated person had died?—Yes. As I said before I was not responsible for that notice, but the fact of the matter is the case was entered in the hospital records as having been only once vaccinated; the authorities who issued the notice got their particulars from the entries in the hospital records. I got mine from the wife, and I have given the corrected information in my report.

2626. That was a case of coherent small-pox?—Yes, I have another note on the card; he was an epileptic man; this was the man who ran about in his night shirt in the pouring rain.

2627. Do you think the epilepsy would be a disadvantage to him?—Any such disease would be a disadvantage to him when he had his attack of small-pox.

2628. (*Mr. Savory.*) When you use the term re-vaccinated do you apply it to the operation whether successful or not?—It is assumed to have been successful.

2629. At page 206 you state that there were 18 of the attendants on the sick who had suffered from small-pox prior to the epidemic. Then in the note you say, "Of these, 16 had been re-vaccinated subsequent to "their attack by small-pox"?—That simply refers to the operation.

2630. You could not tell us at all whether the operation was successful in any of those cases?—No.

2631. (*Professor Michael Foster.*) In reply to Dr. Collins on the last occasion you said that you agreed that vaccination had been well carried out in Sheffield?—Yes.

2632. By that did you mean that the number of people who had been left unvaccinated was small, or did you mean that the operation had been conducted well and properly so as to secure adequate vaccination?—What I meant in that particular answer was that the actual number of persons who escaped vaccination was very small. I did not refer to quality of vaccination.

2633. If you had been asked whether you thought that vaccination had been well carried out in Sheffield, in the sense that a very large number of people had been adequately vaccinated, what would your answer have been?—I could not have answered that question as to the general population.

2634. What is your own private opinion with regard to how the vaccination was carried out?—I can only give it as regards that done by certain operators; that is given in the report.

2635. A good deal of that vaccination was below the Government standard?—Very considerably below the Government standard.

2636. Are you able to state from going among the people during the taking of the census whether that description would be applicable to the vaccination of a large proportion of the population?—No, I am not. There was a certain amount of the vaccination below the standard. I should not say that an excessive amount was below the standard.

2637. I will just turn again to the diagram on page 204, showing the share of deaths borne by those under 10 years of age and those over 10 years of age respectively. Comparing the lower diagram with the diagram higher up, any large change in the relative share of the population under 10 as compared with those over 10 must, to a certain extent, influence the mortality?—But the actual shares would not vary much; the share under 10 and over 10 of the total population would not vary much, it has remained much the same.

2638. Then this change which has taken place between 1887 and, say, 1857, for instance, cannot be explained by any such change in the relative shares in the population?—No, not in the proportions living at different ages.

2639. (*Sir James Paget.*) Would you think that the change depended in any measure upon the improvement in vaccination in the last 10 years?—I think so; to some extent that is borne out by the statement I

have made in regard to improved vaccination between the two periods.

2640. (*Mr. Picton.*) As reference has been made to the quality of the vaccination in Sheffield, I would ask you whether the premiums awarded for good vaccination have been withheld from the town of Sheffield?—I do not know anything about awards given at Sheffield. I am not the inspector of vaccination for Sheffield.

2641. I will ask you this: whether you are at all aware from the Local Government reports that in 1886–87 the amount of premiums was 189*l.* 3*s.*?—I cannot say. I daresay you are perfectly correct.

The witness withdrew.

Staff-Surgeon THEODORE J. PRESTON, R.N., examined.

2642. (*Chairman.*) You are a staff surgeon in the Royal Navy?—I am.

2643. And you have had your attention directed to the subject of vaccination as far as regards seamen in the Royal Navy?—Seamen, and marines serving afloat.

2644. Can you give us any information as to the amount of small-pox in the navy prior to the introduction of vaccination?—If I may be allowed I would quote a passage from a work by Sir Gilbert Blane, entitled, "On the Value and present State of Vaccination," which was written in the year 1819. He says, "When "there was no vaccination in our navy, one fifth of all "the men enlisted died of small-pox." At the same time he remarked that "Vaccination was recommended "in the navy before it was taken up by the civil "population."

2645. When was it first introduced into the navy?—I have no history of its introduction, but in the year 1808 I find that the medical officers in charge of our foreign and home hospitals were ordered to recommend vaccination to all men who came under their care as patients; they were not ordered to vaccinate them, but they were ordered to recommend them to be vaccinated; and if the men agreed they were "to represent "the harmless nature of the operation and the subse-"quent advantages thereof."

2646. When was the first order for compulsory vaccination in the navy?—The first order for compulsory vaccination was issued on the 15th of April 1864 by the Admiralty.

2647. Have you any information which you can give the Commission as to the state of things prior to the issuing of that order?—I have a table which gives statistics from the year 1864, showing the number of cases of small-pox in the whole navy and on each station; the number who died; the vaccinated and unvaccinated, as far as we know; the ratios per 1,000 of force; the death ratios per 1,000; and the average number of men sick daily from small-pox. (*The table was handed in. See Appendix V., Table A: page* 250.)

2648. As regards vaccination or non-vaccination there seems to have been no knowledge as to a very large number of the cases?—No. The medical officers were not instructed at that period to state whether their cases had been vaccinated or not vaccinated.

2649. You are able to give very little information really beyond the number of cases prior to 1864?—Except that, further on, you will find I have made condensed notes from the reports of the health of the navy under each year for the earlier years as far as I could get the information. I begin about the year 1833.

2650. In those notes do you call attention to salient points?—To a certain extent. We have to take into consideration the prevalence of the disease throughout the whole of the world as known to the service.

2651. We will come to the Admiralty order in 1864; that directed every person entering the navy to be vaccinated?—Yes.

2652. But it did not touch those who were in the navy already?—No, it did not touch those who were in the navy already.

2653. So that in the earlier period after 1864 the numbers affected by that order in proportion to the total number in the navy would be small?—It would be so.

2654. Was there any effect apparent after that order had come into operation, or some time after, upon the number of small-pox attacks in the navy?—I think so. In 1860 we had 327 cases; in 1861, 315; in 1862, 103; and in 1863, 121. Then in 1864 we had 462 cases, vaccination was introduced compulsorily in April of that year; in 1865 we dropped down to 164; in 1866 we had 239 cases, but that rise was due entirely to an outbreak on the Cape of Good Hope and East India station, introduced by native West Africans. In 1867 we had 251 cases, due principally to an outbreak in China, but in 1868 we dropped considerably, we had only 83 cases in the total force of the whole navy; in 1869 we had 82 cases, and in 1870, 40 cases; then there was an unfortunate rise in 1871 to 148 cases in the whole service, due principally to an outbreak in the west of England. Then the Admiralty issued an order for compulsory re-vaccination on all persons in the service and entering the service.

2655. Before we go to that, taking the year 1870 for instance, could you give any idea what proportion the seamen and marines who had entered since 1864 would bear to the whole force of the navy?—I could not give any answer to that at present, that would be a very difficult statistical question to answer.

2656. Speaking generally, within what number of years do the men disappear from the navy?—The men are thoroughly renewed once in every 10 years, allowing for deaths, invaliding, and other casualties.

2657. So that in six years something like one third could be old and two thirds new?—Probably.

2658. (*Mr. Meadows White.*) The total number of cases in 1860 was 327, what was the whole force in that year?—I have not taken the strength of the force, but the ratio per 1,000 of the force was 5·2. If you will allow me, I will now pick out the cases on the home station only, that, is Great Britain and Ireland. We had 199 cases of small-pox in the year 1864 when the order came out for vaccination on entry. Then in 1865 we had only 18 cases, all modified and of "rare occur-"rence," in the Channel Squadron. In 1866 we had 29 cases, principally in the west country, 30 in 1867, 16 in 1868, 8 in 1869, and in 1870 24 cases.

2659. (*Chairman.*) In the next year the re-vaccination order was issued?—Yes. On March the 7th, 1871, an Admiralty order for re-vaccination was issued. This order for re-vaccination was compulsory on all persons then in the service and who should hereafter enter the service; they were to be re-vaccinated whether they had had small-pox or not. Very little effect from this order for compulsory re-vaccination was felt until two years afterwards. Thus, in 1871, before the order for re-vaccination came out, there were 148 cases of small-pox in the whole service, of which 67 occurred on the home station, principally in the west of England. In 1872, the first year after the order was promulgated, there were 89 cases in the whole navy, of which 62 occurred at home, due to an outbreak of small-pox at Portsmouth. In the next year, 1873, we had only 16 cases in the whole of the Royal Navy, 7 of which occurred in the "Minotaur" at Lisbon, which is included in the home station. Now our cases drop considerably. In 1874 we had only 9 cases in the whole of the Royal Navy, which then consisted of a mean force of 44,530 men, and of those 9 cases only 2 occurred in the whole home station. In 1875 there were 17 cases in the whole navy, and 1 case only at home, taking place at Lisbon. In 1876 we had no cases in the home station at all, and only 24 in the whole navy, principally due to cases of small-pox amongst the Kroomen, and the natives of India on the East India station, and in China. In 1877 we had 17 cases in the Royal Navy and only 2 on the home station. In 1878 we had 9 cases in the whole of the navy and only 4 on the home station. In 1879 and in 1880 there were no cases at home. In 1881 special vaccination was extensively carried out owing to an epidemic of small-pox which was general throughout the whole of England, and in that year we had 4 cases on the home station out of 25 in the whole of the Royal Navy.

2660. (*Mr. Meadows White.*) What was the ratio per 1,000 of the force in that year?—The ratio per 1,000 of the force at home was ·18. In 1882 there were 10 cases in the whole of the Royal Navy, and 3 cases on the

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home station. In 1883 there were 9 cases in the whole of the Royal Navy, and 1 case only at home. In 1884 there were 6 cases in the whole of the Royal Navy, of which 2 occurred at home. In 1885 there were 7 cases in the whole of the Royal Navy, and only 2 on the home station. In 1886 we had no cases at home, and 11 in the total service, principally in China. In 1887 we had only 1 case in the whole of the Royal Navy, which occurred in China. In 1888, so far as I have been able to take the statistics, we have had 18 cases in the whole of the Royal Navy, 4 of which occurred at home.

2661. (*Chairman.*) Would the number of men amongst whom these cases occurred be about the same, or greater or less than in the earlier years 1856 and onwards?—It would be slightly smaller, because during some of the years when we had petty wars we had rather an increased number of men, but all these tables have been calculated with the ratios per 1,000 of the force, which make the figures much more easy to understand.

2662. (*Mr. Meadows White.*) You have been speaking of attacks, not of deaths?—Yes.

2663. (*Chairman.*) Have you got the number of deaths?—Yes, the deaths are given in the table I have handed in (Table A.), and the ratios of deaths per 1,000 of the force are given.

2664. The re-vaccination circular having been issued in 1871, I see in 1879 there were 37 vaccinated and 13 unvaccinated; was the order not observed?—There was an order subsequently promulgated to the effect that all natives were to be re-vaccinated. There was no compulsory vaccination amongst the natives then—that is the Kroomen.

2665. (*Professor Michael Foster.*) Have you included those among your attacks?—Yes, all men borne on the naval force are included.

2666. (*Chairman.*) The men do not appear to have been all re-vaccinated after 1871, because I see in 1879, of the total 52 cases which you gave us there were 37 vaccinated, 13 unvaccinated, and 2 not known?—Yes.

2667. (*Professor Michael Foster.*) Can you distinguish the native force from the British force in that year?—I could by looking at my notes.

2668. (*Chairman.*) I see that of the 52 cases, 39 were on the West Coast of Africa?—Yes, those would be nearly all Kroomen.

2669. (*Professor Michael Foster.*) All unvaccinated?—All probably unvaccinated at that date; they are compelled to be re-vaccinated now.

2670. (*Dr. Collins.*) What was the date of the order compelling those who joined the navy abroad to be vaccinated or re-vaccinated?—1873.

2671. (*Mr. Savory.*) Have you any record of the number of men who enter the navy each year?—Yes.

2672. So that we could tell what number entered?—Yes; I have only calculated them on the basis of ratio. I could get the numbers from the statistics.

2673. (*Chairman.*) In 1882 there were 10 cases, of which two were marked as vaccinated and eight not known; does that mean that there might have been some still unvaccinated notwithstanding the order?—There might have been some still unvaccinated or not re-vaccinated. In 1882, probably, there were no persons in the Royal Navy who had not been vaccinated once.

2674. The number of deaths has been very small of late years, I see?—Very small, indeed.

2675. There only seem to have been 10 deaths since the year 1880?—Yes. In some instances the ratios are so small that they have not been calculated, they amount to something so very small.

2676. By whom is the operation of re-vaccination performed?—By the medical officer of the ship under the Admiralty instructions.

2677. Suppose a man who enters the navy has been already re-vaccinated at some previous time, would he be vaccinated again?—Every man has his medical history sheet when he enters the navy, and the fact of his re-vaccination has to be placed at the top of it in red ink by the medical officer; that medical history sheet follows him throughout his whole career, so that the medical officer looking over the medical sheets of the ship can tell when, where, and by whom the re-vaccination was performed, and with what result.

2678. Have you any information as to the loss of service arising from small-pox?—I have drawn up and included in the table I have handed in (Table A.) two columns giving the number of days' sickness on board, the number of days' sickness in hospital, and another column giving the average number of men sick per day from small-pox on each station in each year. I will begin with 1864. In 1864, before the orders for vaccination were issued by the Admiralty, the average number of men sick per day for the whole force was 34·1.

2679. Is that sick with small-pox, or all diseases?—Small-pox only, 34·1 in the total force. In 1865, the first year after the order for vaccination was issued, the average number of men sick per day from small-pox was 18·9; in the following year, 1866, it was 17·6, and in 1867 it was 16·1. In 1886 the number had fallen to 5·5; in 1869 it was 6·9; in 1870 it was 4·2.

In 1871, when small-pox was prevalent in the west country, the average number of men sick per day rose to 11·6; during this year the order for re-vaccination was issued.

In 1872 the average number of men sick per day had fallen to 8·6. We may now suppose that all men in the service had been thoroughly re-vaccinated. In 1873 the average number of men sick per day from small-pox had fallen to ·6. In 1874 it was ·4; there was a slight rise in 1875 to 2·1.

2680. Does this include the natives as well as the others?—It includes natives and all.

2681. You said that you might assume them all to have been re-vaccinated at this time; that was a little in excess of the fact, was not it?—Yes. In 1876 the average number of men sick per day was 1·48; in 1877 it was 1·63; in 1878 it was ·95. In 1879, owing to an outbreak of small-pox on board the flag ship on the West Coast of Africa station, which was introduced by Kroomen, who had most probably not been re-vaccinated, and some of them perhaps not vaccinated, the average number of men sick per day from this disease rose to 7·93. It is presumed that about this time the order for re-vaccination of all natives entering Her Majesty's service was promulgated. In 1880 the average number of men sick per day fell to ·53; in 1881 it was 1·72. Special re-vaccination was extensively carried out this year. In 1882 the average number of men sick per day was ·2; in 1883 it was 1·13; in 1884 it was ·58; in 1885 it was ·78; in 1886 it was ·69, and in 1887 it was ·3. The returns for 1888 are not yet completed.

2682. (*Dr. Bristowe.*) Those numbers are on the total force?—Yes.

2683. What is the average of the total force?—The average of the total force varies slightly with each year. In 1881 the total force was 44,400.

2684. (*Mr. Meadows White.*) Does that include marines?—It includes marines serving afloat but not marines in barracks.

2685. (*Sir Charles Dalrymple.*) What was the cause of the increase in the number of cases in 1888 as compared with 1887?—There were four sporadic cases in the home station, contracted by men on leave; two cases on the Mediterranean station, contracted at Constantinople, where small-pox is endemic; and 12 cases on the China station. I was out in China during that year, and there was a great outbreak of small-pox in the whole of the southern parts of China; the disease was introduced into Hong Kong, where a rather severe epidemic took place; several ships that came from the northern part of the station, Japan, managed to contract those 12 cases of small-pox; but in the ship in which I was serving, which remained at Hong Kong, we had no cases at all. That accounts for the 18 cases in 1888.

2686. (*Chairman.*) Perhaps you can get taken out for us the number of men to whom these statistics apply, the number of the total force for each year with which you have dealt?—Yes.

Adjourned till Friday next at 1 o'clock.

Fourteenth Day.

Friday, 1st November 1889.

PRESENT:

THE RIGHT HON. THE LORD HERSCHELL IN THE CHAIR.

Sir JAMES PAGET, Bart.
Sir CHARLES DALRYMPLE, Bart., M.P.
Sir EDWIN HENRY GALSWORTHY.
Mr. WILLIAM SCOVELL SAVORY.
Dr. JOHN SYER BRISTOWE.
Dr. WILLIAM JOB COLLINS.
Professor MICHAEL FOSTER.
Mr. JONATHAN HUTCHINSON.
Mr. J. ALLANSON PICTON, M.P.
Mr. SAMUEL WHITBREAD, M.P.
Mr. F. MEADOWS WHITE, Q.C.

Mr. BRET INCE, *Secretary*.

Mr. THOMAS W. GRIMSHAW, M.D., examined.

Mr. Thomas W. Grimshaw, M.D.

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2687. (*Chairman.*) You are Registrar-General for Ireland?—Yes.

2688. And you combine with the duties of that office those of medical superintendent of statistics at the General Register Office of Ireland?—Yes.

2689. You have held your office for ten years, have you not?—I have.

2690. I believe you are or have been in practice as a medical man?—Yes, I practised in Dublin as a physician for some years.

2691. And you have been examiner in vital statistics in the University of Dublin?—Yes; I am now.

2692. And you are a graduate of that university and a Fellow of the King's and Queen's Colleges of Physicians in Ireland?—Yes.

2693. Prior to your appointment as Registrar-General and whilst you were in practice you were physician to Steevens' Hospital, and to other medical institutions also?—I was.

2694. And I believe you were physician for 13 years to the Cork Street Fever Hospital?—I was.

2695. That is the largest epidemic hospital in Ireland, is it not?—It is.

2696. And there have been a number of small-pox patients treated there as well as fever patients?—Yes, a large number.

2697. You have devoted, I believe, a great deal of attention to subjects connected with State medicine and sanitary matters?—I have.

2698. And you were a member of the Dublin Mansion House Small-pox Relief Committee in 1871-73?—I was.

2699. That was before you were Registrar-General?—Yes, I was appointed to my present office in the autumn of 1879.

2700. You are also a member of the Council of the British Medical Association which has taken much interest in this subject of vaccination, and the enforcement of the vaccination laws?—Yes, I am.

2701. And I believe you took an active part in promoting the Vaccination (Ireland) Amendment Act of 1879?—I did. I was a member of the council of the Irish Medical Association at that time, and they prepared Bills which were afterwards taken up by the Government, and passed with some modifications.

2702. During your tenure of office at Cork Street and Steevens' Hospitals I believe you had practical experience in the treatment of a considerable number of small-pox patients?—Yes, I treated a very large number, about 1,000 I think, myself.

2703. And in relation to that matter you wrote reports, some of them having special reference to small-pox?—Yes, I wrote those reports, which I now produce. They contain a good deal of information upon the subject. One of them, I am sorry to say, is imperfect, but what is defective in it is contained in the other pamphlet. I have here a copy of the Dublin Medical Journal.

2704. I believe you published a report on the small-pox epidemic of 1871-73, as observed in the Cork Street Hospital, in the Dublin "Medical Journal" of July 1873?—That is so; that is the paper that I have just referred to.

2705. I believe you made a special investigation of an outbreak of small-pox at Athenry, in the county of Galway in 1875?—I did.

2706. Your official duties, since you have held your present office, in relation to vaccination, are to issue the books and forms, and regulations, which you deem requisite for the effectual carrying out of the Act of 1864, 26 & 27 Vict. c. 52.; that would be the principal Act?—Yes. Then there is an amending Act of 1879. I issue those books and forms after consultation with the Local Government Board. The relations between the Local Government Board and my department are not exactly so intimate as they are in England between the General Register Office and the Local Government Board; but, of course, in all these matters we confer before anything is done, as the forms are practically issued with the sanction of that Board.

2707. Was the Act of 1864 the first Vaccination Act for Ireland?—No, it was not the first Act. It was the first compulsory Act.

2708. (*Mr. Meadows White.*) The first Act is the 3rd & 4th Vict. c. 29. of 1840, is it not?—Yes.

2709. (*Chairman.*) Prior to 1841 the records of small-pox epidemics in Ireland are not of a very definite character, I understand?—No, they are rather unsatisfactory for statistical purposes.

2710. A chronological table of Irish epidemics I believe was compiled by Sir William Wilde, and published in the Irish Census Report of 1851?—It was. I intended to bring that here, but I find that my assistant did not put it in.

2711. But I understand that there are not in that table any details regarding small-pox epidemics which would be considered of value for statistical purposes?—Not such as I could make use of for statistical purposes: they are popular accounts, newspaper accounts and so on.

2712. On the taking of the Census of 1841, and in the subsequent decennial operations, inquiries were made as to the number and causes of death amongst the population?—They were up to the Census of 1871.

2713. At the time of the Census of 1881 the Act for the Registration of births and deaths, which commenced on the 1st of January 1864, had, of course, been in full force throughout the decade?—Yes, from 1871 to 1881. Our Registration Act came into force on the 1st of January 1864, the same date as the compulsory Vaccination Act.

2714. So that it had not been in force during the whole of the decade 1861-71?—Only during a portion of it.

2715. And it was for the first time enforced for the whole decade 1871-81?—Yes.

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2716. The system of collecting death statistics at the decennial periods only could hardly be regarded as satisfactory?—It was very indefinite. We had to trust to the recollection of the people who filled the Census papers, so that a great deal of it was mere hearsay.

2717. So that complete statistics of deaths from small-pox as compared with the population existed only for the 25 years 1864–88?—Yes. I propose to hand in a table showing the estimated population in each of the years 1864–88, the number of deaths from small-pox registered during each year, and the rate per million of the living. (*The table was handed in. See Appendix VI., Table A: page* 256.)

2718. The number of deaths in the third column include the deaths from chicken-pox, I see?—They do.

2719. But you also give them in a separate column?—Yes.

2720. They are so small that they do not practically affect the result?—Practically, they have no significance.

2721. (*Dr. Bristowe.*) They were probably cases of small-pox?—Probably most of them; that is my own opinion, but they are a very small number.

2722. (*Chairman.*) Hardly worth mentioning—in the earlier years all at events?—That is so.

2723. The first year taken is 1864; was small-pox epidemic in that year?—It was, and for some time previously.

2724. Then in 1872 Ireland was, as we have heard that other countries were, visited with a serious epidemic of small-pox?—It was.

2725. And, again, there was an epidemic period in 1878 and the succeeding years?—There was, and that epidemic lasted practically up to 1882.

2726. For what length of time have you complete vaccination statistics for Ireland?—For seven years; in fact, from the time when I was able to get the statistical arrangements into shape after the passing of the Act of 1879.

2727. What alteration did the Act of 1879 make?—Among other matters it altered the destination of the certificate. The certificate of vaccination was formerly sent to the registrar of the district in which the vaccination was performed.

2728. What had been the chief provisions of the Act of 1864?—A full answer to that question would involve a long statement, but shortly it was a compulsory Vaccination Act for Ireland.

2729. Was it of such a character as to enforce efficiently in all cases compulsory vaccination?—It was so intended; but there were some difficulties about it. I have a copy of the Act here, but I think Dr. MacCabe will speak on that subject more exactly than I can. I produce a copy of the Act of 1864 and the Act of 1879, the sections of the Act of 1864 which were repealed by the Act of 1879 being struck out in that copy. Although the Act came into force legally on the day it was passed in 1879, yet it took some time to mobilize the arrangements, and it practically came into operation on the 1st of January 1880.

2730. (*Professor Michael Foster.*) What was the nature of the Act of 1858?—It was an Act to make further provision for the practice of vaccination in Ireland.

2731. (*Chairman.*) The Act of 1858 provides for the division of the country into vaccination districts, and the medical officer is required to vaccinate all persons who may come to him for that purpose or whom he may be requested to vaccinate?—Yes, it is optional vaccination.

2732. (*Professor Michael Foster.*) In 1864 vaccination became compulsory?—It did.

2733. (*Chairman.*) The Act of 1863 directed the registrar of births and deaths at or immediately after the registration of the birth of any child not certified to him as having been vaccinated within six calendar months after birth, to give notice in writing to the parent that it was the duty of the parent to have the child vaccinated, and to deliver notice of the days, hours, and places at which the medical officer would attend for the purpose of vaccination; and if after such notice the father or mother should not cause the child to be vaccinated, then the parent is rendered liable to a penalty not exceeding ten shillings?—Yes. The period within which a child was to be vaccinated was reduced from six months under the 1864 Act to three months under the 1879 Act.

2734. Then it is provided that "Any penalty recoverable under the provisions of this Act shall be recoverable in a summary way, with respect to the police district of Dublin metropolis, subject and according to the provisions of any Act regulating the powers and duties of justices of the peace for such district, or of the police of such district, and with respect to other parts of Ireland, before a justice or justices of the peace sitting in petty sessions." These are the only provisions as to penalties?—Yes, I believe so. Dr. MacCabe, who is here, has really the administration of the Acts in his hands; I am only the recorder of results.

2735. The penalty was afterwards raised to 20*s.*, was it not?—Yes.

2736. The Act of 1879 came into force in the year 1880, did it not?—Legally it came into force on its passing, but it was not worked until the beginning of the year 1880. There was no time given in the Act for making all the preliminary arrangements, and the result was that practically it was not in force until the beginning of 1880.

2737. In the year 1882, I believe, you introduced a system similar to that which had been for some time in use in Scotland for recording the results of vaccination?—Yes.

2738. What was the change that was then made?—The results were recorded in former times, but there were no returns made except for poor law purposes, and there was no public record kept of private vaccinations, if we may so call them. The vaccinations performed by the public vaccinators were all recorded and returned to the Local Government Board (which was then the Poor Law Commission) and abstracts were published in the reports of that Board; but after this new Act came into force I directed the registrars to add to their regular quarterly returns of births columns for vaccinations, showing the results of vaccination. That could not be done correctly under the Act of 1864, because the destination of the certificate of vaccination was to the registrar of the district in which the vaccination took place. Now it is to the registrar of the district in which the child was born. So that now we are able to compare the vaccinations with the births, district by district, which was a much more difficult matter before.

2739. That renders it easier to see, I suppose, who have not been vaccinated, and who have failed to comply with the law?—Yes, it makes the superintendence of the thing much more easy. Those returns are arranged in my office; here is the last published quarterly return (there is one in the press at present) for the second quarter of this year, at the right-hand side of the table you will see there are columns corresponding with the columns in that form on which those returns are made.

2740. You have the deaths of children under one year of age, and of persons aged 60 and upwards, and then you have the causes of death?—Yes, some of the causes are specified. Then the latter portion of the table gives the number of successful primary vaccinations, the number of cases in which vaccination was postponed, the number of persons insusceptible, and the number of unvaccinated children under three months old whose deaths were registered.

2741. Have you prepared a table showing by decennial periods the total number of deaths from small-pox in Ireland, the proportion of such deaths to deaths from all causes, and the average annual number of deaths per million living from 1831 to 1880, with like details for the eight years 1881–88?—Yes; this is the table and here is a diagram illustrating it. (*The table and diagram were handed in. See Appendix VI., Table B: page* 256.)

2742. I understand that these statistics cannot be treated as being absolutely satisfactory?—For the first three decades that are mentioned they are collected on the system I have before mentioned, by obtaining information at the Census periods; and you have to accept the recollection of the people as a guide. Then you come to the period between 1861 and 1870. The first portion of that decade is collected from Census returns; that is, from April 1861 up to December 1863. Then from 1864 onwards to 1870 the figures are compiled from the death statistics collected regularly by my Department. The figures from 1871 to 1880 are collected

on that system, and the first portion of this decade, 1881–88, also are compiled from the death returns.

2743. That table shows, does it not, a very large decrease in deaths from small-pox in the decade 1861–71, as compared with 1831–41?—It does.

2744. (*Dr. Bristowe.*) Who are the persons whose recollection you availed yourself of?—The same persons who make the Census returns. You probably know the householders' schedule that is circulated at the Census, which every householder gets. There used to be a column in the Irish Census form, showing the cause of death of anyone who had died during the decade, and the cause was written in by the head of the house who filled up the census return. Of course in many cases, if the death had been very recent, he would be quite accurate, but when the death had occurred at the commencement of the decade a mistake would be very probable.

2745. So that at any rate there was some suspicion of truth in the return?—The probabilities are that that return understates the facts.

2746. (*Chairman.*) I imagine that small-pox would be a disease, the character of which was so defined and understood as to be likely impress itself upon the mind of the householder more than some other kinds of diseases?—Probably so, I should think.

2747. He would be hardly likely to put down a death from small-pox as having occurred in the household that had not occurred from small-pox?—It is almost impossible.

2748. (*Professor Michael Foster.*) Does the statement refer to deaths that had taken place in that house?—In that family. You could scarcely say in the house, because the house might change hands and the family might change houses.

2749. Practically it was a family census, and not a household census?—It was both, but we can scarcely conceive that a person making a household return would make a return of death from small-pox which had occurred when the house was occupied by another family, and therefore that death would possibly disappear.

2750. (*Chairman.*) Therefore the probability would rather be that the number of deaths from small-pox in the total population was understated?—That is my opinion.

2751. (*Dr. Collins.*) But some of the information in these returns would be based upon recollections 10 years old?—Nearly 10 years old.

2752. (*Professor Michael Foster.*) If two sons both spoke of their father as having died from small-pox, the two sons living in quite different households, you would have two returns of the same deaths, would you not?—It is a return as to the persons resident with that family.

2753. It was confined to the house, then?—No, to the family.

2754. (*Mr. Meadows White.*) If the question was put to the person in the house at the time of the census he might have given an account of the death of some member of his family in another house?—He might.

2755. (*Professor Michael Foster.*) The record of the death might be lost if the family removed from one house to another?—I should think that in many cases it would be lost. These figures given from recollection are very doubtful, but I should say, on the whole, that they are understated.

2756. (*Dr. Collins.*) Could you give us the question which appeared at the head of the column in the Census paper?—I have not it here, but if it is considered desirable I could find it out.

2757. (*Chairman.*) During the decade 1831–41 there was no public provision for vaccination in Ireland, I believe?—There was none.

2758. So that amongst the poorer classes there would be a difficulty in obtaining vaccination, even if it was desired?—Yes.

2759. I believe that during that decade one-twentieth of all the deaths in Ireland reported to the Census Commissioners were reported as having been caused by small-pox?—They were.

2760. And the average annual rate of mortality on those statistics from that disease was 725 in every million?—Yes, I think so. The diagram which I handed in to illustrate Table B. has been divided into decades. The light shading shows the period when there was no compulsory vaccination; the darker shading the period when there was compulsory vaccination; and the dates of the statutes are put in at the bottom of the diagram. The line which runs through there shows the relations between small-pox deaths and the total deaths the numbers being reversed, beginning at the top.

2761. During the decade 1841–51, that is to say, in the year 1840, the first Vaccination Act came into force?—Yes, that is so.

2762. And public vaccinators were provided by the poor law guardians?—Yes.

2763. And it may be presumed that, although not obligatory, there was more vaccination than during previous decades?—Yes, that may be assumed.

2764. During that decade, 1841–51, I believe the small-pox mortality fell from the previous annual average of 725 per million down to 493 per million?—It did. Of course we are still on Census records; not on registered records.

2765. However, the materials for both of these decades are the same?—Yes.

2766. During the decade 1851–61 further facilities for vaccination were afforded by the passing of the Medical Charities Act, 14th & 15th Vict. c. 68., which came into force on the 1st of October 1851, by which every dispensary medical officer became a public vaccinator, and was required to vaccinate all persons applying to him?—Yes, there was also the Act 21 & 22 Vict. c. 64. in 1858.

2767. Was that provision taken advantage of to a considerable extent?—I have every reason to believe that it was.

2768. During this decade the average annual death-rate fell from the 493 per million of the previous decade to 213 per million, did it not?—Yes, that is so.

2769. In the course of the next decade, 1861–71, the first compulsory Vaccination Act came into force?—Yes, on the 1st of January 1864.

2770. During that decade the small-pox mortality fell from 213 per million to 52 per million, did it not?—Yes.

2771. And it was during this decade that the Act for the registration of births and deaths came into force?—Yes, it came into force on the same date as the compulsory Vaccination Act.

2772. You have constructed a table, I believe, showing the relation between births, registered vaccinations, and deaths from small-pox from that date up to the end of the year 1888?—Yes, and also a diagram illustrating that table. (*The table and diagram were handed in. See Appendix VI., Table C: page* 257.)

2773. There seem to have been a large number of persons born prior to 1864 who had not been vaccinated?—There were a great many; at least, it does not follow that they were not vaccinated previously. Some of those may have been re-vaccinated; we cannot be sure of that; they are not supposed to be re-vaccinated, but it is possible that they were.

2774. But I suppose there would be little doubt that prior to 1864 there would be a large number of unvaccinated?—No doubt.

2775. I notice that in 1865 the numbers of those vaccinated born before 1864 were approximately as large as those born after 1864, 71,982 as compared with 97,160?—Yes, but that is immediately on the enforcement of the Act. The thing was new at that time. There was an alarm about children not being vaccinated.

2776. But under the Act they could not enforce vaccination, could they, on the children born prior to the passing of the Act?—No, it could not be enforced in respect of those children; in fact, at that time the age was six months, so that they might have escaped for the first half year.

2777. It only became compulsory in respect of a period of six months elapsing after the passing of the Act in relation to a child who had been born since the Act?—Yes, practically.

2778. (*Mr. Meadows White.*) It only applied, under section 1, to "the father or mother of every child born "in Ireland after the first day of January 1864"?—Yes, that gives the six months before any compulsion could be exercised.

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2779. (*Professor Michael Foster.*) I suppose that large number of 71,982 in 1865 corresponds with the large number of 139,822 in 1872, which obviously was influenced by the panic of the epidemic?—Yes; I think I have explained that.

2780. (*Chairman.*) You have shown in Table C. the number of births, the number of persons vaccinated, and the number of deaths from small-pox for each year from 1864 to 1888?—Yes, in that table and the diagram illustrating it, as is explained in a note at the bottom of the table, the dates are not the same. The Local Government Board year ends at a different time from the Registration year; one set of dates are up to the 30th of September, and the others are up to the 31st of December, so that there is a slight confusion.

2781. (*Mr. Meadows White.*) Ought not the heading of column 5, Table C., to be this: "Born up to 1st of January 1864"?—It ought to be up to the 1st of January 1864.

2782. (*Chairman.*) This table does not contain a complete return of all the vaccinations in Ireland, does it?—No, only of the public vaccinations.

2783. Do you think that those would form a very large proportion of the whole?—Practically the whole of them, because in the country districts of Ireland the vaccinations are altogether performed by the poor law medical officers.

2784. In 1864 there was a serious epidemic of small-pox, was there not?—There was; it caused 854 deaths in that year.

2785. And the enforcement of the new Act and the panic caused by the epidemic and attention being called to the matter by the Poor Law Commission, stimulated vaccination to a great extent apparently in that year?—It did, I believe.

2786. So that 191,810 persons were vaccinated by the public vaccination officers during the year ending September 1864?—They were. Of course that shows that the number of vaccinations considerably exceeded the number of births.

2787. Then in the following year 1865 there was a considerable diminution in the number of deaths from small-pox?—There was, and a further falling off the next year.

2788. The activity in relation to vaccination which prevailed in the early period after the passing of the compulsory Act did not apparently continue?—No, it gradually wore away and the vaccinations fell very considerably after the panic had ceased.

2789. (*Mr. Picton.*) Do you mean primary vaccinations?—Both primary and the others.

2790. (*Chairman.*) If you take 1876, for example, the births in Ireland were 140,469, and the total vaccinations, including 1,998 born before 1864, some of which may have been re-vaccinations, were 114,487; and in 1877 the births were 139,659 in number and the total vaccinations were 117,679?—Yes, that was so.

2791. (*Mr. Picton.*) Are we informed how many died before the age of vaccination?—No, you have not got that in this table; I have only got seven years of tables which contain all these particulars. That I shall come to presently.

2792. Can you tell us what per-centage of new-born children in Ireland died before the age of vaccination?—I do not think I have that here for this period.

2793. (*Chairman.*) Have you got it for a later period?—I have it for a later period, from 1882 to the present time, and I have a very detailed table here which includes that for every district in Ireland. The age for compulsory vaccination was changed at this period; it used to be six months and it was reduced to three months in 1879. I have not the figures for 1876; that was the six months' period. But in the seven years 1882 to 1888 there are 45,456 children out of 811,521 born, who died unvaccinated under three months; that is about 5 per cent.

2794. (*Mr. Picton.*) For how many years did you say that was?—This is from the year 1882 up to the end of 1888, inclusive.

2795. (*Chairman.*) I mentioned just now the year 1876–77, in which there appeared to have been a great falling off, but it began apparently earlier than that. In 1869 I observe that the births were 145,659 and the total vaccinations were 125,672?—Yes, that is so.

2796. In 1870 the numbers approached more nearly, being 149,846 as compared with 140,220. Did the small-pox epidemic begin in 1870?—I think there were some cases, but it really became epidemic in 1871. There was an alarm of small-pox in 1870.

2797. (*Professor Michael Foster.*) There were 32 deaths in 1870 as compared with 20 in the previous year?—Yes.

2798. (*Chairman.*) The number of those vaccinated having been born before 1864, which had been 71,982 in 1865, came down to 5,163 in 1870?—It did.

2799. And it rose considerably in 1871, and very greatly in 1872, I suppose consequent upon the scare produced by the epidemic?—Yes.

2800. (*Mr. Meadows White.*) That column 4 you say should be "Born since 1st of January 1864"?—Yes.

2801. That column includes 1864?—It does.

2802. (*Chairman.*) On March the 7th, 1865, I believe the Poor Law Commissioners issued a circular to the boards of guardians, calling attention to the fact that many persons did not comply with the Compulsory Vaccination Act?—Yes, that is so.

2803. (*Dr. Bristowe.*) In column 4 "born since 1864" means born since the 1st of January of that year?—Yes, the 1864 is inclusive, and it should have been so stated.

2804. That applies to all the figures underneath, and, if so, it is erroneous. In 1888 does your last figure, 2,871 in column 5, refer to all born before 1864?—Yes; some of these may be re-vaccinations.

2805. But you mean born before 1864?—Yes, certainly. These are taken from the Local Government Board reports.

2806. (*Mr. Picton.*) Then people born between 1864 and the year in the first column are not accounted for at all. Take, for instance, 1876, the year we were speaking of; there were 140,469 births in that year, and there were 114,487 vaccinations. Of those we are told that 112,489 were born, as I understand, since the 1st of January 1876; is not that so?—No, since the 1st of January 1864. If I may be allowed to explain with regard to these 112,489 children in column 4 who were born since the 1st of January 1864, it may be assumed that the great majority of those children were born in the year opposite their number, that is in the year 1876. Of course there is a balance always turned over at the end of each year in statistics of this sort of the children that were still within the limit of age, and certain others who may not have been vaccinated for various reasons. It is, of course, impossible to make an absolute comparison of the number of children born at that particular period who were vaccinated at that particular period, because they have always three months' law.

2807. Then the fifth column will ultimately die out when everyone has died who was born before 1864?—Yes, that will die out, except in the matter of re-vaccinations. These are the poor law figures.

2808. (*Chairman.*) But even as regards re-vaccinations that column will die out when everybody has died who was born before 1864?—Yes.

2809. Supposing a child born in January 1864, who therefore, of course, would be 25 years old now, and might well have been re-vaccinated, to be re-vaccinated say at 20 years old in 1884, that would come in in the fourth column?—It would. They have not distinguished between the two.

2810. So that the fourth column would include some re-vaccinations, and would not be confined to primary vaccinations?—Quite so. Dr. MacCabe will give you more accurate information on that subject than I can. These last three columns are really his figures; they are put in there to compare with the small-pox deaths and births which came from my Department.

2811. I believe in February 1868 the Poor Law Commissioners issued a circular calling the attention of boards of guardians to the diminution of small-pox in Ireland, and calling for returns of any cases which might have occurred throughout the country?—That was so.

2812. In reply to that circular they received information relative to the existence of small-pox in five unions, did they not?—That is so.

2813. On inquiry two of those outbreaks were traced to the disease contracted in England and three to inoculation; did inoculation prevail at that time?—It did to some extent. I think Dr. MacCabe will give you

more accurate information on that. In fact, there were one or two convictions for inoculation about that time.

2814. (*Dr. Collins.*) Did not the Act of 1863 make inoculation a penal offence?—Yes. There was one case of a conviction at Sligo where a man got five years' penal servitude in consequence of the death of a child from inoculation. That was in 1875 or 1874, I think.

2815. (*Chairman.*) Then I believe in March 1868 another circular was issued calling attention to the necessity of seeing that vaccination was not neglected?—Yes.

2816. But notwithstanding that, vaccination does not seem to have been effectively enforced in the case of all the births?—No, it was not.

2817. Then I believe on the 21st of December 1869 another circular was issued calling attention to certain deaths which had resulted from small-pox, again impressing the necessity of vaccination?—Yes, that is so.

2818. Then there appears to have been an increase in the attention to vaccination in the following year, 1870?—That was the case.

2819. Towards the end of 1870 there was a serious outbreak of small-pox at Belfast, which apparently was the commencement of the epidemic that raged through 1871?—That was so.

2820. In July 1871 it was announced that the disease had appeared in 53 unions of Ireland?—Yes, that was so.

2821. In that year, 1871, there was a great increase in the number of persons vaccinated and re-vaccinated, was there not?—There was.

2822. And still more in 1872?—It was during the period of the alarm created by the epidemic. In 1872 that was particularly remarkable. There were 282,484 vaccinations in 1872 and the births were only 149,278 in number.

2823. There seems in 1871 still to have been a considerable deficiency in the primary vaccinations, because the births were 151,355, and the vaccinations of those born since 1st January 1864 were only 139,000?—Yes, there was a deficiency in that year: but it was towards the end of the year that the small-pox became epidemic, so that there was no alarm upon the subject.

2824. In the year 1873, there was a great diminution in the number of deaths from small-pox, was there not, as compared with 1872?—Yes, the number fell very much.

2825. It seems to have been slightly higher again in 1874 and 1875?—It was. A great number of these deaths were in Dublin; small-pox was very prevalent in Dublin in 1872. The epidemic continued in Dublin from 1871 to 1873, extending over part of 1871, the whole of 1872, and part of 1873.

2826. In 1876 and 1877 there appears to have been a great deficiency again in primary vaccination?—Yes, there was a great fall in primary vaccination again in 1876.

2827. In 1878 there was a considerable increase in the number of deaths from small-pox, was there not?—There was.

2828. In fact, the number was greater than in any year except the year 1872?—Yes.

2829. I believe you have also prepared a table showing the number of births registered, and the number of vaccinations performed in the Dublin registration district?—Yes. I have a table here compiled on the same principles as the last, with the addition that the majority of the cases of admission to the Dublin hospitals are included, and I produce a diagram which corresponds with it. (*The table and diagram were handed in. See Appendix VI., Table D: page* 258.) I was able to collect a great number of records of admission to the Dublin hospitals for the same period as Table C., but it is not complete because the Union hospitals did not make any returns.

2830. A very large proportion indeed of the deaths from small-pox in 1878 appear to have been in Dublin; I see that the deaths from small-pox in Dublin in 1878 were 550 out of a total of 873 for the whole of Ireland?—Yes.

2831. The next year there were 520 small-pox deaths in Dublin out of a total of 672?—Yes; that was also the case in the previous epidemic; both fell with great severity on Dublin. The public vaccinations in Dublin are carried on in two ways. Through the country the public vaccinators are the dispensary medical officers; but in Dublin there is a vaccine institution similar to the National Vaccine Institution here, and they vaccinate a large number of children in Dublin; so that in order to get the public vaccinations in Dublin you have to add together the vaccinations performed by the poor law medical officers and the vaccinations at the Vaccine Institution. It is now called the Vaccine Department of the Local Government Board. During a great portion of this period it was managed by a separate board and had a public grant.

2832. (*Mr. Meadows White.*) In Dublin, I suppose, there would be more private vaccinations?—Probably there would be.

2833. (*Chairman.*) Still in 1875 there appear to have been in the Dublin district 8,680 births registered, and in 1876 9,006 births as against 6,459 and 5,682 vaccinations respectively, which would seem to show a considerable deficiency?—Yes, that leaves a considerable balance, and that will be found to be the case when I come to the more recent tables. Dublin at present is the least vaccinated part of Ireland, and there are reasons for that.

2834. In 1868 and 1869 vaccination had fallen low in Dublin, had it not?—It had.

2835. In 1871 there was a considerable stimulus given to vaccination, I suppose, owing to the existence of a considerable amount of small-pox?—Owing to the appearance of small-pox.

2836. Coming to the epidemic of 1876–80, in 1876 small-pox was active in the towns in the north of England which were in constant communication with Ireland, was it not?—Yes, that was so.

2837. And apparently in that way the disease was introduced and an epidemic began?—Yes, it was introduced from Manchester by one case, and from Stonyhurst by another. They all came through Liverpool. We generally get our Dublin epidemics that originate in England from Liverpool.

2838. The epidemic of 1875 at Athenry was one of the severest in out-lying parts of Ireland, I believe?—Yes, the Athenry epidemic was rather a severe one. If the Commissioners wish I could tell them something about that epidemic. I wrote a report on it for the "Sanitary Record" at the time. It appears to have made its way down not directly as might have been expected. Athenry is a station on the Midland Railway directly between Dublin and Galway, and epidemics getting into the west of Ireland generally travel by that line; but in this case it appears to have come through Belfast, to have gone through the north and north-west of Ireland and down in a south-westerly direction until it reached Athenry, or rather until it reached Tuam. It originated in Tuam; a patient brought it from Tuam and communicated the disease to some people in the neighbourhood of Athenry, and it spread in a sort of lodging-house in the town, and finally became a very severe epidemic indeed. The vaccination of the Athenry people is given in a table which I have here, but I thought it was so local a thing that it was scarcely worth while calling attention to it.

2839. Is it sufficiently extensive to throw any light upon the subject?—Scarcely, but it is remarkable from the way in which it got there, and from the fact that vaccination had been very irregular and incomplete prior to the epidemic. It has been also stated by some people, but not on very good authority, that some of the spread of small-pox in the west of Ireland may have originated in inoculation. For instance, in July of that year, 1875, a man was convicted and sentenced to five years' penal servitude at the Sligo assizes for inoculation. He inoculated a child and the child died. The plan pursued with regard to inoculation at that time was that the child was brought to a place and a fee, which was generally half-a-crown, was left with the child. Then the parent or guardian left the child and the inoculator came there and inoculated the child and left it; so that the person who procured the inoculation never saw the inoculator, and was unable to give evidence. In this particular case the mother returned before the inoculator had left, and she was called upon to give evidence, and the man was convicted. I have a note here from my predecessor, Dr. Burke, who was Registrar-General before me; he told me that he had heard on very good authority that a man at Ballyhaunis, in county Mayo, earned 17*l.* in a

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very short time by these small fees for inoculating children.

2840. (*Dr. Collins.*) In what year would that be?—It would probably be in the year 1875. It was in 1875 that this epidemic occurred at Athenry which directed my attention to that particular point.

2841. (*Chairman.*) Is any special point brought out by this Athenry epidemic?—Nothing, except the irregularity of vaccination prior to this outbreak. It is more interesting as regards the means by which the epidemic was spread than as pointing to questions connected with vaccination.

2842. It would not throw any additional light on the subject beyond that given by your general statistics?—No, the general figures are of much more consequence.

2843. In 1880 was there an amendment in the vaccination law?—In that year the 1879 Act came into operation. The 1879 Act was practically inoperative until the beginning of 1880.

2844. In 1882 there was a great increase of public vaccinations, was there not?—There was.

2845. During the years 1883, 1884, 1885, 1886, 1887, and 1888 there have been very few deaths indeed from small-pox?—Very few indeed; it has almost disappeared. From 1882 onward I have much more reliable figures.

2846. But during some of these years do the vaccinations seem to have fallen somewhat low?—In 1882 the number of vaccinations exceeded the births; there were 132,825 vaccinations against 122,648 births. The number of vaccinations dropped afterwards, and it is still going down now. You will see that in this set of printed tables. These are the most important tables that I have, and as accurate as any figures I have.

2847. During the first three quarters of this year I believe there have been no deaths from small-pox in Ireland?—None. The last quarterly report is not circulated yet, but there are not any deaths from small-pox recorded in it, and there have not been any during this year.

2848. I believe you are prepared to hand in a table showing the births, vaccination results, and deaths from small-pox for each union in Ireland from 1882 to 1888?—I have here two tables which I will hand in. (*See Appendix VI., Tables E and F: pages* 260 *and* 268.) I have mentioned that up to the present, this year there have not been any deaths from small-pox registered in Ireland. In the first quarter of last year there were three deaths registered, but two of these occurred towards the end of the previous quarter and were not recorded, so that during last year there was but one death from small-pox in Ireland. Of the three deaths recorded two took place in the Dunfanaghy Union, in the county Donegal; they occurred at the end of the year before last. One of those was an adult who had been vaccinated in youth, and the other was a non-vaccinated child of six weeks. There was also a case in the North Dublin Union, a boy of 12 years, in the Hardwicke Hospital; that occurred within the quarter.

2849. Table E. shows the number of births, the number of successful vaccinations, the number of persons insusceptible, the difference between the number of births registered and the number of persons accounted for as regards vaccination, and the number of deaths from small-pox in each of the superintendent registrars' districts or poor law unions?—There is a difference in that respect between England and Ireland. In Ireland the superintendent registrars' districts are also the poor law unions of Ireland, and they are the same administrative areas as are administered for all poor law purposes in the country. The column is headed "Superintendent Registrars' Districts or Poor Law Unions." There are two tables here, one gives the details for each union for each year. The other is a summary of the results.

2850. The summary shows that during the seven years ending 1888 811,521 births were registered, that there were 709,834 successful vaccinations, that there were 2,271 persons returned as insusceptible of vaccination, that 45,456 unvaccinated children under three months old died, making a total of 757,561 persons accounted for as regards vaccination, leaving a balance of 53,960 unaccounted for?—Yes; that is to say 6·6 per cent. of the births were unaccounted for during that period.

2851. That would make the number accounted for about 93·4 per cent.?—Yes.

2852. In column 6 some of the figures are printed in italics; what is the reason of that?—That shows that the births were fewer than the vaccinations.

2853. That might be accounted for by the vaccination in that year of some who had been born in previous years?—It would account for a few.

2854. Or to some extent by migration from other districts?—Yes, by migration from Great Britain. Of course these cases that we are speaking of now are altogether primary vaccinations. There are no others in this table.

2855. (*Mr. Meadows White.*) There are very few of these cases where the figures are printed in italics?—The number is 41. There are 163 districts, and in 41 of those districts the numbers are printed in italics.

2856. (*Chairman.*) From those returns it appears that if you take the total number of unions where the cases accounted for exceed the births and where therefore the population may be regarded as fully or nearly fully vaccinated, those districts number 41?—Yes, they do.

2857. And small-pox deaths are recorded in only one of them, namely, Tullamore, where there was one death?—That is so; that is, in 2·4 per cent. of the number of districts.

2858. Taking the districts where there were a number of children unaccounted for you divide them into two classes, where the unaccounted were above and where they were below the average of 6·6 per cent?—Yes.

2859. In 52 unions the unaccounted for were above the average?—Yes; and there were 15 in which deaths from small-pox occurred, or at the rate of 28·8 per cent. of the districts. There were 70 unions where the unaccounted for cases were below the average, and in those there were eight in which deaths from small-pox occurred, or at the rate of 11·1 per cent. of the districts. Of course the tendency of that is to show that where vaccination prevailed most small-pox prevailed least.

2860. In Armagh where the unaccounted for amounted to only 1·7 per cent. there were 10 deaths?—Yes, those all occurred in the year 1882, when the unaccounted for were above the average amounting to 7·6 per cent.

2861. (*Dr. Collins.*) What were the ages of those at the time of death?—I could not tell you. The individual cases could be discovered, but I did not look into that.

2862. (*Chairman.*) You have no statistics of those individual cases as I understand?—I have not.

2863. There are some facts with regard to your experience in relation to small-pox at the Cork Street Hospital that you desire to lay before the Commission?—Yes; I was physician to the Cork Street Hospital during the whole of the epidemic of 1871–73, and during part of the subsequent epidemic in 1877–78. I left the institution in 1878, but the epidemic continued some time afterwards. During the continuance of these epidemics and another epidemic in 1881, together with a few scattered cases in the years 1882 and 1886, there were 3,860 cases treated in the Cork Street Hospital from 1871 to 1886 inclusive. I have those cases classified according to their severity in a table which I will hand in. (*See Appendix VI., Table G: page* 272.) They are classified into discrete, confluent, and malignant cases, the latter term being used to designate cases accompanied by black spots and hæmorrhage, of which there were a considerable number. These groups are classed as to whether they were or were not vaccinated, the evidence as to the vaccination being taken from the statement of the patient or his friends regardless of the vaccination marks in a large number of cases. In my time an attempt was made to record the nature and number of the marks, but it was from one cause or another not properly carried out during a considerable portion of the period under consideration, and therefore there are no complete figures available on this subject. Since then I have ascertained that there are some figures to be had at Cork Street Hospital with regard to the nature and number of the marks which might be extracted, but I do not know what condition they are in. I applied to the authorities there, and I have not yet got an answer about it. This Table G. has been compiled in my office from the reports of the hospital, which were carefully examined, and from that table it appears that out of the 3,860 cases treated in Cork Street Hospital during the period under consideration 2,217 were discrete cases, 1,245 were confluent cases,

and 398 were malignant cases. Of the 2,217 discrete cases, 94·9 per cent. were stated to be vaccinated, and 23, or 1 per cent., died. Of these 16 were vaccinated and 7 unvaccinated. In many cases I believe they died of complications; in fact, I know a great many of them did. Of the 1,245 confluent cases 64·4 per cent. were stated to be vaccinated, and 491 or 39·4 per cent. died; of these 491 cases that died 184 were stated to be vaccinated, and 307 unvaccinated. Of the 398 malignant cases, which may all be considered to have been complicated with purpura of a severe type, 61·1 per cent. were stated to have been vaccinated. Of the 398 malignant cases, of which 243 were stated to have been vaccinated, and 155 unvaccinated, 308, or 77·4 per cent., died. Of all the 3,860 cases treated 822, or 21·3 per cent., died. Of the 822 fatal cases 368, or 44·8 per cent., were stated to have been vaccinated, and 454, or 55·2 per cent., unvaccinated. Of the 3,038 who recovered 2,782 or 91·6 per cent., were vaccinated, and only 256, or 8·4 per cent., unvaccinated. Out of the 3,860 patients 3,150 were stated to have been vaccinated; of those 368, or 11·7 per cent., died, and of 710 unvaccinated persons 454, or 64·0 per cent., died. I was physician to Cork Street Hospital I found that during the epidemic of 1871–73, of re-vaccinated cases properly so-called, we had but four. Two of these were brothers, one of whom had been re-vaccinated twice and the other once; both of them had purpuric small-pox and both died showing some extraordinary family peculiarity. Of the other two one was doubtful, and the other so remarkable that I will give the particulars. A male child aged six weeks who had not been vaccinated was admitted; his mother had been successfully re-vaccinated about three weeks before, also his sister aged 13. In order to secure proper attention to the baby, the sister was admitted to nurse him. This she did, sleeping with him at night, and carrying him in her arms all day, until his death on the eighth day. Then the sister fell sick and had the initiatory fever of the disease, and five modified vesicles appeared on her face and two on her chest: she was confined to bed only for four days. I need scarcely point out that the exposure to contagion in this case was almost such as to preclude escape from infection, and I believe, but for the re-vaccination this girl would have suffered terribly. As there were many thousands of persons re-vaccinated at the Dublin dispensaries, if re-vaccination had not been an almost certain preventive of small-pox, we could scarcely have been without many more cases occurring in re-vaccinated persons. There were several cases of so-called re-vaccination where the operation must have been performed after the invasion of the disease; all these cases proved fatal, and I have published an account of them in the British Medical Journal for August 31st, 1872. There were three patients said to have been re-vaccinated. One of these I had little doubt of, as she was an old nurse in a family where I had attended a small-pox patient whom she nursed and for whom she washed. Her attack was slight, and the eruption was almost confined to the wrists, which had been chapped during the cold weather. Two patients had been previously affected by small-pox, one of them having had confluent small-pox, and in consequence was deeply pitted. They were both mild cases; but one, a patient whom I had once treated for fever, and who had chronic disease of the spine, was very slow in recovery. Those are the only two cases I know of, of second attacks of small-pox. Among the patients that were admitted during the epidemic of 1876–78 up to the time of my ceasing to act as a physician to the hospital there were not any cases of small-pox in re-vaccinated persons. The epidemic of 1871–73 was a very severe one. We had to get up a relief committee, and 6,000 persons who had been affected by small-pox applied for relief, either personally or on account of their friends. That is all that I have to say about the records of Cork Street Hospital. The table I have handed in gives a summary of the results there showing the relation of vaccination to the severity of the disease.

2864. Is there any evidence afforded by the statistics you have as to the relation of small-pox deaths to the general death-rate?—Yes, I have figures showing that small-pox being very scattered, and occurring as it were in local outbreaks, it does not affect the death-rate through the country very much. If you take Ireland as a whole the question whether the deaths from small-pox materially influence the general death-rate is difficult to answer, as small-pox epidemics seldom spread over the whole or any great part of the country at once. Thus the epidemic of 1871–73, as it is usually called, lingered on in varying places for about five years. At its height in 1872 it appears to have slightly raised the death-rate in Ireland. The rate was 16·4 per 1,000 living in 1871; in 1872 it rose to 18·1: the highest on record (beginning with 1864) up to that time. It was about the same, namely, 18·3 in 1873; it fell to 17·3 in 1874; and it again rose in 1875 to 18·5, when small-pox still continued, and when scarlatina and small-pox both prevailed at the same time; so that it would be very difficult to make anything of that point with regard to the whole country. The last-mentioned rate has only been exceeded during the year 1878, when the rate reached 18·6, when small-pox again was unusually fatal (there being 873 deaths altogether in that year), and in the years 1879, 1880, and 1883, when the rates stood at 19·6, 19·8, and 19·2 respectively. There was great agricultural distress, approaching the verge of famine, in the winter of 1879–80, and in 1879 small-pox also was very fatal (there were 672 deaths), in the year 1883 there was a high mortality from diseases of the respiratory organs and deaths of old people owing to the severity of the weather. In the case, however, of local epidemics we have got figures to help us. I have a table here showing the deaths in Dublin from all causes compiled from the weekly reports which we publish on Tuesdays. (*The table was handed in. See Appendix VI., Table H: page* 273.)

2865. Will you call the attention of the Commission to the leading facts shown by that table, or the inferences to be drawn from it?—This table gives the deaths and death-rates of the population of Dublin for the past 25 years, and an examination of it will show that the death-rates were unusually high during the prevalence of small-pox. Thus in 1872 there were 1,350 deaths from small-pox in Dublin, and the general rate reached 28·5, a rate not previously reached, except in 1866, when there was an epidemic of cholera. The rate did not rise so high, except in the cholera epidemic of 1866 until 1878, when there were 550 deaths from small-pox and 333 from fever, when the rate reached 29·5 per 1,000, to rise still higher under similar circumstances during the following year when it reached 35·7, to increase still higher to 35·9 in 1880, when small-pox, scarlatina, fever, and whooping cough all prevailed together. There can be little doubt that where small-pox prevails in the epidemic form it materially increases the general death-rate. Here is a diagram made for another purpose, but which illustrates Table H.; it was made for a lecture which I gave some years ago at the Royal Dublin Society, when I was discussing the question of the relation of deaths from zymotic diseases to other deaths, and it shows that small-pox did materially increase the death-rate on several occasions. (*The diagram was handed in. See Appendix VI., facing page* 274.) If you look at the diagram you will see that those diseases which are frequently epidemic in Dublin constitute a band of lines which, taken together, show little variation; wheras cholera, small-pox, and scarlatina, which have from time to time risen into severe epidemics, show their influence by being accompanied by rises in the lines indicating the zymotic death-rate and the general death-rate. In the diagram all these diseases are set out separately at the bottom. There is a line representing the zymotic death-rate; there is one for deaths from respiratory diseases, and at the top we have the deaths from all causes. These tend to show that when small-pox prevailed in a severe epidemic form it did materially influence the death-rate of the city.

2866. Have you also made some notes with reference to the relative ages of persons affected by or who died of small-pox?—I have prepared a table giving annual averages by quinquennial periods and by ages, of the deaths from small-pox in Ireland from 1864 to 1888 inclusive. (*The table was handed in. See Appendix VI., Table J: page* 274). From this it appears that during the first period 1864–68 the annual average deaths of children under 5 years of age from small-pox numbered 164 out of 311, or at the rate of 52·7 per cent.; that is, of the total deaths from small-pox. In the next period, 1869 to 1873 inclusive, the annual average per-centage was 25·7; in the next period 1874 to 1878 it was 24·9 or very slightly less; and in the next period, 1879–83, it was 25·8; so that during the latter three periods the per-centage was practically the same, and it was one half what it was in the first period. During the past five years 1884–88 the number of deaths was so small that reliable ratios cannot be calculated. The remarkable fact demonstrated by the table is that during the first period of compulsory vaccination of infants

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1864-68, the deaths under five years of age are relatively about one half of the total deaths; then in after years when the system became more fully established, although the absolute number of deaths from small-pox was much greater during the quinquennium 1869-73, and considerably greater during the quinquennium 1874-78, the deaths among children under five years of age were only about one quarter of the total deaths. It will be observed that during the same quinquennia the relative mortality at the more advanced periods tended to increase, if you look at the columns of the more advanced ages you will see that the deaths were rising. I have tried to make out also for the Commission a table of the deaths, ages, and vaccinational condition of persons who died from small-pox in Ireland during the years 1881-88. (*The table was handed in. See Appendix VI., Table K.: page* 274.) The number of cases were the condition of the vaccination was unspecified was so great that it prevents one from drawing any reliable conclusion from the figures. Out of 241 deaths at all ages there were 131 persons as to whom we do not know whether they were vaccinated or not, so that Table K. is not of any great value.

2867. Have you prepared a table with reference to the age composition of those dying from small-pox as compared with those dying from fever?—I have a table here with the view of showing what the relation is. (*The table was handed in. See Appendix VI., Table L: page* 274.) I do not attach very much importance to this. I was told it was a question which some member of the Commission wished to be informed on, but the cases of fever have been all lumped together, all the different forms of continued fever. I do not attach much importance to the comparison of this table with that of the deaths from small-pox; firstly, because all forms of fever are combined; secondly, because the different forms of continued fever fall with unequal force on persons of different ages; and thirdly, because the prevalence of the different forms of fever is unequally influenced by sanitary measures. I do not think it is of very much consequence.

2868. The next matter with which you have dealt is one that we do not propose to go into fully at the present stage, but we may as well, having the advantage of your attendance now, take the evidence as a matter of statistics, that is the number of deaths stated to be caused by cow-pox or the results of vaccination?—Since the commencement of the year 1881 there has been a place in the tables for deaths from cow-pox and other effects of vaccination. I, of course, have only the records of the deaths. I know nothing about any illnesses stated to have been caused by inoculation. There have been seven deaths returned as having resulted from cow-pox or other effects of vaccination since the commencement of 1881 to the last quarter (September quarter 1889), out of a total of upwards of 800,000 vaccinations performed during that time. I have got them summarised here:—

DEATHS FROM COW-POX AND OTHER EFFECTS OF VACCINATION IN IRELAND, FROM THE 1ST OF JANUARY 1881 TO THE 30TH OF SEPTEMBER 1889.

Name.	Locality.	Date of Death.	Stated Cause of Death.	Age at Death.
1. Patrick Murray.	Ballinasloe, co. Roscommon.	5.3.81	Blood-poisoning after vaccination.	7 months.
2. Hugh Gilchrist.	Ballymena, co. Antrim.	4.1.82	Setina,* occurring immediately after vaccination.	3 months.
3. John Gallagher.	Londonderry -	17.5.82	Vaccinia, 16 days; debility, 5 days.	6 years.
4. Mary Jane Crawford.	Ballymoney, co. Antrim.	20.6.82	Vaccinia, 26 days; erysipelas, 15 days.	3 months.
5. Lillian Maude Waterman.	Fermoy, co. Cork.	12.10.84	Cow-pox, 1 month; enteritis, 3 days.	3½ months.
6. Mary Devers.	Ballina, co. Mayo.	9.10.87	Cow-pock, 1 month	8 months.
7. Edith Ware Harper.	Belfast	10.1.87	Vaccination, 2 months; general exzema and boils, 1 month.	8 months.

* Setina is a contraction of scarlatina.

I have here certified copies of the entries in those cases taken from the books of the General Register Office.

2869. In the first case I see "cause of death" and "duration of illness," "uncertified," no "medical attendant," besides what you have read?—Yes. I was going to mention that the first two cases are uncertified, they had no medical attendant, and therefore the cases must rest mainly on the statement of the informants. In case 3 the certificate is "Vaccinia, "16 days, debility 5 days." There is nothing to show any connexion between the debility and the vaccinia. Case 4 is manifestly a case of erysipelas after vaccination. Case 5 is manifestly a death from enteritis, a common cause of death in infants affected by diarrhœa, but there is nothing to show that the vaccination had any connexion with the enteritis, especially as it did not arise until 28 days after the vaccination. With regard to Case 6 there is some question whether that was not a case described as cow-pock without its having any relation to vaccination at all. I had not time to inquire into that. I intended to query it when I went back. Case 7 was eczema and boils; the former is a very common disease among infants, and did not arise until a month after the vaccination, therefore it can scarcely have had any connexion with it. I have not sent any queries with regard to these cases, but if the Commission desire it I will direct queries to be made as to any particulars they wish to have.

2870. To avoid the necessity of your being recalled, it might be as well to have also as a matter of statistics a table which you have prepared with reference to deaths from infantile syphilis registered between the years 1864 and 1888, showing the number each year under one year and over one year, and under five years?—From this table it appears that during the past 25 years syphilis in infants has tended to diminish as a cause of death in Ireland. (*The table was handed in. See Appendix VI., Table M: page* 275.) The total number in 1864 was 107 (when registration was imperfect), in 1865 there were 141, and in 1888 only 47; the average of several years past, being about 50, is little more than a third of what it was 25 years ago.

2871. For the last 20 years it appears to have kept very uniform?—Yes, very uniform.

2872. With reference to blindness resulting from small-pox, are you able to give us some statistics?—Yes, I hand in a table dealing with that. (*See Appendix VI., Table N: page* 275.) In this case the information is derived from the individual who is blind. The blind persons are returned in the first instance in the ordinary Census form, and then a query is sent to each as to the cause of blindness, duration of blindness, and so on. In 1851 the total number of the blind in Ireland was in the ratio of 1 in 864 of the population, but at that time we did not know anything about the causes of blindness. In 1861 there were 1 in 843 of the population blind, and the total number of deaths from small-pox during the preceding 10 years was 12,727, and the ratio of the blind from small-pox to the total blind population was 1 in 9·5. Then in 1871 it became 1 in 12, and in 1881 it became 1 in 17, so that the number of persons reported as blind from small-pox has materially decreased. Of course these are figures that have not the exactitude of regular statistics, but nevertheless they are founded on queries addressed direct to the persons concerned.

2873. The number of cases in which blindness is attributed to small-pox diminished from 725 in 1861 to 359 in 1881?—Yes, but the ratio of the blind from small-pox to the total blind is the main point, that is in the last column.

2874. (*Professor Michael Foster.*) Are you in a position to make any statement with regard to the quality of vaccination in Ireland?—No.

2875. Will Dr. MacCabe be able to give us any information about that?—You will probably get from him all that is known upon the subject.

2876. In your Table M., giving the number of deaths from infantile syphilis, would not it have been as well besides the general total to have given the death-rate, as there has been a diminution in the population of Ireland?—That could easily be added.*

2877. Your Table A. gives the estimated population of Ireland as being 4,777,534 in 1888, whereas it was 5,640,527 in 1864?—Yes.

* This has since been done.

2878. Have you any data as to the number of deaths from syphilis of infants under three months?—No, I have not taken that out. The ages can be taken out if it is considered desirable to do so; in fact, this table was asked for by Dr. MacCabe for some of his own purposes, and I thought I might as well put it before the Commissioners. It was made out for him in the form in which he asked for it.

2879. (*Mr. Picton.*) Was the syphilis in any of those cases ascribed to vaccination?—In none that I am aware.

2880. (*Mr. Whitbread.*) With regard to inoculation, who drew up this report in the "Sanitary Record"?—I did.

2881. Do you believe the statement there to be correct that inoculation was practised to a considerable extent up to the year 1874–75?—I am quite satisfied of it. It was well known to everybody in the west of Ireland that it was.

2882. I presume it was principally practised upon the children who were not vaccinated?—I do not know about that.

2883. Parents, as a rule, liked to have the double-barrelled security of vaccination and inoculation too?—I could not answer that.

2884. Assuming that they would have preferred probably one remedy or the other, if a considerable number of unvaccinated children were inoculated it would go far to destroy the value of any comparison as to the amount of security given by vaccination, would it not?—If there were a very considerable proportion of such cases, but I do not think there was any large proportion.

2885. But even a few cases of inoculation upon the smaller number of children who were unvaccinated as compared with vaccinated would largely alter the proportion, would it not?—I do not think a small number could have much effect in altering the proportions. I have no idea that there was such a prevalence of inoculation as could compare in any appreciable ratio with the number of vaccinations. I have no particular knowledge upon the subject.

2886. I draw your attention again to the conclusions stated to be arrived at in that report: "No. 1, that "the prevalence of small-pox now existing in Athenry "is a portion of an epidemic spread over the north "and west of Ireland. No. 2 that the spread of the "disease in the west of Ireland has been much "accelerated by inoculation"?—When I say "spread" I do not mean that all those people who had got small-pox were inoculated. I mean that one case or a few cases of inoculation would communicate small-pox to other people. I do not attribute the cases that are recorded there as having small-pox directly to inoculation, but indirectly; that is, that an inoculated person would become a centre of contagion to the surrounding community. I never met with a case during that inquiry suffering from small-pox who was stated to have been inoculated.

2887. Would it be likely that an inoculated person would cause contagion?—I think so under the circumstances.

2888. From the account given in that report does not it appear as if inoculation was a customary practice well understood and known in the neighbourhood?—No doubt it was well known in the neighbourhood. There was a considerable amount of it, but small-pox originating directly from inoculation is one point, and small-pox originating by contagion from a person inoculated is a different thing; and that is what in that report the spread is attributed to.

2889. (*Mr. Meadows White.*) In your evidence with regard to your second table you said you had omitted reference to the Act of 1858?—I did. I overlooked that.

2890. That Act would extend, you see, over a part of the decennial period 1851 to 1860, and over part of the period from 1861 to 1870?—Yes.

2891. I see that that Act has considerably assisted vaccination, it provides that dispensary committees may divide dispensary districts and require medical officers to attend for purposes of vaccination. It directs payment of medical officers for successful vaccination. It directs that medical officers should report the number of persons successfully vaccinated, and it also gives the costs of proceedings taken by guardians against persons inoculating?—That was really to supplement the previous Acts.

2892. Still, that would have had some effect?—Yes.

2893. And might have been influential in the decrease of deaths from 493 per million to 213 and 52?—Yes.

2894. With regard to Table D, it struck me as being strange that in the Dublin registration district the proportion of public vaccinations to births seems to have fallen so much of late years. Have you any explanation to give upon that?—I cannot explain why that should be so of late years. I can give an explanation why Dublin is not so largely vaccinated as other places. There are two large unions in Dublin, consisting of the city and a part of the suburbs, and a third union, Rathdown, consisting of a portion of the suburbs. Numbers of women in advanced pregnancy are admitted into the unions for the purpose of being confined, and they leave almost invariably as soon as they possibly can after their confinement. They take away the baby with them, the three months has not expired, and the child has not been vaccinated. That is one point. Another is that in Dublin there is a very large lying-in hospital in which a large number of children are born. Those women come from all quarters, and many of the children are illegitimate; the moment the mother gets free from the hospital she disappears altogether with her child. Those births are all registered in one district in Dublin, and comparatively few vaccinations of those children are registered in that district.

2895. In 1884 there were 10,268 births registered and there were 4,849 vaccinations at dispensaries and 2,119 vaccinations at the Cowpock Institution, making a total of 6,968 vaccinations. In 1885 the number of births registered was 10,144, and the total number of vaccinations was 6,813. In 1886 there were 10,199 births registered, and there were only 6,724 vaccinations. In 1887 there were 9,840 births registered, and 6,691 vaccinations; and in 1888 there were 9,884 births registered, and 6,616 vaccinations. The proportions of vaccinations to births registered in those years appears to be small?—It is; that is one of the usual falls that takes place after a small-pox epidemic.

2896. In column 7 the deaths from small-pox are very few?—There is no alarm, and therefore the people do not give so much attention to it.

2897. It looks as if the number of deaths from small-pox was declining, and the proportion of vaccinations to births decreasing?—I am afraid we are just ready for another epidemic.

2898. (*Mr. Picton.*) I think you told us that there are no repeated penalties in Ireland on non-vaccination?—I do not think I said so. I believe there are.

2899. In 1871 the Committee sitting on the Vaccination Act were informed that there were no repeated penalties; was that altered in the Act of 1879?—I cannot tell you. I could not answer that question. My impression is that offenders may be fined repeatedly.

2900. The Committee in 1871 were informed that there was a general disposition to accept vaccination gratefully in Ireland; is that so still?—I think that is so; that is my opinion.

2901. They were told by Sir Dominic Corrigan in answer to Question 4003 that the feeling of the whole country was in favour of it; is that so still?—It is, in my opinion.

2902. Is compulsion necessary in Ireland at all?—There are a good many prosecutions, but not a large proportion.

2903. Do you think if there were no compulsion the number of vaccinations would be very much diminished?—It is very hard to express an opinion of that sort. I think the people yield to Vaccination Acts very readily. There are more cases of negligence than attempts to evade the Act, that is my impression.

2904. Referring to your tables, comparing Table A. with Table C., I find some inconsistencies which I am not able to explain. In Table A., taking as an instance the year 1882, you give the number of deaths as, I understand from small-pox, 137, whereas in Table C., in 1882 the number of deaths is given in the last column as 129?—The figures for 1882 in Table C. are exclusive of the deaths from chicken-pox, that makes the difference, 8 from 137 leaves 129. The object of putting in that last column in Table A was in order that any member of the Commission who wished to correct the previous column could do so for himself.

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2905. That is an explanation of all the differences?—Yes, I presume the figures are all quite correct; all this has been carefully checked by my statistical clerks.

2906. Perhaps it is my dullness, but I do not quite understand it yet, for in Table A. in 1864 the number of deaths is given as 854, and it is 854 in Table C.; there they agree; the 12 chicken-pox cases are not left out in Table C.; how is that?—In Table C., from 1864 to 1880 inclusive, the deaths from chicken-pox are included; after 1881 they are excluded.

2907. Referring to the next year, 1865, in the same way the number of deaths from small-pox is 461 in each table?—Yes.

2908. (*Chairman.*) No deduction is made until you come to the year 1881?—It was only in 1881 that the published tables showed the deaths from small-pox exclusive of those from chicken-pox. A supplementary table being given by means of which deaths from chicken-pox and other special diseases could be deducted from the numbers in the general tables. In 1881 by an arrangement with the office here in London we struck out a new form of classification of disease.

2909. (*Mr. Picton.*) Do you consider that in Table C. there is reasonable proof of the effect of vaccination in diminishing deaths from small-pox?—It appears to me that there is.

2910. In what way do you think it is shown?—I think it is mainly shown by the converse, that when vaccinations fell low we immediately had an epidemic of small-pox.

2911. Do you mean in the following year?—The following year, or the year after.

2912. A low rate of vaccination in one year leads to an increase of small-pox in the next year?—No, I will not say that, because there might be no contagion in the country, no approach to an epidemic. Another point I would mention is that the death statistics are made up to the last day of December; that is my year; the Local Government year ends at the 30th of September. The two do not correspond accurately.

2913. Will you please refer to 1870 in Table C. The number of births in that year is given as 149,846, is it not?—Yes.

2914. And the number of young persons vaccinated in column 4 is given as 135,057, is it not?—Yes.

2915. Are you aware that in the returns of the English Local Government Board the number of children dying before the age of vaccination, which is three months, is more than 9 per cent.?—I do not remember that.

2916. In Ireland is it as low as 5 per cent.?—Yes, the infant mortality for Ireland, taken as a whole, is considerably below the English rate.

2917. Taking it at 5 per cent. out of 149,846 there would die before three months of age 7,492, would there not? That would be 5 per cent.?—Yes.

2918. You have to deduct those, so that there would be 142,354 living at the age of three months?—Yes.

2919. In the English returns are you aware that they then deduct a per-centage for those who are insusceptible?—Yes.

2920. Those are not given here?—No, because I did not know them. That was before we had the means of collecting that information.

2921. Are you aware that a further deduction is made for such as had contracted small-pox before they could be vaccinated?—Yes.

2922. Is that deduction made in your tables?—No.

2923. When you have made all these deductions from 149,846 births, do not you think the 135,057 vaccinations represent an exceedingly good state of vaccination. Could you call that a bad vaccination year?—There were a number of children who were not vaccinated at all who were born before 1864.

2924. I would like you to tell me whether you would consider that a good or a bad vaccination year?—It would be a medium vaccination year, I suppose, scarcely either good or bad. I can only take the figures that I know of.

2925. Taking the figures you give us, would you call it a good or a bad vaccination year?—You cannot take deductions made in England as applicable to Ireland, the rate of mortality in Ireland is a totally different thing to what it is in England; the infantile death-rate is very much lower in Ireland. I do not know what the infantile mortality at that time was.

2926. You have given us the rate of mortality for a long series of years in the later table?—Yes.

2927. That being 5 per cent. in children under three months?—Yes.

2928. Is not it fair to take it as 5 per cent. in this year 1870?—Yes.

2929. That would reduce the number to 142,354, and, after making other deductions for children insusceptible, I must again ask you whether 135,057 is not a very respectable number of vaccinations?—The figures speak for themselves.

2930. You told us in the early part of your examination that by far the larger number of those in column 4 would have been born in the year opposite the number given in that column as being the number of vaccinations in any particular year?—Not at that date, that was during the six months period. The vaccinations are made up to the 30th of September. It throws the whole thing out completely in making exact calculations. You have six months of the previous year running on.

2931. Do you think that any considerable number of the children born that year, 1870, were unvaccinated during the year for which the vaccination return is made up?—Yes, certainly; a very considerable number.

2932. Would they be vaccinated the next year?—That would depend upon circumstances, whether the country was roused up or whether a circular was issued by the Poor Law Board. I told the Commission that these figures must be received with considerable caution.

2933. In 1871 the number of births was 151,355, was it not?—Yes.

2934. The number of vaccinations of children born since 1864 was 139,053, was it not?—Yes; but that was the number of children vaccinated up to the 30th of the previous September.

2935. But there was a larger number than in the previous year?—Yes.

2936. And in that year did the number of deaths from small-pox suddenly spring from 32 to 665?—It did.

2937. In the next year, 1872, the number of births was 149,278?—Yes.

2938. And the number of vaccinations 142,662?—Yes.

2939. And the number of small-pox deaths suddenly rose to 3,248?—Yes.

2940. The small-pox rate rose rapidly during those three years, in fact by leaps and bounds, did it not?—Yes.

2941. The vaccination rate was increasing during those years?—Yes.

2942. In the following year did the number of vaccinations fall to 119,319 of children born since 1864?—Yes.

2943. Did the number of small-pox deaths fall to 504?—Yes.

2944. Not to delay you unnecessarily long, during the next two years was not the amount of vaccination practically the same?—It was.

2945. And the number of deaths from small-pox increased in the year 1874, did it not?—Yes.

2946. And fell again in the year 1875?—Yes.

2947. Do you observe that in 1876 the number of vaccinations of young people fell to 112,489?—Yes.

2948. And the number of small-pox deaths fell to 24?—Yes.

2949. Do you think those figures are consistent with the theory that the increase of vaccination decreases the number of deaths from small-pox?—Certainly, for this reason, that the vaccinations rose because the small-pox was there, not the small-pox because the vaccination was there. There were circulars issued by the Local Government Board calling upon the guardians throughout the country to enforce the

vaccination Acts in consequence of the prevalence of small-pox.

2950. That is your explanation?—Yes; and the converse is very apparent; whenever vaccinations fell very low the small-pox began to show.

2951. We will take the years where the number of vaccinations of children born since 1864 has fallen apparently very low; in 1884 it fell to 99,445, did it not?—Yes.

2952. How many small-pox deaths were there then?—One.

2953. Has that low rate of vaccination been since followed by any great increase of small-pox?—No, certainly not.

2954. In 1888 the number of vaccinations was 89,627?—Yes.

2955. In that year did the number of small-pox deaths largely increase?—No.

2956. (*Dr. Collins.*) To what cause do I understand you to attribute the recrudescence of epidemics of small-pox in Ireland?—To the diminution of vaccination.

2957. Do you attribute the epidemic of 1871 and the following years to neglect of vaccination?—I do, and re-vaccination. In "vaccination" I always include the term "re-vaccination," because I consider that essential for the prevention of small-pox.

2958. Are you aware that before the Committee of the House of Commons which sat in 1871, the progressive diminution almost to nothing of the small-pox death-rate in Ireland from 1865 to 1870 was claimed as the result of the operation of the Vaccination Act?—Yes, I believe it was.

2959. In the evidence of Sir Dominic Corrigan before that Committee the following passage from a circular issued by the Poor Law Commission of the 20th September 1869 was read by Dr. Lyon Playfair:—"It is "encouraging, however, to observe that the present "total cessation of the disease in Ireland has been "gradually approached since the compulsory vac-"cination of children has been put in force under the "Act of 1863, the annual mortality by small-pox "having been for many years previously about 1,000 "deaths on the average, representing, of course, a very "much larger number of cases of attack and dis-"figurement. The course of decrease in the mortality "has been as follows:—In 1864 the number of deaths "was 854; in 1865, 347; in 1866, 187; in 1867, 20; "in 1868, 19; in the first quarter of 1868, 3; and in "the second quarter, none." Upon that Dr. Lyon Playfair asked: "Does that, in your opinion, represent "fairly the action of the Vaccination Act in Ireland?" and Sir Dominic Corrigan said, with some slight qualification, "I am sure it does." Would you endorse that opinion?—I think I would. Perhaps you will allow me to read a quotation from this paper of mine on the prevalence of small-pox in Dublin. It is a quotation from the evidence given before the Royal Sanitary Commission in 1869, in which exactly the same point was raised; it is from the examination of Dr. Burke, who at that time was superintendent of statistics at the General Register Office. He was asked, at Question 8841, "Are you satisfied that "the singular diminution in the amount of small-pox "is owing to compulsory vaccination?" and he answered, "The diminution is very remarkable, but no "epidemic of small-pox has occurred since the intro-"duction of the Compulsory Vaccination Act." Again, answering the Question 8842, "I presume that you do "not go so far as to say that owing to compulsory "vaccination small-pox has been stamped out in Ire-"land, or that it will be stamped out." Dr. Burke said, "I should be very sorry to make use of such an "expression. I think you should have the test of an "epidemic in the country before you would use such "strong terms." The fact is that the disease was not introduced.

2960. Then do I understand that vaccination had been neglected to a large extent before the year 1871?—It had.

2961. It was incorrect to represent Ireland as a well-vaccinated country in 1871?—I think that statement is rather an over-statement; it certainly was not as well vaccinated as it is at present.

2962. Is there any year for which you have official figures in which there were more deaths from small-pox in Ireland than in 1872, when there were 3,248?—No.

2963. You have given us some figures for Dublin, have you similar figures for Cork?—I have not, but they could be got for any district that might be named.

2964. In the Blue Book handed to us by Dr. Thorne I read that "the deaths in Dublin in 1872 were 1,350, "and throughout the whole of the epidemic 1,557, or "at the rate of 5 per 1,000 of population, a rate ex-"ceeding that of any large English town except Sun-"derland, Norwich, Wolverhampton, and Newcastle-"on-Tyne. The deaths in Cork were 1,873, or at the "rate of 9·6 per 1,000 of population, which is a higher "rate than that of any large town in England"?—I believe that is correct.

2965. So that the rate in the year 1872 in Cork, 9,600 per 1,000,000, would be greater than any of the annual averages that you gave us from 1831 to 1861, would it not?—The annual averages are for Ireland; of course the small-pox does not prevail all over Ireland at the same time; it might be occurring at Cork, and there might be a totally distinct state of things in a place 100 miles off.

2966. Have you had any evidence before you to show you that previous to that year vaccination had been neglected in Cork?—I have not looked into it. I believe Cork is not well vaccinated at present—it has been rather a neglected place.

2967. I understood you to say that some of the epidemics of small-pox in Ireland, at any rate as late as 1875, were, in your opinion, attributable to inoculation?—No, not attributable to it.

2968. Not the epidemic in Athenry?—No, I did not say that.

2969. You do not think that the practice of inoculation would be likely to introduce small-pox into the country?—Yes, I do, certainly.

2970. Given the practice of inoculation in a particular country do you think it likely that the small-pox mortality in that country would increase?—If it was left to itself. If you inoculate a number of people and let them loose in the community of course small-pox would spread.

2971. Was inoculation as practised in Ireland practised under such restrictions as would have prevented it spreading?—I think it was to a great extent, because it being illegal there were a considerable number of attempts made to conceal it.

2972. Would the methods you describe to us with regard to placing children in certain places for illicit inoculation be likely or not to assist the spread of an epidemic of small-pox?—I should say they would very likely restrain the full force of it; because the people would conceal those cases, and in order to conceal them they would keep them from contact with other people; nevertheless, they would be likely to give rise to a certain limited number of cases.

2973. Before 1858 in Ireland inoculation was not a penal offence, was it?—No.

2974. Prior to 1858 was inoculation more extensively practised?—I cannot tell you.

2975. It has been given in evidence that inoculation up to the beginning of this century and apparently for some time after the commencement of this century was practised in this country; was that the case in Ireland so far as your information goes?—I think so. I am pretty sure it was. As a historical fact, there is no doubt it was.

Adjourned till Wednesday next at 1 o'clock.

Fifteenth Day.

Wednesday, 6th November 1889.

PRESENT:

THE RIGHT HON. THE LORD HERSCHELL IN THE CHAIR.

Sir JAMES PAGET, Bart.
Sir W. GUYER HUNTER, K.C.M.G., M.P.
Mr. WILLIAM SCOVELL SAVORY.
Dr. JOHN SYER BRISTOWE.
Dr. WILLIAM JOB COLLINS.
Professor MICHAEL FOSTER.
Mr. JONATHAN HUTCHINSON.
Mr. J. ALLANSON PICTON, M.P.
Mr. SAMUEL WHITBREAD, M.P.
Mr. F. MEADOWS WHITE, Q.C.

Mr. BRET INCE, *Secretary.*

Mr. Thomas W. Grimshaw, M.D.

1 Nov. 1889.

Mr. THOMAS W. GRIMSHAW, M.D., further examined.

2976. (*Dr. Collins.*) With reference to the nature of the lymph employed in vaccination in Ireland, would that be in your department or Dr. MacCabe's?—I do not know anything about that. Dr. MacCabe will give you any information that is available on that subject.

2977. With reference to the question, whether repeated penalties are recoverable under the Vaccination Acts in Ireland, are you aware that John Savage of Kinsale was fined 29 times?—No, I do not know anything about the particulars. I think I stated my opinion that the penalties could be repeated, but I know nothing about the particulars of the administration.

2978. Can you tell me when the Public Health Act came into operation in Ireland?—The general Public Health (Ireland) Act is the Act of 1878. There was another Act in 1874.

2979. Since that time has there been considerable improvement as regards the sanitary condition of the large towns in Ireland?—There has been an improvement. It is a question, of course, of degree, but I do not think there has been so much improvement as there should have been.

2980. The earlier periods, for which you have given us figures in Table B., would include famine years, the years in which there was a failure of the potato crops, would they not?—Yes, the great famine is included, of course, between 1841 and 1851.

2981. The 1864 Act would come into operation during the period 1861–70?—Yes.

2982. And I see the small-pox deaths per million living were 52?—Yes.

2983. During the next period, 1871–80, the rate rose to 143, did it not?—It did.

2984. And since that period, from 1881 to 1888, there has been a great diminution down to 6, has there not?—Yes.

2985. Did I correctly understand you to say, in answer to Mr. Picton, that the low mortality from small-pox within recent years was to your mind premonitory of a new epidemic of small-pox?—That, taken together with the fact that vaccination had fallen somewhat. You remember, possibly, that at the bottom of the printed tables it is shown that there are 6·6 per cent. unaccounted for as regards primary vaccinations I consider that that is a considerable proportion, and may afford food for small-pox. As we have had very little small-pox lately, and as there are a considerable number of persons who are not accounted for in our vaccination records, amounting to 6 per cent., it is probable that we are open now to an epidemic of small-pox if the disease were introduced.

2986. You think that the operation of the Vaccination Acts, as at present carried out in Ireland, would be insufficient to secure the nation from a further outbreak of small-pox?—Yes, it is certainly insufficient absolutely to prevent small-pox.

2987. (*Dr. Bristowe.*) In certain cases?—I say that absolutely to prevent an outbreak of small-pox I consider that vaccination is insufficient at present. I would remind the Commission that I have always used the word "vaccination" to include re-vaccination, because I do not consider that primary vaccination will prevent any community from suffering from small-pox.

2988. (*Dr. Collins.*) Will primary vaccination, as at present carried out in Ireland, secure from an epidemic of small-pox?—No, certainly not; nor at any time.

2989. You put in a table (which has not yet been printed, I believe) showing some relationship between general mortality, zymotic mortality, and small-pox mortality?—Yes; that was for Dublin only.

2990. Could you tell us whether the general death-rate and the zymotic death-rate in Dublin are high relatively to other large towns?—The general death-rate of Dublin is very high; it is one of the highest in the United Kingdom.

2991. Should I be right in saying that it is somewhere near 35 per 1,000?—It has been 35 per 1,000. The yearly average for the period ending 1873 was 26·0, and it rose then for the next decennium to 29·2.

2992. Is the zymotic death-rate for Dublin high as compared with that of other large towns?—Not very high.

2993. Could you give us the figures?—I have not got them on the table which I have before me. I have handed in a diagram which has the death-rate marked on it, I think. I know, as a matter of fact, that it is a very high death-rate in Dublin. It is a matter that we have always complained of and we have been working very hard to reduce it; but I should mention that the great height of the death-rate of Dublin depends upon constitutional diseases and diseases of the respiratory organs. We have a great many cases of deaths both from consumption and from diseases of the respiratory organs generally. They are the main element of the death-rate of Dublin.

2994. Do you find, as a matter of general experience, that the reduction of one zymotic disease reduces the general zymotic mortality?—In particular cases it does. For instance, there are certain diseases, such as cholera, scarlatina, and small-pox, all of which have produced sensible effects in raising both the zymotic death-rate and the general death-rate of Dublin. There is a diagram (*see Appendix VI., facing page* 274) which I referred to in my previous examination, which shows this much better than the table.

2995. The Tables E. and F. which you have handed in refer to the vaccination of children during the years 1882–88, and show 169 deaths from small-pox at all ages during the same period?—Yes. It is practically the vaccination of children. If there have been children who escaped vaccination and have grown up to adult life, and were primarily vaccinated, they would be included in the table, but they must be a very small number. It is the result of primary vaccinations as distinguished from re-vaccinations. There are no re-vaccinations in this table.

2996. Can you tell us whether any system of isolation of such a disease as small-pox by means of infectious diseases hospitals is largely practised in Dublin, or in any other Irish town?—Yes, I should think very much the same as in most places. We have special hospitals. There are two large infectious diseases hospitals in Dublin; for instance, one on each side of the town; and during the small-pox epidemics they have had

special portions of their buildings devoted to small-pox.

2997. I see in your Table D., which relates to Dublin, in the year 1872 while there were 1,350 deaths from small-pox in that year, or in the year corresponding with it, there were 652 small-pox cases admitted to the hospital, while in the year 1878 there were 550 deaths from small-pox, whereas 2,309 cases were admitted to the hospital; do not these figures suggest that there has been more efficient isolation by means of infectious diseases hospitals during the latter period than during the former?—Certainly it is the fact that there has been more care taken. The health officers of the city have been more active in driving people into hospital, and the magistrates have been more willing to give orders for removal to the hospital. There is no doubt whatever that the business is better done.

2998. In Table G. I observe that you give the total mortality of the vaccinated and unvaccinated together as 21·3 per cent.; can you tell us how that compares with the mortality in the unvaccinated in pre-vaccination times?—No, I cannot. Compared with these figures, it is 63·9 deaths for the unvaccinated, and for the vaccinated 11·7. I could not tell you anything about pre-vaccination times. The fact is that this form of making up the statistics was introduced by myself into the Cork Street Hospital when I was physician there. Previously to that they were not very definitely kept.

2999. Is the practice of re-vaccinating the nurses in the small-pox hospitals in Dublin uniformly carried out?—I think so. I can speak for Cork Street that it was uniformly done there in my time, and it has been done since.

3000. Are you aware of the experience which is recorded in the "Medical Press" by a Mr. Porter with respect to the attendants at the South Dublin Union sheds in the epidemic of 1872, where the experiment was tried of not re-vaccinating the nurses?—I do not remember. I may mention that everybody in Cork Street Hospital was re-vaccinated in my time, except one resident pupil who refused to be re-vaccinated, and he died of small-pox. He was the only one of the officers or servants in the institution that was not re-vaccinated.

3001. Have you heard of any experience of small-pox among the re-vaccinated students attending the Misericordia Hospital?—There was something about it, but I forget the details. I have not looked up all these things lately.

3002. In Table J. which you have handed in, I think in all those figures the deaths from chicken-pox are excluded, are they not?—Not before 1881.

3003. Most of the chicken-pox deaths would be in persons under five years of age, would they not?—Yes, I think so.

3004. Do you observe in the last line on that table giving the rate per million living at different ages, that while the mean of all ages is 72, that rate is exceeded in the periods 0 to 5 years, 5 to 10 years, and 15 to 25 years; and is less in the periods 10 to 15 years, 25 to 45 years, and 45 years and upwards; the rate from 0 to 5 years being 184, from 5 to 10 years 80, and from 15 to 25 years 93; so that all those would be in excess of the rate at all ages?—Yes, that is so.

3005. Whereas from 10 to 15 and from 25 years upwards the rates are less than they are at all ages?—Yes.

3006. Have you any further explanation to offer with reference to Table L. referring to fever?—No, I do not think there is anything that I wish to mention upon that point.

3007. I have before me the Supplement of the 17th Report of the Registrar-General for the years 1871–1880; would that be one of your reports?—Yes; that is a decennial summary for Ireland.

3008. I read there, on page 24, "An investigation "into the relative number of deaths at different ages in "typhus and enteric fever is very interesting. Table "XII. sets out these deaths by eleven age periods. "Under five years the proportion of deaths from typhus "is smaller than at any other period of life, while in "enteric fever it is larger. As middle life is reached "the death-rate from typhus increases, while that "from enteric fever diminishes, as compared with "early life; both diminish as old age approaches. "The high rate of mortality from typhus is maintained for a considerable period during middle age, "when this disease is especially fatal. In the case of "simple fever the rate of mortality steadily increases "as age advances, reaching its maximum in advanced "life." That suggests a different behaviour as regards age-incidence and mortality in the different classes of fever, does not it?—Yes; I think I mentioned on the last occasion that in Table L. all the fevers are combined, and I said that I did not attach much importance to it from that fact, because the incidence of death is different in the different forms of fever.

3009. I see you add that "The statistics of deaths from "forms of fever, included under the head of 'simple "' and ill-defined fevers,' are so numerous and indefinite "that they defy any kind of accurate analysis"?—Yes.

3010. Those deaths from "simple and undefined "fevers" would form a considerable proportion of those in Table L., would they not?—Yes; a considerable number.

3011. Have you taken out the figures for typhus and typhoid separately?—Not for the whole period covered by Table L.; in the earlier years all the deaths in the group were tabulated under one head,—fever. It is a well known fact that typhus fever is scarcely fatal at all to children. I never saw a young child die of typhus fever, and I have seen thousands of cases.

3012. With regard to Table M., in reference to infantile syphilis, may I ask with what object that table is furnished?—That table was furnished for the purposes of the Local Government Board, and Dr. MacCabe will probably be able to tell you the object of it. It was with a view of comparing, I think, with some of their records, but I do not exactly know which. I was asked the last day to add the rate per 1,000,000 to this table, which I will have done.

3013. That would make it in proportion to the population?—Yes.

3014. Could you tell us whether the opinion held in Ireland by eminent medical authorities at the present time would be that which was given by Sir Dominic Corrigan in 1871, who represented Irish medical opinion before the Committee, and who was asked, at Question 4059, "You hold, do you not, that vaccination will "not convey syphilis or any other than the vaccine "disease?" and his reply was, "That is my opinion. "I hold that it will not convey any poison whatever "but itself, and in using the word 'poison' I use it, "of course, in the sense in which it may include the "most healthy things as well as the most destructive"?—I do not think that that is a universally accepted opinion. I think that many men would hold that other diseases might be conveyed by vaccination.

3015. Are there men of eminence who hold that opinion?—I could not name any one at present, but I have no doubt that there are men who believe that other diseases can be conveyed by vaccination with the lymph. I think there are, but I cannot mention any one at present.

3016. Do you hold that opinion yourself?—I really have not a very definite opinion upon the subject. I think it is a very doubtful question.

3017. Could you tell us what other diseases are, in the opinion of some medical men in Ireland, conveyed in the process of vaccination?—I cannot say that, because I do not remember any individual who has expressed an opinion upon the subject that I could quote at present. Officially these questions do not come under my notice at all.

3018. With reference to Table N., which speaks of blindness from small-pox, have there not been in the decennium 1871–81, a larger number of cases and deaths from small-pox than there were in the decennium 1861–1870?—Yes.

3019. And yet the ratio of the blind from small-pox to the total blind population was reduced from 1 in 12 to 1 in 17?—Yes; there is an explanation of that which I did not give before. Ophthalmia, which was very prevalent in Ireland, has decreased. Every one who has any experience of ophthalmia knows that if a person suffering from ophthalmia is attacked by small-pox, the ophthalmia attacks the eyes with special virulence. In that way some of the diminution may have taken place; it may be partly owing to the diminished severity of small-pox, and partly owing to the diminution of ophthalmia.

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3020. Is not the blindness that occurs in small-pox usually referable to coincident ophthalmia rather than to the pustules on the cornea?—My point is this: that the eyes of persons who are suffering from ophthalmia at the time that they are attacked by small-pox suffer more severely.

3021. (*Professor Michael Foster.*) Your table of blind from small-pox would include those blind from small-pox alone and those blind from small-pox occurring with ophthalmia?—It would, I think.

3022. (*Mr. Meadows White.*) Have you, in your acquaintance with the general population of Ireland, observed any difference in their appearance, comparing the present time and the time when you were young with regard to the marks of small-pox?—I do not know; perhaps I am not old enough; I have only been 30 years in the profession altogether.

3023. (*Professor Michael Foster.*) You called our attention to certain cases of inoculation of small-pox at Athenry; have you reason to think that that is general over Ireland, or is it confined to that district?—It is certainly not general. At that time it was confined to the west.

3024. (*Mr. Whitbread.*) The "west" is rather a wide expression?—By the west of Ireland we mean west of the Shannon.

3025. Is it general in the west?—No, it is not general; it is exceptional there.

3026. (*Professor Michael Foster.*) Have you ever known of its having taken place in other localities than in the neighbourhood of Athenry?—No, I do not know of any case. I should not say that it was the neighbourhood of Athenry, because when I spoke of those cases I meant in Connaught. It is not immediately in that district or in that union, but in Connaught, in Ireland, west of the Shannon.

3027. If you had to name the part of Ireland in which inoculation had taken place comparatively recently you would name Connaught?—Certainly.

3028. And it has not taken place elsewhere so far as you know?—I should say not elsewhere, so far as I know. Dr. MacCabe will be able to give you more particulars about that. I do not think that some of the members of the Commission in dealing with the tables of public vaccinations and small-pox, Tables C. and D., were quite aware of the discrepancy in dates. I think there was some confusion about it. The births and deaths years are made up to the 31st of December; the Local Government year ends on the 30th of September, and it is in the latter that the record of public vaccinations is published. In the earlier periods, before the passing of the Act of 1879, the children had six months to be vaccinated. After that period they had three months. If the years in the earlier period were compared accurately it would be found that there were really only the children born within one quarter of the year that would come in as common to all those three periods. So that a comparison between those different columns in the table might mislead. I cautioned the Commission against it before.

3029. (*Chairman.*) That is to say, it is impossible to draw any accurate deduction by taking one year only, but you must take groups of years?—Yes; in the same way in Dublin there is another element introduced. With the exception of those for the years since 1878, the statistics for the Dublin hospitals are made up to the 31st of March. Several of the Dublin hospitals have Government grants, and in order to meet the demands of the Treasury and keep the financial year square with the Treasury year, statistics are made up to the 31st of March; so that in that case there is another element introduced, which leads to some confusion; and although if it had been done at the time it would have been quite possible to have taken them out by dates and arrange them in corresponding years, it is absolutely impossible now; you could not make an accurate comparison at this period. But, as your Lordship says, if they are taken in groups of years the figures will give a very accurate general idea.

3030. At all events, two years must be taken; that is to say, those who were born in one year ought to have been vaccinated at some time during the course of the next year?—Yes.

3031. (*Mr. Picton.*) Table C. does show with accuracy the rise and fall of vaccination from year to year, and the rise and fall of the death-rate from small-pox?—Yes, but they are not for the same year.

3032. But in general I mean, taking the whole course of years?—Yes. It is stated at the bottom of the tables that these dates are not precisely synchronous. I thought afterwards, on reading over my evidence, that some of the members of the Commission had not quite understood that.

The witness withdrew.

Mr. F. X. F. MacCabe.

Mr. Francis-Xavier Frederick MacCabe, examined.

3033. (*Chairman.*) You are a Fellow of the King's and Queen's College of Physicians of Ireland, and a Member of the Royal College of Surgeons, England?—Yes.

3034. And you are Medical Commissioner on the Local Government Board for Ireland?—Yes.

3035. How long have you filled that position?—A year and a half.

3036. Were you before that connected with the Local Government Board in any way?—Yes, as an inspector.

3037. I understand that you propose to divide what you have to say with reference to the subject of small-pox in Ireland into three periods?—That is so, if that arrangement is convenient to the Commission.

3038. First, with reference to small-pox before the time of inoculation and vaccination, what have you to say?—I do not know whether the Commission may be aware of the fact that in the fifth part of the census of Ireland for the year 1851 there is a very interesting sketch given, which I believe was the work of the late Sir William Wilde, upon the subject of cosmic phenomena, epizoötics, famines and pestilence in Ireland; and in going through that there are several references to small-pox. The first in point of date is in A.D. 675, where there is this entry: "There reigned a kind of "great leprosie in Ireland this year called the pox, in "Irish *bolgach*," literally pustules or pimples; and small-pox is also referred to in these ancient records as *gala breach*, the speckled disease. Various references from the year 675 downwards are to be found through these records to the prevalence of small-pox in Ireland.

3039. What are these records?—They are extremely interesting records. The authorities quoted are principally the Annals of the Kingdom of Ireland by the Four Masters, Dr. O'Donovan's translation.

3040. (*Sir Guyer Hunter.*) What is the date of those Annals?—They extend from a very early period indeed. Other authorities are the Annals of *Clonmacnoise*, McGeoghegan's translation, a MS. in the library of Trinity College, Dublin. There are also Grace's Annals of Ireland, a MS. in the library of Trinity College, Dublin, and the Book of Leinster, a MS., Mr. Corry's translation. I quote this on the authority of the Census; I have never seen any of these MSS.

3041. (*Professor Michael Foster.*) But they are acknowledged to be classic?—Perfectly so. The next reference is in 679–80 of "a most grievous leprosy in Ireland "which is called *bolgach*;" in 741 "leprosy in Ireland," probably small-pox; in 742–3 "the *bolgach*" or small-pox. I need not, I think, quote the entries seriatim. The early ones that I have quoted are from these Annals; the later ones I fancy are from other sources, but they are not specially quoted by the Commission.

3042. Later than what date?—Later than probably the year 952. The last entry that I have in these extracts is 1718–21, in the summer of which fever and dysentery prevailed, and that brings me to the year 1725 when the practice of inoculation was introduced into Ireland.

3043. Four years later than in England?—Yes, it was eight years after Lady Mary Wortley Montagu's letter. Inoculation prevailed in Ireland very extensively I believe from the year 1725 to the year 1840, when it was first prohibited by statute. There was a further prohibition in a later Act increasing the penalty, and I have not heard of it since that later Act which was passed on the 31st of July 1868. It is the

31st and 32nd Vict. c. 87, the Vaccination Amendment (Ireland) Act. The reason, I think, why it prevailed so extensively is that there are to be found in the earlier reports of the Irish Poor Law Commissioners several references to the practice of inoculation; and I also find that they from time to time issued circulars to boards of guardians advising them in every way to discourage the practice.

3044. (*Chairman.*) How early do you find that advice to discourage the practice of inoculation?—I think one of the earliest references to it will be found in the first Medical Charities Report in 1853, but I shall have occasion to refer to those reports, and I know that I have made a note of the earliest reference.

3045. Will you state what are the various statutes that bear upon the subject which we have to consider?—The first statute bearing upon the subject of vaccination in Ireland is the 3rd and 4th Vict. c. 29, which was passed in July 1840, and is entitled "An Act to extend "the practice of vaccination." This Act enabled guardians to divide their unions into districts of convenient extent, subject to the approval of the Poor Law Commissioners, for the purposes of vaccination, and to make yearly contracts with medical practitioners for such purposes. Under that Act the general arrangements made show that in October 1846, 57 out of a total of 130 unions into which Ireland was then divided had made no arrangements. The general rate of payment to medical practitioners under agreement was 1*s.* per case up to a limit of 100 or 200, and 2*d.* to 6*d.* per case over that number. The Act, by section 8, imposed a penalty for inoculation. The next Act is a very important one. The Commission will observe that the Act of 1840, to which I have just referred, enabled guardians to do certain things; and I find, on reference to the records, that the extent to which they availed themselves of the powers given them almost steadily declined; instead of the vaccination advancing, it, in point of fact, declined. Then we come to the 14th and 15th Victoria, c. 68, the Medical Charities Act, passed in 1851. This important Act provided for the division of the unions in Ireland into dispensary districts under committees of management, and for the appointment of medical officers by such committees, subject to the approval of the Poor Law Commissioners, now the Local Government Board; and section 13 imposed upon the medical officer of every dispensary district the obligation of vaccinating free of charge any person who presented himself for that purpose at one of his vaccination stations. The Act further provided that all the contracts made by boards of guardians under the preceding Act should cease. The next Act is the 21st and 22nd Victoria, c. 64, which was passed on the 2nd of August 1858, and which was entitled the Vaccination (Ireland) Act, 1858. This Act afforded further facilities for vaccination by directing the committees of management who were constituted by the previous Act to subdivide their districts in a manner convenient for the public, and to require the medical officer to attend at the stations that were created by such subdivisions at convenient times, for the purpose of vaccinating all who presented themselves. The other provisions of the Act refer to the amount of payment to be made to the medical officers, and to the returns which the medical officers are to make of the vaccinations performed. The next Act is the 26th and 27th Victoria, c. 52, passed on the 13th of July 1863, and entitled "An Act to further "extend and make compulsory the practice of vacci- "nation in Ireland." The Act of 1863, to which I have just referred, for the first time introduced compulsory vaccination into Ireland, and the important point is worth bearing in mind that at the same time the first Registration of Births Act came into operation also in Ireland; the two Acts came into effect on the 1st of January 1864. The Act to which I have just referred provides that all children born after the 1st of January 1864 shall be vaccinated within six months of their birth, and that they should be taken for inspection on the eighth day; and then it provides as to the certificates that are to be furnished by the vaccinator, the payments to be made to him, and the duties of registrars of births and deaths under the Act. The next Act is the 31st and 32nd Victoria, c. 87, passed in 1868, and entitled "the Vaccination Amendment (Ireland) Act, 1868." The only sections of that Act to which it is necessary to refer are sections 3 and 4. Section 3 provides that vaccination shall not be deemed to be parochial relief so as to disqualify; and section 4 provides that the penalty for inoculating with variolous matter may be six months' imprisonment. Then we come to the 42nd and 43rd Victoria, c. 70, passed on the 15th of August 1879, and entitled "An Act to amend the Acts relating "to vaccination in Ireland," the Vaccination Amendment (Ireland) Act, 1879. The important change introduced by this Act is the reduction of the period within which it is of obligation to have a child vaccinated from six months to three months. It may be worth while to call attention to section 10 of this Act, which provides that the guardians of the poor may direct proceedings to be instituted for the purpose of enforcing obedience to the provisions of the Vaccination Amendment (Ireland) Acts; that the medical officer of any district may be required by the guardians to attend and give evidence, and he shall be entitled to be paid a certain fee and such expenses as the justices may order; and it further says that proceedings may be taken at any time during the continuance of the neglect. Then it prescribes the duties of registrars of births.

3046. Would that 1879 Act tend to the more complete enforcement of the provisions of the law for compulsory vaccination?—Decidedly.

3047. It would render the system more effective than the Act of 1864?—Much more effective. The last Act in which there is any reference to the subject of vaccination is the 41st and 42nd Victoria, c. 52, the Public Health (Ireland) Act of 1878. Section 147 of that Act has an important bearing upon the subject of vaccination; and I remind the Commission of this particular section of the Public Health Act because I have reason to believe that boards of guardians very generally proceed, when they do proceed against defaulters, under this section. An important point is that all the other Acts had theretofore cast upon the boards of guardians alone the duty of enforcing the Compulsory Vaccination Acts. Here it is placed also in the power of the registrar under the Registration of Births and Deaths Act to make a complaint; and it goes on to say that if any registrar or any officer appointed by the guardians to enforce the provisions of the Acts relating to vaccination in Ireland shall give information in writing to a justice (I need not quote the precise words) that any child under the age of 14 years has not been successfully vaccinated, the justice can have such child brought before him, and if he has not been vaccinated or has not had small-pox, can fix a time within which he shall be vaccinated; and, failing obedience to it, it provides for the imposition of a penalty of 20*s.*

3048. That completes the review of the legislation?—That is the actual state of the legislation.

3049. Will you inform the Commission what are the precise arrangements which are made?—Yes. The Commission are aware that Ireland is divided into 32 counties, and at present (I had better deal with the present state of things) into 160 unions. Those 160 unions comprise 3,438 electoral divisions. The whole of Ireland is further divided under the Medical Charities Act into 720 dispensary districts, having each one or more medical officers. The total number of medical officers of those 720 dispensary districts is at present 809. I referred just now to the Act which provides that the committee of management shall divide their districts for the convenience of the public for the purposes of vaccination; and I may mention that the 720 dispensary districts include 1,139 out-stations or dispensary stations, and I think there are some further purely vaccination stations which are occupied for a short period four times in the year, but which are not returned to us, because the arrangement fluctuates from year to year; but I think on the whole the number is larger than the 1,139 that I have quoted. Under the Acts for carrying out vaccination these 809 dispensary medical officers are bound to vaccinate all who come to them, and the boards of guardians are charged with the duty of seeing that the Acts are properly carried out, the medical officers being responsible to their committees of management for their returns of vaccination, and looking to the boards of guardians for the payment of the fees to which they are entitled by statute. The Registrar-General, I think, will have mentioned that when a medical officer of a dispensary district is not himself the registrar, the registrar acting for the time is bound to make a return to him periodically of the number of children who are born, and the number of children who have died.

3050. Are the offices of registration officer and vaccination officer often combined?—They are generally combined. When a medical officer is appointed, one of the questions that he has to answer is whether he is willing to accept the post of registration officer; and

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the answer is, generally, yes: but if for any reason the medical officer may not have accepted the post and a non-professional registrar is thereupon appointed, and the medical officership again becomes vacant, that is the only instance in which the newly appointed medical officer would not have the power of taking it, because the person who replaced his predecessor would not be displaced for the accommodation of the incoming medical officer. The medical officer is bound to send in returns every three months on a particular form to the board of guardians of all children whose age exceeds three months, and who have not presented themselves for vaccination. The guardians thereupon call into requisition the services of the relieving officer, there being throughout Ireland 424 relieving officers. The lists of any children who are reported not to be vaccinated are handed to the relieving officers, and they visit the houses in the discharge of their ordinary duties and warn the parents that they ought to have their children sent in; and practically that reminder is generally quite sufficient. I think the number of prosecutions in Ireland is very small. They are recorded generally speaking on the proceedings of the boards of guardians, but they may not be always entered. The Local Government Board, however, make it a rule that all reports of defaulters, whatever action the guardians may take upon them, shall be entered upon the minutes; and those minutes are examined every week at the Local Government Board, and if it is found that the order made is postponed or that no action has been taken, we write to the guardians asking to be informed what steps have been taken with a view to looking after these defaulters; and in fact we keep up that correspondence and watch the weekly minutes of the boards of guardians until we find that the defaulters have been accounted for. In urban districts it is a very common thing to have this record: "The relieving officer has inquired into such and such cases, and "finds that the people have left the address and "cannot trace them." That case is lost sight of. The medical officers of the dispensary districts are further bound to make a return to the Local Government Board every quarter of the number of persons they have vaccinated and the number they have re-vaccinated; and at the end of the year they have to make a report which is supposed to include the preceding four quarters. They have also to answer certain questions as to the sufficiency of the supply of vaccine lymph kept up at the dispensary, as to the source from which they obtain it, as to the progress of primary vaccination, as to whether the amount of vaccination performed is in proportion to the population, and if not they are asked to state what is the probable cause of any diminution. They are also particularly asked (and this is a point to which I attach great importance) whether in performing vaccination they follow the instructions of the Local Government Board by seeking to produce four typical vesicles. There is a good deal to be said upon that point presently. I should like to submit copies of the forms of return that we ask our medical officers to make, because the Commission may desire to refer to them, and at the same time to remark that I think the form is capable of improvement as a record of primary and re-vaccinations. With reference to the supervision that is exercised over vaccination, Ireland is divided into four provinces, and for each province there is a medical inspector.

3051. What are his duties?—His duties are principally, under the Medical Charities Act, to inspect dispensaries, to inspect the records of the medical officer's work, to see that he does perform his work and that he records it properly, and to see that the sick poor are duly attended to. Incidentally, as a part of his work, he has to look after vaccination, and he is asked to answer certain questions: the number of stations in the district for vaccination, the periods of the year fixed for attendance, the manner of keeping up the supply of lymph, the manner in which the registers of vaccination are kept, as to whether the notices of the arrangements made for vaccination are duly posted in the district, and whether the notices of the requirements of the Compulsory Vaccination Act are duly served upon parents; also as to whether the reports of defaulters are regularly sent in to the guardians, whether vaccination appears to be properly carried out in the district, and whether the medical officer performs the operation in the manner directed by the regulations of the Local Government Board.

3052. Does that complete your account of the system of administration?—Yes; I think I have nothing else to say on that point.

3053. What have you to tell us with regard to the issues of lymph?—In 1804 three eminent physicians and three eminent surgeons of Dublin, Drs. Clark, Cleghorn, and Evory, and Messrs. Stewart, Richards, and Ober, established the Cowpock Institution for the purpose of the gratuitous vaccination of the population and the spread of vaccine matter. Those were their objects. The Cowpock Institution thus established continued under private management from that period until 1877. It was supported partly, I think, by subscriptions amongst persons who were interested in affording facilities for vaccination, partly by a charge for the lymph which was made to medical practitioners who looked for it, and also by a grant of 400*l.* a year from Parliament in support of the institution. In 1877 representation was made in Parliament that the annual grant of 400*l.* to the Irish National Cowpock Institution was insufficient. The Government consented to increase the grant to 1,200*l.* a year provided that the supply of vaccine lymph, which had hitherto been paid for by the Poor Law unions, be in future gratuitous, and that the institution be placed under the management of the Local Government Board. The governors of the Cowpock Institution willingly assented to the proposal of the Government, and from the 1st of April 1877 the collection and distribution of lymph was directed and controlled by the Local Government Board. The work performed by the Cowpock Institution is represented by these figures. It was opened on the 14th of January 1804. From that period to the 30th of March 1851 190,155 vaccinations were performed and 89,501 points charged with lymph were distributed. From 1851 to 1861 the number of vaccinations performed was 22,819, and the number of points of lymph issued 259,982. From 1861 to 1871, 15,745 vaccinations were performed and 292,260 points of lymph issued. From 1871 to 1881, 21,047 vaccinations were performed, 316,348 points of lymph were issued, and 6,262 Husband's tubes were issued. From 1881 to 1889, 15,859 vaccinations were performed, 165,045 points of lymph were issued, and 22,254 charged tubes were issued.

3054. When you say 1861 to 1871 does that include 1861 or 1871?—I asked for the return in the ten year periods from the Cowpock Institution. From 1851 to 1861 I should imagine would be the period from 1851 to 1860 inclusive.

3055. It would include 1851 and exclude 1861?—Yes, I take it that it would be so.

3056. It probably would be so, because the last period you gave was 1881 to 1889?—Quite so, 1881 to June 15th, 1889. The total figures are these. From the 14th of January 1804 to the 15th of June 1889 265,625 vaccinations were performed; 1,123,136 charged points were sent out; and 28,516 Husband's tubes.

3057. Would those tubes that you speak of contain more than the points?—They would contain more than the points. They would contain sufficient, if properly handled, to perform three or four vaccinations.

3058. So that the figure which you gave of 28,000 tubes would really represent as much as between 80,000 and 90,000 points?—It would. But our instruction to vaccinators throughout the country is not to depend upon the supplies that they get from what is now the Vaccine Department of the Local Government Board, but to keep up their own supplies, and if possible so to arrange that they shall vaccinate from arm to arm.

3059. What is the next point to which you wish to direct the attention of the Commission?—The point in connexion with this subject that I was desirous of bringing under the notice of the Royal Commission is what I consider to be the defect of vaccination in Ireland. It has often been represented, and I believe it has been generally thought, that Ireland is extremely well protected in the way of vaccination. I have arrived at a different conclusion, and I have done so on these grounds: Up to the year 1880 the original instructions to vaccinators issued by the Cowpock Institution continued to be sent out, and those instructions were explicitly to vaccinate in two places, to make two insertions. Any practical vaccinator knows that the result of such an instruction as that is that in many cases there will be only one vesicle produced. It was not until the year 1880 that the Local Government Board, acting upon the earnest representation of the medical inspector then in charge of the Dublin district, who sent them in a report upon the subject, issued their new instructions to the public vaccinators,

requesting them to aim at the production of at least four typical vesicles. I am satisfied that a very large proportion of the adult population in Ireland stands in the position as regards the danger of contracting small-pox, of having the protective influence of their primary vaccination worn out or partially exhausted, and that they are liable to take small-pox whenever they are exposed to the infection of the disease. In the second place, in Ireland we have not that close supervision over the practice of vaccination that exists in England. In England there are inspectors attached to the Local Government Board whose special duty it is to visit the various vaccination districts and to examine into the method in which public vaccinators perform their duties and the results that they obtain. I think it would be a great improvement in Ireland if we had an inspector of vaccination. Then I may add for the information of the Commission, as a matter of interest, that although considerably over a million points of lymph have been issued, and a very large number of vaccinations have been performed by our medical officers since the passing of the Act of 1840, we have only had four complaints addressed to the Local Government Board with reference to the ill effects of vaccination. I have had the records very carefully searched, and there are only four instances in which complaints have been addressed to us. In each instance an inquiry was held, and it was very clearly shown that the presumed injury inflicted by vaccination could not fairly be traced to the operation or to its effects.

3060. Can you give us approximately the dates of those complaints?—I can give you each of the cases, and the nature of them. The first was in 1871; the second in the same year; the third in 1877, and the last was during my own period of office in 1888.

3061. So that there were none between 1875 and 1888?—None.

3062. (*Mr. Meadows White.*) Did they all come from the same quarter?—All from different parts of Ireland. I can send the Commission full particulars of these cases, so far as we possess them. (*See Appendix VII., page* 276.)

3063. (*Chairman.*) You have spoken of the insufficient vaccination as regards the quality of it, that is to say, the number of vesicles. I believe you have some remarks to make about the excessive returns of insusceptibility?—I had the advantage of seeing those returns only very recently, but on the face of them it is manifest that they will require a great deal of attention from my department. The number of persons returned as insusceptible in the table that was put in by the Registrar-General for Ireland calls for a great deal of explanation on the part of some medical officers.

3064. (*Professor Michael Foster.*) In Cavan there are 218 returned as insusceptible on 6,000 vaccinations?—Yes.

3065. Dr. Cory's record is 1 in 30,000, I think?—Yes. I have been a public vaccinator myself, and I confess that I have never met with a case of insusceptibility. These returns astonish me. I shall have to look into them, and to draw the attention of my board to them.

3066. (*Dr. Collins.*) Does it mean that each one of those reported as insusceptible has been vaccinated three times? What is the meaning of the term "insusceptible" as appearing in that report?

(*Professor Michael Foster.*) In England "insusceptible" has a technical meaning, viz., that the subject has been vaccinated three times unsuccessfully; does that meaning hold good in Ireland?—No, I think not. I am almost sure that a number of these returns means that the medical officer has used dry lymph, has attempted it once, and that the child has been returned as insusceptible.

3067. (*Chairman.*) But what Dr. Collins was asking you was this: supposing that the vaccination officer did his duty completely, ought he to return as "insusceptible" those whom he has once tried to vaccinate, or ought he to try more than once?—I cannot imagine a medical officer vaccinating with fresh lymph and failing three times. I am told that that is the rule in England. I can only say that on one occasion I was going over the vaccination records of a medical officer, and he showed me a case of insusceptibility. "How often have you vaccinated?" I said. "Five times," he replied. I said, "How do you vaccinate?" and he told me. I said, "Well, you try fresh lymph from another child's arm; have another child there and take fresh lymph, and make cross scratches," in the way I pointed out to him. He afterwards told me that he succeeded at the sixth time.

3068. You think that insusceptibility in many cases, at all events, indicates rather that the child has not been properly vaccinated than that it was insusceptible?—That is my experience.

3069–70. (*Professor Michael Foster.*) In these records insusceptibility may mean only one attempt at vaccination?—It, I am afraid, must mean that, because they are out of all proportion. In the Dunshaughlin union, a union that I know something about, in the county of Meath, out of 1,126 vaccinations the medical officer returned 60 as insusceptible. The next union to that is Edenderry; out of 2,407 vaccinations there are no insusceptible cases returned; the return of insusceptibles is nil. It is perfectly manifest that this return of the Registrar-General requires very close looking into; and it will involve on the part of my department a great deal of correspondence with these medical officers.

3071. (*Chairman.*) Are those two adjoining unions?—They are not very far apart; they are in the same province, but they stand here alphabetically next to each other, and therefore they caught my eye.

3072. (*Dr. Collins.*) Do you not issue instructions to your public vaccinators under contract?—We do not; we are somewhat defective in that respect. Every medical officer of a dispensary district is *ex officio* public vaccinator and medical officer of health of his district; and, as I pointed out just now, it was one of the defects that until 1879 we had had no satisfactory instructions issued. It was in consequence of the report addressed to the Local Government Board in 1879, on the insufficient vaccination, that the existing instructions, dated 1880, were sent out. Those are very full and very satisfactory.

3073. (*Chairman.*) You referred to the number of defaulters who had left their places of abode; have you reason to think that the number of untraced defaulters is considerable?—I am quite satisfied that it is in Dublin and in other large centres of population. We have very few such centres, but in Dublin particularly it is within my own knowledge that the number is large, because I had charge of the Dublin district; and one fact alone will illustrate it. It is this: that out of a population of a quarter of a million, living within the municipal area of Dublin, 100,000 live in tenement houses, that is to say, houses which are let out in single rooms for the accommodation of a family. It is amongst that class, to a very great extent, that the defaulters exist. The relieving officer, when he goes to the tenement dwelling, where the family were returned as living at the time of the birth of the child, finds that they have left and gone to some other tenement dwelling, and there is no trace of them, and even people living in the same house cannot tell the relieving officer exactly where they have gone to. A great number of these defaulters occur in that way. Then also in the metropolitan workhouses there are a good number of women who come in for the purpose of being confined, and they leave considerably before the child is three months old. Those are often lost sight of. In the Rotunda Lying-in Hospital, the same thing happens; women come from all parts of the country to be confined there, and they leave with their babies within the legal period of three months after birth, and the children are lost sight of. But I am quite sure, from that and from some other information that I have gained, that there is a very large proportion of our population unprotected by vaccination. That is why I am not at all surprised that we should have outbreaks of small-pox from time to time. For instance, from 1876 to 1879 I personally made an examination of all the children who were in my district in the workhouses. The union workhouses contain children from all parts of the union; and it therefore appeared to me that their condition as to vaccination would present a very fair view of the general state of vaccination in that particular union amongst the poor. I examined all those children personally. The total number was 1,446, and I found this very strange result, that amongst 1,446 children there were eight per cent. wholly unprotected, who had not been vaccinated at all, and 626 had only one mark. Now the unprotected and those bearing only one mark were considerably more than 50 per cent. of the total number examined. That, I think, is an unsatisfactory state as regards protection against an outbreak of small-

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pox. I found that there were only two children out of the whole 1,446 who bore five marks, and those two had been vaccinated in England. There were only 19 children bearing four marks, and several of those had been vaccinated in England. With three marks there were 81 children, and with two marks, 597 children. That result appeared to me so startling that I wrote a report to the Local Government Board, a memorandum as I called it, upon vaccination, which I should like to be permitted to hand in, as it bears upon the subject. Some time afterwards it fell to my lot to be asked by the Chief Secretary for Ireland to take upon myself, as a temporary arrangement, the inspection of the reformatory and industrial schools in Ireland. I turned to the children to see what was their condition as to vaccination.

3074. What was the date of that inspection?—1887, two years ago. I examined a number of the children personally, 268 in all, and I found 12 per cent. unprotected, had no vaccination marks. I thereupon sent a very strong circular to the managers of all those schools, pointing out to them that one of the first duties they owed to the children was to have them carefully examined by the medical officer attending the school, and to have them vaccinated, and in the medical report book which it is the duty of the medical officer of each school to keep, to ask him to record the result of his vaccination. In 1887 I also got returns of all the prisoners, adults (be it observed they are all adults), then confined in the local prisons in Ireland. There were 2,765 prisoners, 197 of them were unvaccinated; that gives 7 per cent. At the close of 1871 or the beginning of 1872 I examined all the lunatics, also adults, in a county lunatic asylum in Ireland, the Waterford County Asylum. I was then the medical attendant of that asylum myself. Small-pox was prevalent throughout Ireland, and I thought it my duty to examine all the lunatics in that asylum. I examined them and I found amongst those that 16 per cent. were unprotected.

3075. When you say unprotected you mean with no mark of vaccination?—No mark whatever. I vaccinated all those, and the resulting vesicles were typical primary vaccination vesicles. I asked the staff of the asylum to be re-vaccinated, such of them at least as appeared to me not to have very typical marks of primary vaccination, and they all consented except one who had no marks at all, and the only case of small-pox in the asylum was that particular man, an attendant there. I think from these facts that came under my own personal observation I am justified in saying, having regard to the Registrar-General's returns of presumed insusceptible cases, and having regard to the number of untraced children, and to the facts which I have just mentioned, that there is a very large proportion of the population in Ireland either unprotected or insufficiently protected.

3076. Is there any other point to which you wish to direct the attention of the Commission?—No, I think not. I had intended to put in a return which is contributed partly by my own department and partly by the Registrar-General, but I find he has anticipated me, and has put in that return.

3077. (*Mr. Savory.*) Can you tell us what is the exact source of the supply of lymph to the Cowpock Institution—how is the supply kept up?—It is kept up by a number of collectors who are paid for the tubes they send in; it is in charge of Dr. Montgomery, an extremely competent man, and an admirable vaccinator, and a man of very great experience; he has been many years connected with it; he gets the supplies of lymph from a number of what are called collectors, medical men who have offered to charge the tubes, and they send them to him, and he distributes them.

3078. Has that been the method of supply ever since the establishment of the institution?—Yes.

3079. No other?—No other.

3080. (*Mr. Meadows White.*) Have you observed any improvement since the issue of the circular of 1880?—A very great improvement.

3081. I see Table F. which was handed in by Dr. Grimshaw, and to which you have been referring, shows a large proportion of insusceptible cases. That purports to be between the years 1882 and 1888?—That return of the Registrar-General is only for six years.

3082. Those years were subsequent to the circular of 1880?—Certainly.

3083. Has not this come under your observation before?—No.

3084. (*Chairman.*) Will you be good enough when you receive any information which you think of importance with reference to that return to communicate it in writing to the Commission, and we will then consider how far it may be necessary to recall you?—Certainly. If there is any other point upon which I could furnish fuller information, if the Secretary communicates with me, I shall be most happy to do so at any time.

3085. (*Mr. Meadows White.*) You say this has not come under your official investigation before?—No; it took me by surprise.

3086. When did you first see this?—The day before I left Dublin; it was an uncorrected proof that Dr. Grimshaw was so courteous as to send me, and I may say that it has given me matter for very uncomfortable reflections.

3087. It has not yet been published?—No; it has evidently been prepared for the purpose of this Commission, because the copy sent to me was an unrevised proof.

3088. How are the returns made from which this insusceptible column is made up?—I do not know from what source Dr. Grimshaw made this; they do not make any returns to us of insusceptibility, they must be made to the registrar. They must in those cases, I suppose, have given an absolute certificate, under the statute, of insusceptibility, or I do not know how the Registrar-General could get the information, that is the only statutory way in which his registrar could become aware of the fact that these were insusceptible cases.

3089. (*Mr. Whitbread.*) You have given us some information from very early records in the history of Ireland, as to the existence of small-pox at different times; is there any record of any recognised treatment of small-pox in vogue in those times?—No, not that I am aware of. I have never heard it referred to.

3090. Nothing at all before inoculation?—Nothing at all that I am aware of. I believe historically that is the first record of anything which we have in the shape of—it cannot be called curative treatment, but anticipatory treatment.

3091. You say that inoculation was introduced into Ireland in 1725?—Yes.

3092. By "introduced into Ireland" you mean by the medical faculty?—I do not know by whom. I find only the fact recorded that inoculation was first practised in Ireland in 1725.

3093. You do not know whether that means practised by medical men?—I do not know by whom.

3094. You do not think that it existed amongst the people long before that?—I think not. I have no knowledge that it did.

3095. (*Mr. Meadows White.*) In these early epidemics which are mentioned in these early records is there anything stated in a general way about the mortality?—There is this general statement, for instance, "In "the year of our Lord 1327 a mortality from small-"pox throughout all Erin." "1498. This year was "fatal to learned men from small-pox"; and then there are other records of the deaths from small-pox of eminent persons at the time, but there is nothing more precise than that.

3096. (*Mr. Picton.*) You told us that the vaccinators in the various districts are required to report the source from which they have obtained their lymph?—They are required to answer the question, "From what quarter do you get your lymph?" The answer has been always one of two: "From your own vaccine establishment," or, "I keep up my supplies from arm to arm." In former years they got it from the National Vaccine Establishment in England, but of late years I have never heard of anybody getting it from that source.

3097. Have you known any case where animal lymph has been used?—We have had some such cases. I may here mention a very interesting report, if the Commission desires it, from Dr. Montgomery on that subject; he procured from Dr. Warlomont a supply of calf lymph, and he vaccinated with it, and he had given a very interesting and extremely good account of the results that he obtained. But as far as the supply of calf lymph is concerned, we have only issued 36 tubes to private vaccination stations, 18 to dispensary medical officers, and 10 were used for the experiments

recorded there, 9 in the Vaccine Department itself. Practically we have had no demand for calf lymph.

3098. Do you consider that vaccination resulting in one mark affords no protection at all?—No; I am quite satisfied that it affords protection, and very considerable protection for a time; but practically, I think, in adult life a person who has had only one mark in infancy runs very great risk of contracting small-pox; that is the view I take of it. If he does contract small-pox he certainly will not have as bad an attack as if he did not bear any mark.

3099. Do you think that vaccination resulting in four marks will continue the protection to adult age?—My own experience inclines me to think that it will, but my experience, of course, is limited; within my own range of observation I think it will.

3100. Have you met with no cases in which people were taken with small-pox who showed four marks?—I never met with one.

3101. What is considered the fulfilment of the law; if a child is brought at the eighth day and shows one mark, is that a fulfilment of the law?—Yes.

3102. (*Dr. Collins.*) Could you give us any information as to the original source of the vaccine lymph current in Ireland?—I cannot. I cannot trace it at all.

3103. Is any of the lymph current in Ireland to your knowledge derived from inoculation of the cow with small-pox?—None whatever.

3104. Do you happen to remember a communication dated February 10th, 1879, from your Local Government Board to the Galway union?—I remember the letter very well.

3105. Could you relate the circumstances which led to that letter?—Yes; I have the correspondence here. It was in the year 1879. This is an extract from the minutes of the Galway union: "Dr. Brown brought "under the notice of the board the necessity of pro- "curing a healthy calf for inoculation in order that a "full supply of lymph be obtained for the union, and "Mr. Richard Ffrench, a poor law guardian who was "present, intimated that he was willing to lend a "healthy calf for the purpose, which offer the guardians "thankfully accepted. The medical officers to see the "animal inoculated."

3106. As the result of that minute was any communication sent from the Local Government Board in Dublin to the Galway union?—Yes.

3107. Will you read it?—This is the answer to that minute which I have just read: "10th February 1879. "—Sir, the Local Government Board for Ireland "acknowledge the receipt of minutes of proceedings "of the board of guardians of the Galway union on "the 7th instant, from which it appears that a "suggestion was made by a member of the board that "a healthy calf be procured for inoculation in order "that a full supply of lymph be obtained for the "union, and another member having intimated his "willingness to give a calf for the purpose, the "guardians passed a resolution accepting this offer "and directing the medical officers to see the animal "inoculated. In reference thereto the Local Govern- "ment Board desire to observe that it is not clear "from this resolution whether the proposal is to "inoculate the calf with small-pox virus or with vaccine "lymph obtained from a human subject; but in neither "case can the Local Government Board approve of "the resolution adopted by the guardians. Small- "pox virus taken from a calf would communicate that "disease to a human subject, and be thereby a fertile "source of propagating that disease, and would, more- "over, render the operator liable to prosecution under "the 4th section of the 31 & 32 Vict. cap. 87. If the "proposition were to vaccinate a calf with lymph "obtained from a human subject the board have to "state that it has long since been ascertained that "animal lymph for vaccination purposes must in the "first instance be obtained from a cow in which the "disease has spontaneously arisen, and that vaccina- "tion performed with lymph taken from a cow which "had been vaccinated with human lymph is not re- "liable. The Local Government Board therefore lose "no time in cautioning the medical officers against "either of the practices referred to, as the guardians, "no doubt, acted in ignorance of the consequences "when they passed the resolution directing their "medical officers to act on the suggestion made. By "order of the board, B. Banks, secretary."

3108. May I take it that the opinion of your board then was that the lymph obtained by the inoculation of a calf with human small-pox would propagate small-pox?—I do not think that was the opinion of the board—a matter of that kind would be dealt with by the medical commissioner, although the communication addressed to the clerk of the union would be in the name of the board; he, as the only expert supposed to be acquainted with the subject, would really be personally responsible for the minute. Of course I need hardly tell the Commission that letter was written under a misapprehension of the real facts. Such a letter as that would not be written now. That does not express the view of the Local Government Board.

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3109. Could you kindly give us the view which is entertained by the Irish Local Government Board at the present time as to the relationship between small-pox and cowpock?—If such a letter were addressed to the Irish Local Government Board at the present time the reply made to the guardians would be this, under my direction: That the Local Government Board would advise the guardians that, in the presence of small-pox, which then existed in Galway, having no reason to doubt the efficacy of the supplies of humanised lymph forwarded to them by the Local Government Board upon their application, they would recommend them not to enter upon an experiment which was very uncertain in its results. Of course if a calf were inoculated with the virus of small-pox the resulting lymph, if any result followed, for it is a very difficult thing to do, I believe, but if any result followed, the lymph taken from the calf would be cow lymph, and would not communicate small-pox. I regret very much that that letter was written. It was a mistake, to my mind. If a calf had been vaccinated with humanised lymph, I suppose everybody who has studied the subject would say that no result at all would follow. It would simply be retro-vaccination; but if any result did follow it would still be humanised lymph having passed through the system of a calf. That letter contains an expression of what I conceive to be erroneous views upon the question that was raised. I regret that it was written.

3110. Should I correctly understand your opinion to be that while it is difficult to inoculate small-pox upon a cow or calf the lymph which could be obtained from such a source would be cow-pox and not small-pox?—That is my opinion.

3111. You would regard the vaccine disease as small-pox grafted upon the cow?—Quite so.

3112. Would you also consider the letter to be erroneous with reference to the statement as to the desirable source of animal lymph being from a spontaneous case of cow-pox?—I do not know that there is such a thing as spontaneous cow-pox, but I should say on that I speak with very great reserve, because I am not an expert upon the subject. All that I know in connexion with calf lymph is solely from reading, and the authority that has guided me, I think, is Dr. Seaton principally, so that any opinion I may express upon difficult points of that nature is really of very little value.

3113. As one evidently acquainted with the literature of the subject perhaps you are aware that Dr. Edward Jenner considered spontaneous cow-pox to be worthless as a protection?—I cannot say that I remember that, I do not doubt that it is so. I cannot say that the literature of the subject is very fresh in my recollection at the present moment.

3114. On page 7 of his Inquiry he says, "It is "necessary to observe that pustulous sores frequently "appear spontaneously on the nipples of the cows, and "instances have occurred, though very rarely, of the "hands of the servants employed in milking being "affected with sores in consequence, and even of their "feeling an indisposition from absorption. These "pustules are of a much milder nature than those "which arise from that contagion which constitutes "the true cow-pox. They are always free from the "bluish or livid tint so conspicuous in the pustules in "that disease. No erysipelas attends them, nor do "they show any phagedenic disposition as in the "other case, but quickly terminate in a scab without "creating any apparent disorder in the cow. This "complaint appears at various seasons of the year, but "most commonly in the spring when the cows are "first taken from their winter food and fed with grass. "It is very apt to appear also when they are suckling

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" their young. But this disease is not to be considered as similar in any respect to that of which I " am treating, as it is incapable of producing any " specific effects on the human constitution. However " it is of the greatest consequence to point it out here " lest the want of discrimination should occasion an " idea of security from infection of the small-pox " which might prove delusive "?—I remember reading that perfectly well many years ago.

3115. I think I understood you to say that there was some animal lymph sent out by your board which was derived from Dr. Warlomont's source; was that so?—I do not think that the supply sent out to private practitioners was derived from Dr. Warlomont, but I think that the calf lymph with which Dr. Montgomery instituted the experiments that he has recorded in that report was derived from Dr. Warlomont, but it is a Mr. Darke, whose address is somewhere in London, from whom we get supplies of calf lymph when it is asked for, and perhaps he gets it from Dr. Warlomont.

3116. Do you attach great importance to the original source of the lymph employed?—I have never had any reason to pay particular attention to that point in Ireland, because we have never had any reason to complain of our lymph; we have always had good results, and we have continued it from one year to another.

3117. Dr. Warlomont's source was from a spontaneous case of cow-pox, so called?—I cannot recollect that point.

3118. This letter having been written under a misapprehension, might I take it that your board would not feel justified in interfering with any board of guardians that suggested, as the Galway union did, renewing the source of lymph by inoculating a cow or calf with small-pox?—We should not interfere with them.

3119. It would not render the operator liable to prosecution under the 31 and 32 Victoria, chapter 87?—No, it is a total misapprehension from beginning to end.

3120. I think you stated that on the whole you would consider Ireland at the present time to be not well protected by vaccination?—Not well protected.

3121. In the adult population you consider the protection is largely worn out?—That is my personal opinion.

3122. And you also think it desirable to have in Ireland, as we have in England, inspectors of vaccination?—I should like much to have them, one at least.

3123. Could you tell us whether in Ireland there is any system, as there is in England, for making awards to public vaccinators upon successful results?—No, there is not in Ireland.

3124. There is no premium paid in addition to the fees under contract?—None.

3125. (*Chairman.*) I suppose there are no means of ascertaining at all what proportion of the population born prior to January 1864 was at that time unvaccinated?—I think not.

3126. (*Sir James Paget.*) Could you give us a general statement of what proportion of the population you could now think were unprotected or inadequately protected?—I think about from 8 to 10 per cent. I think the Registrar-General's returns would show about 6 per cent., so do my returns; but perhaps one is more apt to be impressed by what one sees, and I think from 8 to 10 per cent. would be found to be unvaccinated.

3127. (*Mr. Picton.*) You say you get some supplies of lymph from Mr. Darke?—Yes.

3128. What is his position; has he a public position?—He is a London man. I asked Dr. Montgomery, and he told me that the supplies of calf lymph were obtained from Mr. E. Darke, 12, Pall Mall East.

3129. He has no official position?—I really do not know.

3130. You simply send for this lymph, and you take it on faith?—So it would appear.

3131. You do not know directly anything about the origin of it?—I do not. I have been a year and a half medical commissioner. The arrangement with Mr. Darke was made under my predecessor. I have no doubt he made all necessary inquiries, and that Dr. Montgomery is satisfied, but I personally know nothing about it.

3 32. (*Dr. Collins.*) Is it within your knowledge that there are a variety of eruptions upon the teats of cows, many of which are communicable to the human subject, and not all of which, at any rate, are alleged to have some protective influence?—That, I believe is the case.

3133. (*Mr. Picton.*) You have not seen them yourself?—I have never seen them. I guard against being supposed to be an expert. I know nothing upon the subject, except from my reading.

3134. (*Dr. Collins.*) Can you tell us who might be referred to as an expert upon that subject in Ireland?—I do not know anyone in Ireland.

3135. Anywhere else?—I should imagine the officers of the Local Government Board here.

3136. If the statement in answer to Question 3132 be correct, and you say, though you are not an expert on the subject, you have reason to think that it would be so, it would necessitate great discretion as to which variety of the eruptive disease on the teats of cows should be used for vaccination, would it not?—That is what I have always understood. I have always understood that great discretion is necessary to distinguish a true Jennerian vesicle from others that are not of a protective character.

3137. But you would not be prepared to do so upon your own authority?—Not at all.

3138. (*Mr. Whitbread.*) Did I rightly understand you to say a little while ago that you had not heard of a case of inoculation since 1868?—The latest case of inoculation that I have heard of was in the year 1876; that is referred to in the report of the Local Government Board for 1876. I personally never knew of a case of inoculation, but mention is made in that report of 1876 of the case of Charles Stenson, who was convicted of inoculation, which was followed by death, and sentenced to five years' penal servitude. Since that public trial and conviction I do not think there has been any inoculation; we have not heard of any.

3139. (*Dr. Collins.*) Can you tell me whether any of the Acts in operation in Ireland prescribe that true Jennerian cow-pox lymph alone is to be used for vaccination?—No, there is no reference whatever to the nature of the lymph to be used.

3140. Do you think any of the post-vaccinal small-pox that occurs has reference to the use of spurious cow-pox lymph?—I am not prepared to answer that question.

3141. (*Mr. Picton.*) Could you explain to an unprofessional man what vaccination is?—I think I had better not attempt to do it. In the first place it is extremely difficult to give a satisfactory definition of anything; the question is extremely comprehensive, and I am very much afraid if I, who am not by any means an expert on the subject, were to attempt to give a definition of vaccination it would land me in a great many difficulties, probably.

3142. You judge only by results?—Yes.

3143. That is, what prevents small-pox is vaccination, and what does not prevent it is not proper vaccination?—Improper vaccination is not vaccination at all, but I have never seen improper vaccination in Ireland. I have never yet seen a vesicle produced by vaccination in Ireland that was not a typical vaccine vesicle.

3144. (*Mr. Savory.*) You would recognise something characteristic which follows the insertion of the lymph?—Yes.

3145. Which you can diagnose or distinguish?—Yes.

3146. There can be no question about that?—No.

3147. Whatever question may be raised as to the origin of the lymph something follows the insertion of that lymph which is characteristic?—That is so characteristic that it is impossible for a practical vaccinator to be mistaken.

3148. That you call vaccination?—Yes.

3149. (*Dr. Collins.*) Are you equally satisfied that there is no other pox upon the teats of cattle that will produce the same phenomena?—I do not know that there is. In the very passage which you have read to me it was pointed out that there were certain spurious

eruptions which, though they produced local irritation, would not carry with them the protective influence of the true vaccination.

3150. Then would the series of phenomena which result from inoculation of any given pox be sufficiently characteristic for you to be satisfied that you were dealing with the true Jennerian cow-pox?—Yes, I should know a true Jennerian vesicle, and I think it would be impossible for me not to be able to distinguish between that and spurious pox, not only upon its actual appearance from the date of vaccination to the falling off of the scab, but also in the typical and unmistakeable appearance of the resulting cicatrix—it is impossible to mistake it for anything else.

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3151. You are not acquainted with any other virus that would produce the same phenomena?—No.

The witness withdrew.

Adjourned till Friday next at 1 o'clock.

Sixteenth Day.

Friday, 8th November 1889.

PRESENT:

THE RIGHT HON. THE LORD HERSCHELL IN THE CHAIR.

Sir JAMES PAGET, Bart.
Sir EDWIN HENRY GALSWORTHY.
Mr. WILLIAM SCOVELL SAVORY.
Dr. JOHN SYER BRISTOWE.
Dr. WILLIAM JOB COLLINS.
Mr. JOHN STRATFORD DUGDALE, Q.C., M.P.
Professor MICHAEL FOSTER.
Mr. J. ALLANSON PICTON, M.P.
Mr. SAMUEL WHITBREAD, M.P.
Mr. F. MEADOWS WHITE, Q.C.

Mr. BRET INCE, *Secretary.*

Staff-Surgeon THEODORE J. PRESTON, R.N., further examined.

Staff-Surg. T. J. Preston, R.N.

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3152. (*Chairman.*) Have you had taken out the number of men to whom the statistics with which you furnished the Commission apply?—Yes. In compliance with your Lordship's wish I have drawn out a number of extra statistics. I produce a table showing the number of attacks of and deaths from small-pox in the Royal Navy for each of the years 1860–1888, with in each case the ratio per 1,000 of force; and also a table showing for the same years the ratio per 1,000 of deaths from all causes, from disease alone and from small-pox alone; and a diagram, based on one of Dr. Barry's diagrams in the Sheffield Small-pox Epidemic Report, showing the number of deaths during the different periods of vaccination in the service. (*The tables and diagram were handed in. See Appendix V., Tables B. and C., page* 254.)

3153. I observe that in the year 1879 there was a considerable increase in the number of cases of small-pox occurring in the navy; can you give any explanation of that increase?—Yes. The "Boadicea," the flagship on the West Coast of Africa, had 39 cases out of 52 in the whole year. She went to Sierra Leone, and took on board 37 Kroomen, and these Kroomen, native West Africans, were taken from one native village, where it was subsequently ascertained that small-pox was epidemic. Of these Kroomen, 16 had had small-pox; the remaining number consisted of white men, part of the ship's company of the "Boadicea," who were attacked and had the disease in a modified form. There were 12 deaths.

3154. (*Professor Michael Foster.*) Do the deaths include the natives?—They include the natives. There were 14 deaths in the whole of the Royal Navy; but of those 14, 12 took place on the West Coast of Africa.

3155. Were all those 12 deaths, deaths of Kroomen?—Not all; one white man died.

3156. (*Chairman.*) Therefore the total number of deaths from small-pox in the navy during that year, except those 11 Kroomen, was three?—The total number of deaths was three, apart from the Kroomen.

3157. (*Professor Michael Foster.*) But so late as 1879 the Kroomen were vaccinated too, were they not?—They should have been re-vaccinated.

3158. (*Mr. Meadows White.*) Were they?—They were not re-vaccinated. 16 of those Kroomen had had small-pox; the remainder had not been re-vaccinated. Two of the number had marks of infantile vaccination, but it was very doubtful about the other cases.

3159. (*Chairman.*) Are the Kroomen kept on for any length of time, or are they only taken only for the voyage?—They are taken during the commission—so long as the ship remains on that part of the station. They never come to England. In a similar manner Chinese in the far East, and the Seedies on the East India station are taken.

3160. I should gather that some of them, at all events one or more, must have had the disease in a state of incubation at the time they came on board?—Undoubtedly. They were received on board on the 27th of December 1878. The first case appeared on board the ship at sea on the 2nd of January 1879.

3161. (*Sir James Paget.*) Was the first case in one of the Kroomen whom they had shipped?—It was.

3162. (*Chairman.*) So that if they had been re-vaccinated, that man at all events would have been re-vaccinated during the time of the incubation of the disease?—Undoubtedly so.

3163. The order for compulsory re-vaccination appears to have been issued in 1871; what effect, if any, had the compliance with that order on the number of cases of small-pox occurring in the fleet?—During the ten years 1861–70 inclusive, there were 1,860 cases of small-pox, with 135 deaths. During the ten years 1871–80 inclusive, there were 388 cases of small-pox with 47 deaths. From 1881 to 1888 inclusive, there have been but 87 cases of small-pox, with nine deaths.

3164. The two new tables that you put in show, do they not, the number of cases of small-pox from the year 1860 to 1888, with the mean force and the number of deaths?—Yes; the first shows the mean force and the number of attacks and of deaths, and the second shows the death-rate from all causes from disease alone, and from small-pox alone, because in a service like the Royal Navy the greater part of the mortality is due to accidents.

3165–6. (*Chairman.*) I see that you have also put together in a short form the orders relating to vaccination in the navy?—I have. (*The paper was handed in. See Appendix V., page* 255.)

3167. (*Professor Michael Foster.*) Can you make any statement as to the quality of the lymph which is used

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in the navy; is it exclusively stored lymph?—It is nearly all received from the Local Government Board; but at the home ports, as we call them, that is to say, Portsmouth, Plymouth, and the others, there are local contracts existing for the purchase of lymph from the local practitioners, in order to ensure that we shall get it absolutely pure and first hand. Abroad the lympn has to be demanded from the Medical Director-General in England, or, if the requirement is urgent, it may be purchased locally.

3168. Have you any returns as to the insusceptibility of the sailors?—No, I have no returns; but I may state that I have copied a return on some extensive re-vaccinations that took place after the issue of their Lordships' order for re-vaccination in 1871. I take the two stations, the Home station and the Mediterranean station, as the largest. On the Home station there were 10,154 persons re-vaccinated, of whom 5,936 produced a perfect vaccine vesicle. On the Mediterranean station there were 1,934 persons re-vaccinated, with 1,181 perfect vesicles. The numbers giving no results I have also. On the Home station, of the 10,154 persons re-vaccinated there was no result in 1,869 cases; and on the Mediterranean station, of the 1,934 persons re-vaccinated there was no result in 527 cases.

3169. Is there any distinction in these re-vaccinations between the cases which had satisfactory marks before and those which had not?—No; no distinction has been made.

3170. We have been told that it is the custom in the army for soldiers when they are re-vaccinated to suck the punctures immediately after the operation. Have you any knowledge of any such practice being common in the navy?—I have; I have known it to be done.

3171. Do you think it is very common?—No, I do not think it is common in the navy, because our men are kept very much under the eyes of the officers and petty officers. It is the usual custom in the service, it being known that such an operation does occasionally take place, to keep the men when you re-vaccinate them some few moments in the room or sick-berth until you satisfy yourself that the vaccine lymph has dried upon the punctures. We do not vaccinate a man and then let him go about his work again at once; we keep him there for three or four minutes until we ascertain that the vaccine lymph has dried.

3172. I gather from the table which you have put in that down to the year 1873 your cases of small-pox, including both the attacks and the deaths, cover the foreigners, the Kroomen, and others, who have come in, as well as the Englishmen?—It includes all persons belonging to the naval service.

3173. And that a large number of those who were not British had not been re-vaccinated up to that time?—They had not up to that time been re-vaccinated.

3174. (*Mr. Whitbread.*) Will you repeat the number of Kroomen that swelled the figures so much in 1879?—There were 37 taken on board.

3175. How many cases of small-pox were there?—There were 39 cases of small-pox, because some of the white men were attacked as well.

3176. The 39 cases include the whites?—Yes.

3177. Have you the number of cases among the Kroomen themselves?—Yes, there were nine Kroomen attacked.

3178. How many of those attacked had had small-pox?—None of those who were attacked had had small-pox previously.

3179. Had any of those who were attacked been vaccinated?—No. I may say that none of the Kroomen had been vaccinated. There were two of the men who had infantile vaccination and the others were rather doubtful, and therefore are put down as unvaccinated.

3180. Of these nine or of the 37?—Of the whole 37.

3181. But none of the nine had either had small-pox or been vaccinated?—No, none of the nine had had small-pox or been vaccinated.

3182. (*Mr. Meadows White.*) Have you any similar figures with regard to the death-rate of 1865 and 1867—there are 15 deaths I see in 1865, and 14 in 1867?—Yes, they are principally due to the China station. In the year 1864 Japan was first opened to European commerce, and the Japanese, in common with the Chinese, adopted the practice of inoculation very largely. The "Conqueror" and one or two other vessels went up to Yokohama. The epidemic began amongst the fleet on the 26th of November 1864, and ceased on the 5th of May 1865. Out of those 105 cases which took place on the China station there were 59 in the "Conqueror" alone.

3183. Were there any foreigners in the death-rate for 1865?—There may have been some foreigners amongst them, but I have no particulars as to their having died. There were possibly two or three Chinese; that would have no effect upon the death ratio.

3184. What were the facts in 1867?—In 1867 the increased death rate is due to the accession of 169 cases, also on the China station. Some of the ships which came down from Japan during the year called in at some of the ports in northern China where small-pox is usually endemic on account of the practice of inoculation being carried out, and the small-pox was brought to Hong Kong. The "Princess Charlotte" had a rather large epidemic. She left Hiogo in Japan on the 13th of February 1867, and the next day 20 cases of small-pox were placed on the sick list. By the 15th there were 60 cases, and up to the 20th of February 120 cases had come under treatment, of whom eight died. The ship made for Hong Kong and landed 116 cases at the hospital there. She communicated cases to other vessels. There were two or three other vessels there; the "Vestal" had a slight epidemic of 22 cases, the "Scylla" 10 cases, and the "Serpent" 21 cases.

3185. Do you find in the navy that the separation of the force amongst the various ships has an effect upon the spread of small-pox?—Undoubtedly; it would, naturally, have an effect.

3186. Therefore, in that particular, the navy is somewhat exceptional?—It is; but unfortunately it very often happens that when small-pox has broken out on one ship, and before communication can be stopped, and that ship placed in quarantine, she has communicated the disease to other vessels.

3187. With regard to the years 1865 and 1867, have you any statistics as to whether those sailors who died had been vaccinated or re-vaccinated?—In the year 1865, on the China station, out of 105 cases which occurred, there had been 65 vaccinated, seven unvaccinated, and 33 not known. The remarks that are made by the medical officer in charge of one of the ships are—"Of the 59 cases in the 'Conqueror,' in 43 the "vaccination marks were good, in seven, absent or "imperfect. Six of those cases were second attacks "of small-pox."

3188. What was the whole complement of the "Conqueror"?—Her complement was 410 men at that time.

3189. In the year 1864 there were 33 deaths; were those due to the epidemic you spoke of in 1864-65?—They were due to the epidemic in Japan. It was the "Euryalus," the flagship, that principally picked up the disease, which was due entirely to the Japanese and Chinese practice of inoculation.

3190. I think you gave the statistics as to vaccination; have you any statistics as to the cases where death occurred; for instance, among the 33 in 1864?—Do you refer to the China station only?

3191. I have it before me that there were 33 deaths in the force during the year 1864; have you any tabulated statement that you could give us as to whether those persons who died had been vaccinated or re-vaccinated?—I have no general statistics that I could get out.

3192. (*Mr. Whitbread.*) You say that there were, in 1865, 105 cases on the China Station, of whom 65 were vaccinated, seven not vaccinated, and 33 not known; could you distribute the deaths amongst those three separate classes?—No, I could not. I find in searching through the records and journals that in many instances it has not been stated. To the best of my belief orders have been issued since that time, that it should always be stated in reporting a case of small-pox whether the officer or man had been vaccinated or re-vaccinated, and if so, when. It was principally the occurrence of these epidemics in China that induced the Admiralty to issue these orders. I may remark that in 1864 we had 199 cases on the Home station alone; and the Inspector-General of Haslar reported that, with the cases arising from 1863, there were altogether 83 cases of small-pox under treatment during Lady quarter of the year. Of those 83, six were not vaccinated and 77 were vaccinated; and in the case of three of the unvaccinated and 19 of the vaccinated, the disease assumed the confluent form.

3193. Then that did not show anything very great in favour of vaccination, did it?—The figures speak for themselves.

3194. (*Chairman.*) Nineteen out of how many?—Out of 83 there were six not vaccinated and 77 vaccinated.

3195. Then in the case of one-half of the unvaccinated and in the case of about one-fourth of the vaccinated, the disease assumed the confluent form?—Yes.

3196. Can you tell us in these later years, 1886 for example, when there were 11 cases, how many were vaccinated and how many were unvaccinated?—In 1886 there were none unvaccinated, five vaccinated, and six not recorded.

3197. What does "not recorded" mean?—Most probably they were vaccinated. Undoubtedly they must have been vaccinated once in compliance with the Admiralty orders; but they might not have been re-vaccinated. There is no statement made to that effect in the cases detailed in the medical officers' journals.

3198. But how comes it that they are not recorded?—That is a very difficult question to answer.

3199. But they ought in due course to have been recorded, I suppose?—They should have been recorded.

3200. (*Mr. Whitbread.*) Does it mean that the vaccination had not "taken"?—No; it means that in describing the case of the patient, no record is made as to vaccination or re-vaccination.

3201. (*Chairman.*) But I thought their papers always had on them a record of the fact of vaccination?—The medical register sheet has, but that remains with the man during the whole of his service. We get these professional returns from the medical officers every year. The register sheet is retained by the Executive, and goes to Whitehall afterwards, at the expiration of the man's service.

3202. A comparison of that with the medical officers' return would have shown what was the fact as to vaccination or re-vaccination, would it not?—That is very difficult to get. These men may be serving in other parts of the world, thousands of miles away.

3203. Who would keep the certificate which shows when there was re-vaccination?—That goes with the man so long as he is in the service.

3204. In his ship?—In his ship. It goes with his Admiralty service certificate.

3205. Then would not that be accessible to the medical officer of the ship at the time the man had the small-pox?—It is so; it goes with him, and the medical officer has possession of it so long as the man is in the ship.

3206. Then what was the difficulty in the medical officer recording the fact?—He has not recorded that case. Those six cases which are stated as "not known" with regard to vaccination may have been re-vaccinated within the previous seven years.

3207–8. Could he not have ascertained it by an examination of the papers?—Yes, he should have done so.

3209. (*Mr. Picton.*) You have handed in to his Lordship, I think, a copy of the Admiralty Regulations on vaccination?—Yes; it is a repetition of my previous evidence.

3210. You have told us, I think, that in 1860 vaccination was merely recommended by the medical authorities?—Yes.

3211. There was then no compulsion at all?—There was no compulsion at all. The Medical Department recommended their medical officers to vaccinate all men that joined the service. It was a semi-authoritative circular approved by their Lordships, but not emanating from Whitehall.

3212. In 1864 vaccination was made absolutely compulsory, was it not?—On all persons entering the service.

3213. So that if the regulation was carried out there could be no unvaccinated seaman or marine?—Since 1864.

3214. We may take it for granted then that every one attacked by small-pox had been previously vaccinated at some time?—I think so, with the exception possibly at that period of those whom I have called foreigners.

3215. (*Mr. Savory.*) But I thought you said that it was only compulsory upon those who entered at that time?—Upon those who entered.

3216. Would it be a proof that every one then in the navy had been vaccinated?—Not necessarily.

3217. That was Mr. Picton's question. It would not follow that everybody then in the navy had been vaccinated?—Not necessarily, because the order was issued on the 15th of April 1864, and the man might have entered the service on the 1st of April.

3218. There is no proof that he had been vaccinated?—No proof at all.

3219. (*Chairman.*) There are some men with long service in the navy?—Yes, it is nearly all long service.

3220. (*Mr. Picton.*) In 1871 re-vaccination was made compulsory in the navy, was it not?—Yes, on the 7th of March in that year.

3221. Does re-vaccination mean repeated vaccinations, or only one re-vaccination?—According to the success or the reverse of the operation. I have written on that paper that I submitted to his Lordship the Admiralty regulations with respect to it. (*See Appendix V., page* 255.) The present regulations state that the medical officers are to re-vaccinate all persons entering the service, whether they have had small-pox or not, and that if the first re-vaccination does not take, they are to be again re-vaccinated, a second operation is to be performed.

3222. (*Chairman.*) You gave us a little while ago a very large proportion of vaccination, in the Mediterranean station particularly, that did not "take," about 500 out of 1,900; does that mean ultimately, or only on the first attempt?—That means on the first attempt.

3223. Is there any record of how many of those were successfully re-vaccinated afterwards?—No, there is no record at all of that. The only record taken at that time were the numbers of those who presented a perfect vesicle, a modified vesicle, and no result.

3224. And there was no record, if there was a second attempt at re-vaccination, whether it was successful or not?—No. I may remark that the orders for a second attempt at re-vaccination were not promulgated at that time, and not till some 10 years afterwards—certainly not till 1879. The Queen's Regulations of 1879, I believe, gave the orders for the second re-vaccination to take place.

3225. (*Professor Michael Foster.*) Then before that they were only re-vaccinated once?—They were only re-vaccinated once before about the year 1879.

3226. (*Mr. Picton.*) But we may assume, may we not, that from 1871 all men and boys in the navy had been re-vaccinated?—Yes, from the year 1871, with the exception of foreigners. The word "persons" was an unfortunate term to use, because at that time there were several officers who said the word "persons" did not include officers, and several officers escaped the re-vaccination, I am sorry to say with fatal results.

3227. Did it include black men?—No, they were not included until the year 1873, I think.

3228. In 1873 all foreigners were included, were they not?—Yes.

3229. Then from 1873 we may assume that all men and boys, whether foreigners or not, were either vaccinated on entry or re-vaccinated?—Yes.

3230. (*Sir James Paget.*) But were those who were in the navy previously all re-vaccinated?—In the year 1873.

3231. (*Chairman.*) Did that apply to those then serving, or only to those then entering?—That applied, I think, to those then serving. The order of 1871, omitting the preamble, is that "all men and boys on entering the "service are to be re-vaccinated; secondly, that all "men who had not been re-vaccinated between their "first entry into the service and the age of 18 shall be "re-vaccinated as soon as possible, however good the "primary vaccination cicatrices may appear, or even "should they present unmistakeable evidence of having "suffered from small-pox previous to that age." The words "as soon as possible" mean as soon as possible after the receipt of the order, according to the way it is published in the instructions. Therefore, if this order were sent to a ship on the Australian station, they would of course not be able to comply with it as soon as a ship on the Home station.

3232. (*Mr. Picton.*) Is that order dated 1871?—Yes.

3233. Then we may safely assume that from 1873 all men and boys, whether foreigners or not, were vaccinated or re-vaccinated?—Yes.

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3234. (*Chairman.*) Would that be so, because if the order was only issued in 1873 as to the Kroomen, the question then arises at what date in 1873 was the order issued, for it would not get to them probably until the end of the year?—This order reached the West Coast of Africa about the middle of 1873, and, of course, some two or three months later it would reach China.

3235. (*Mr. Picton.*) On the paper that you have furnished us with we have not the number of small-pox cases given, but only the number of small-pox deaths?—The number of cases and of deaths are both given.

3236. You gave us just now the number of deaths in the 10 years from 1860 to 1870; will you kindly repeat the number?—The number of deaths from 1861 to 1870, inclusive, was 135.

3237. Can you give us the number of cases?—Yes; for the first 10 years there were 1,860 cases with 135 deaths.

3238. Would you give us the numbers again for the next 10 years?—For 1871-80 there were 388 cases with 47 deaths.

3239. Do you attribute the diminution in the number of cases and deaths during the second 10 years entirely to the orders for re-vaccination?—I think we may assume it to be attributable to that cause.

3240. Entirely?—I think so.

3241. Will you now give us the numbers from 1880 onwards?—From 1881 to 1888 there were 87 cases with nine deaths.

3242. Was there any change made in the orders for re-vaccination in 1880?—Not in 1880.

3243. Has any change been made in the orders for vaccination or re-vaccination since 1873?—Yes; in 1881 special vaccination was extensively carried out, small-pox being believed by their Lordships to be generally epidemic throughout the whole of Great Britain.

3244. But the orders were practically the same?—The orders were practically the same.

3245. Then to what do you attribute the considerable diminution in the number of cases and deaths from 1880 onward?—I think there can be very little doubt that the diminution in the number of deaths was due in a great measure to the thorough way in which re-vaccination has been carried out in the service, especially to the great care which has been taken to prevent unvaccinated foreigners from entering the service. And there is also another very important factor: the China station used to furnish us with a very large number of cases of small-pox; but about the year 1873 the Japanese were persuaded to abandon inoculation and to take to vaccination. I might here remark that when the severe epidemic of small-pox was taking place in the years 1864-65 in Japan, we built some huts on land which was granted to the Admiralty by the Japanese Government, at Yokohama. In 1875, after the Japanese Government had taken to vaccination, which was then not compulsory in Japan, as I believe it is now, the small-pox hospital which we had built there fell into decay from non-usage; I notice that it had not been occupied for four years, and the small-pox hospital, which was only built of wood and temporary, was at that time repaired by the Admiralty and added to the general hospital.

3246. You are no doubt familiar with the improvements that have been made in the sanitary arrangements and in the food and in the comfort of the men in the navy during the last 20 or 30 years?—Yes.

3247. Great improvements have been made?—Undoubtedly so.

3248. Could you give us approximately any dates at which marked sanitary improvements have been made?—I think we may take the year 1860, the introduction of the ironclad, as being the first step towards general sanitary improvement in the service. I think another improvement which has recently taken place, but the effect of which is hardly as yet marked, is the substitution of iron for wood in the construction of gunboats and smaller vessels.

3249. Has the food been improved?—No; the food is practically the same as it was, with this exception, that, owing to the spread of civilisation and commerce there are more ports on the sea coasts of the different countries that are visited by the navy, and that, therefore, fresh supplies of food are more easily procurable than they were.

3250. Has the general health of the navy improved within that period from 1860?—I think so.

3251. Has it improved much of late years?—If you will kindly refer to the table which I have drawn out (Table C.) showing the ratio of deaths per 1,000 from all causes, and from diseases alone, and from small-pox alone, and if you take the second column, the death-rate from disease alone, which includes small-pox, you will find that the numbers have diminished considerably since 1861. In 1861 appears two figures for the last time; the ratio per 1,000 of deaths from disease alone only comes to one figure since the year 1862.

3252. Then since 1861 the death-rate from disease alone has diminished considerably more than 50 per cent. of the former rate, has it not?—Yes.

3253. To what do you attribute that diminution of deaths from disease?—To shorter sea voyages; to greater care not to overcrowd; to plentiful and frequent supplies of fresh food; to the introduction of condensed water; and to the care which is now taken in the general economy and hygiene of the vessels.

3254. Do you think that those causes have had no influence at all upon small-pox?—I cannot think so, upon small-pox alone; but I find there is little or no difference in the number of cases of what one might call similar diseases. Thus, we have had a steady number of cases of scarlet fever, measles and mumps, with no alteration at all during the whole of those years. I very much regret that I have not been able to get out tables with regard to those diseases, but I found the difficulty almost insuperable.

3255. What is expected from re-vaccination with regard to protection against small-pox?—We expect what I trust we have found. We find that where our men have been re-vaccinated, the disease is hardly perceptible. There have been several cases at different stations where the eruption has been almost absent, two or three pustules, perhaps, appearing. We have also found that the epidemics do not spread in the way that they formerly did. Instead of having, perhaps, 50 or 60 cases, or even more, as we have seen previously in China, nearly 200 cases occurring in a ship's company of about 600 men, we find that we have about four or five, and perhaps one or two more.

3256. Then you do not expect re-vaccination to guard against contagion?—Not altogether; we cannot do so, because we have no guarantee that our re-vaccination has been thoroughly performed. I may here remark that very great difficulties are experienced in getting reliable lymph in stations abroad. The difficulties of transit are great owing to the lymph having to pass through a very high temperature. In China, particularly, and also on the West Coast of Africa and the East Indies, it is very difficult to get the lymph in a state in which it may be used; and I am sure that a considerable quantity of the lymph which reaches the tropics becomes attenuated, and in very many instances almost inert. That is so well known now, that all lymph that is sent out to the Hong Kong Government, and also to our own ships there, is sent by the Canadian Pacific Railway now, in order to avoid the heat of the Red Sea and the Indian Ocean.

3257. Then a man who was re-vaccinated would not safely go within the reach of contagion?—I cannot allow that he could be guaranteed against taking the disease, but I think the chances are very much in his favour that he would not take it.

3258. Would you kindly refer to the Report upon the Health of the Navy for 1883, from which it appears that, although there were apparently no deaths from small-pox, there were nine cases in that year. That is so, is it not?—Yes; in 1883 there were no deaths.

3259. There was one case of small-pox upon the "Hector," at Southampton; that was a re-vaccinated case, I presume?—It is not known with regard to that case. There is no history of it.

3260. But it was under the stringent regulations. May we not assume that the man was re-vaccinated?—Yes, we may assume that he was.

3261. Have you any record of how he took the disease?—He was at Portsmouth, where for several years there have always been sporadic cases in a part of Portsmouth known as Landport.

3262. Through contagion?—Yes. But I find that there was only this case on the Home station amongst 22,200 persons. He was two days sick on board, and the number of days he was sick in hospital was so small that the

ratio would not work out; it was only a matter of two or three days. In fact, it was a very doubtful case. Whenever there is the least doubt upon the point, it is always the rule in the hospitals to put the case down to the disease of which there is a doubt.

3263. (*Professor Michael Foster.*) Do you mean that you do not feel sure that that was an actual case of small-pox?—No. It was a very doubtful case indeed. The man was two days sick on board, and then he was sent to the hospital; he was in the hospital, and then in quarantine.

3264. (*Mr. Picton.*) There are 10 cases of vaccinia mentioned on page 21 of the report, as having occurred in 1883. Will you explain what is meant by the cases of vaccinia which are mentioned repeatedly in the Navy Health Reports?—Vaccinia, of course, is cow-pox, according to the Nomenclature of Diseases. In that year there was a mean force on the Home station of 22,200 men, of whom we may presume a certain number were re-vaccinated. Now, it is absolutely essential in the service that a man shall be ready and able and fit to do any duty that he may be called upon to perform at any time. Of course, instances must occur when re-vaccination has been performed, particularly if that re-vaccination is at some distant date from the primary vaccination, where the arm would get a little irritable and inflamed. All those men who had been re-vaccinated are inspected about the fourth or fifth day, and again on the eighth day; and if a man's arm is found to be so inflamed that it is advisable that he should carry it in a sling for two or three days, he is put on the sick list, because it is reasoned that he is unable to pull in a boat, and unable to do his duty aloft, and it is advisable that he should be kept quiet. Therefore, those 10 cases were put on the sick list for, probably, a very short period. I have no exact number of days for 1883, but I have for several of the years following.

3265. They were cases of exceptional severity, I suppose, because all the men were re-vaccinated; but they were not all put on the sick list?—They cannot be called severe. A man must be, so to speak, in perfect health, to do the whole of his duty; he must have no loophole for excuse. For instance, supposing he had to pull in a boat, he might say to the officer in command of the boat, "I am unable to pull; my arm is sore." Therefore, as that man is unfit for duty, he is put on the sick list for two or three days, until the inflammation has subsided to a great extent. But in civil life, a man would think of no such thing; he would go about his work.

3266. Are there any cases of severe suffering from vaccinia?—No, I can find none. In the year 1881 there were, on the Home station, a mean force of 22,140 persons, and special re-vaccination was extensively carried out. There were only 19 cases out of that large number put on the sick list.

3267. There are 42 cases of erysipelas mentioned; were any of those the result of vaccination?—No, if that had been so, they would have been set down to the original disease, not to erysipelas, in the statistical returns.

3268. On the China station in the year 1883 there were four cases of small-pox, were there not?—There were.

3269. Those were traced, I believe, to small-pox in the Chinese ports, were they not?—At Shanghai.

3270. Those men, therefore, were not protected against contagion by vaccination?—I have a report upon those few cases if I may be allowed to read it. The force on the China Station during that year was 2,950 men. There were four cases. Three cases occurred in the "Audacious" which were contracted at Shanghai. All three men had been successfully re-vaccinated, one in 1880, one in 1881, and the third in 1882. The disease was of a very mild form, and the men were but slightly marked. About 100 persons were re-vaccinated on board the ship when the first case appeared, many of whom had been previously re-vaccinated, without result in nearly every case. The fourth case took place in the "Fly" at Kukiang. The man had been unsuccessfully re-vaccinated six weeks previously. The eruption was confluent, but the medical officer remarks: "There was no headache "or back ache, and a good appetite throughout the "illness."

3271. All this is thought to be proof of the efficiency of the system of re-vaccination now in force in the navy, is it not?—I think so.

3272. Are you aware, or I might say, are you not aware, that there are large civil populations that are less visited by small-pox than the navy appears to have been?—Yes; but the navy is peculiarly constituted. We have to go where the small-pox is; the civil population does not. The civil population carries on its ordinary work of every-day life, and run the chance of the small-pox coming to them; and it may be that some time elapses and the small-pox does not arrive there. In the navy it is different; we have to go where the small-pox is, and all of our men who are given leave there are sent on shore, and of course you cannot tell a man where he is to go when he has leave, as it is said, "to follow his private occasions"; but our seamen unfortunately gravitate towards the low parts of the town—the low public-houses—where small-pox is usually endemic; and it is not to be wondered at that our men should occasionally pick up modified cases of small-pox.

3273. They are safe as long as they do not come into contact with the disease; that is the fact, is it not?—That is with regard to some; but on the other hand, I must submit that a very large number of our men do go comparatively fearlessly into houses where small-pox cases are known to exist; that they go about the streets of foreign ports where you see the children with the scabs of small-pox on their bodies or faces, and they come to no harm; but of course here must always be some percentage who will contract the disease.

3274. May I refer you to the Report upon the Health of the Navy for the year 1881, dated 1882. In that year there were, I believe, 25 cases of small-pox in the navy, were there not?—Yes.

3275. On page 22 there is a reference to four cases of small-pox on the Home station; those were contracted when the men were on leave, I suppose, and came in contact with the disease?—Yes.

3276. As to the cases of erysipelas there mentioned, I suppose you would tell me that if any such case had arisen from vaccination it would have been stated?—Yes, according to the instructions in the Nomenclature of Diseases.

3277. On page 55 there are some remarkable cases referred to on the West Coast of Africa and Cape of Good Hope station. There we are told that small-pox occurred in the "Pioneer" in cases that were vaccinated and re-vaccinated, is not that so?—Yes, I have some notes with regard to those cases. There were five cases of small-pox in the "Pioneer," all Kroomen, you will note.

3278. Had the Kroomen been vaccinated?—Two who were attacked had had small-pox before. The most severe case had been re-vaccinated, but not satisfactorily.

3279. In what respect was the unsatisfactoriness?—The case did not "take," as it is called.

3280. How was the disease got rid of in that ship?—They were all put into quarantine on the one side of Ascension Island, where there were no other persons, and the sick were landed in tents. They made a sort of temporary hospital on shore and kept them there until no further cases arose.

3281. Was anything done to the ship?—She was disinfected in the usual manner with sulphur and afterwards scrubbed with carbolic acid and water, and then repainted.

3282. And then the disease disappeared?—Then the disease disappeared.

3283. On page 63 there is a reference to nine cases occurring on the "Eclipse" on the East India station. Let me read a passage from this portion of the report:—"The first case, in the person of a leading seaman, "aged 31, was contracted at Rangoon where small-"pox had been lately prevalent, and proved to be a "severe case of the confluent form of the disease. "The patient had been re-vaccinated two years before. "He was taken ill on the 19th of April; there was a "copious confluent eruption, with high fever and "delirium. On the arrival of the ship at Trincomalee "he was landed at a bungalow on Sober Island, where "he died on the next day, the 28th April. On the "29th of April, a second case appeared, in the person of "an able seaman, aged 27, who was at once landed in "the temporary hospital; in his case the eruption

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" was also confluent, and he died on the eleventh day " of the disease. He is said to have been successfully " re-vaccinated four years previously." Have you any remarks to make upon those cases?—No. The only remark that I might offer with regard to these two men who died of confluent small-pox after being re-vaccinated is, that in the former case most probably, as in the latter, the re-vaccination had been imperfectly performed. We have no history whether these men were re-vaccinated, we have only the history of when the second man was re-vaccinated. At that time the type of small-pox at Rangoon was very severe indeed. But I think you should also note that eight other cases occurred, who recovered after mild attacks.

3284. Those men who were sick afterwards had been vaccinated and re-vaccinated, had they not?—Yes.

3285. Then I should be right in saying that severe cases of small pox do occur in the navy after re-vaccination?—It appears so from these returns, but they are at the same time very rare, and before entirely accepting them I should endeavour to ascertain whether the re-vaccination was perfectly and properly performed. As I reminded his Lordship, at times lymph is sent out to foreign stations passing through hot climates in tropical weather, and the lymph deteriorates, that is to say, certain phenomena or signs are produced after the operation which are not due to thorough re-vaccination, so far as I can express myself. I mean that the re-vaccination instead of being perfect is abortive, and I should expect to find that the re-vaccination of these two men was of the abortive type.

3286. (*Professor Michael Foster.*) This paragraph which you refer to speaks of arm-to-arm vaccination of the crew, carried out while the ship was in quarantine. That from your former statement I suppose to be very exceptional?—Very exceptional. It says that the lymph supply was not looked upon as trustworthy, that is to say, the medical officer had endeavoured to purchase lymph on shore at Rangoon, but finding probably that it had been in the colony, say a month, or even less, he could not rely upon it.

3287. In answer to my question you said that the lymph was usually stored lymph?—The lymph received from England is.

3288. Do you know of any other case of arm-to-arm vaccination in the navy besides this one which is quoted? I take it this means that being dissatisfied with your stored lymph, and there being vaccinated infants in the port, you vaccinated from the arm of those infants?—Yes.

3289. That, I take it, is very exceptional?—Very exceptional. It could not always be done, but medical officers are encouraged to do that as far as possible.

3290. It is done to some extent?—It is, to some extent.

3291. You do not know to what extent?—No; occasionally we get reports that it has been done.

3292. If one infers that all your vaccination abroad from stored lymph one is wrong?—Yes. I myself serving abroad have vaccinated from a child.

3293. Would you say that one-third of the vaccinations were done in that way?—No; I do not suppose that abroad ten per cent. of the vaccinations are performed from arm to arm, but in the home ports it is practically all done from arm to arm. It is very difficult to get the infants on board the ships in the home ports, but certain medical men have the contract for supplying the Admiralty with lymph. The lymph is taken and sealed up hermetically in the tubes and sent on board at once.

3294. And used within a few hours?—Within a few hours. I have no idea of the actual time, but it is used as soon afterwards as practicable.

3295. (*Mr. Picton.*) Are not the regular re-vaccinations usually carried on at home. As a rule men would be re-vaccinated on the Home stations, and that would last them for a year or two, at any rate?—Yes, it would be so. But, for instance, if a ship was going out to China, where small-pox is endemic, on the voyage out the medical officer in charge would thoroughly inspect the men's arms, and he would overhaul the records in the medical history sheets, and he would take care to re-vaccinate them as soon as they arrived on the station and joined their own ship.

3296. According to the regulations, all these men whom he so carefully inspected have been re-vaccinated?—They have.

3297. And they have been re-vaccinated on home stations for the most part?—Yes.

3298. From arm to arm, in fact?—No, not always.

3299. But as far as possible?—As far as possible, from arm to arm.

3300. (*Chairman.*) Do men join at the foreign stations?—Yes, men do join; foreigners.

3301. So that there would be some in the navy who would not have been vaccinated on the home stations?—Yes.

3302. Those could only be re-vaccinated at a foreign station?—They could only be re-vaccinated at a foreign station. I may remark, with regard to your Lordship's observation, that up to within a comparatively recent period persons who were enlisted abroad were allowed to be brought home, but it was found that there were persons who were objectionable in more ways than one. There was the introduction of the African negro as a seaman in our ports, the introduction of the Goanese and other natives, and it was occasionally found that these men actually did bring the disease of small-pox into our ships in the home ports, and therefore some few years ago the Admiralty decided that those men were all to be discharged on the station where they were enlisted, and in many instances they simply rejoin another ship.

3303. Are Englishmen ever enlisted on foreign stations?—Very rarely. If so, they are usually men who have left the service at the expiry of their first period and then re-enlist, but it requires special permission from the commander-in-chief, I believe.

3304. (*Mr. Picton.*) Then it is felt that the vaccination at home does not protect the population against the small-pox brought by these foreigners?—We have not tried that.

3305. I understood you to say just now that one objection to bringing these foreigners to the home stations was that they would bring with them the disease of small-pox?—That was one objection.

3306. Then the home population are not protected?—They brought the disease, but this was prior to compulsory vaccination being carried out in the service. I was merely generalising when I made that remark. It is from the earlier records that I have been able to work it out, but it was found to be so.

3307. I understood you only to give that as the explanation why the Government now would not allow these people to be brought over?—That is one reason; there are other political reasons unknown to me.

3308. (*Dr. Collins.*) Could you tell me the date at which the order was made that those enlisted abroad should be discharged abroad?—No, it is not in the Queen's Regulations at all, that I am aware of. I should think it was an Admiralty circular which came out some few years ago.

3309. About how many years ago?—I think it must have been about 18 years ago, or something like that.

3310. First, I should like to ask you a question with reference to the strength of the navy upon which you assess these attacks and deaths. At Question 2661 you were asked by the Chairman: " Would the number of " men amongst whom these cases occurred be about the " same, or greater or less than in the earlier years 1856 " and onwards?" and you replied, " It would be slightly smaller." Are you acquainted with the return moved for by Mr. Burt, No. 328, " Small-pox—Army and Navy"?—I believe I have seen that paper, but I am not sure.

3311. I see in that paper that the mean strength for the year 1860 is given as 79,018, and the number of new entries as 13,038; whereas the mean strength in 1882 is 57,067, and the number of new entries 6,998; so that apparently in the year 1860 there would be half as many again in the Royal Navy as there were in the year 1882, and the number of new entries would be double?—I must explain that our medical statistics are taken from the average number that are victualled every day on board the ships, and our total force does not include what the return given to Mr. Burt included. The return there includes the coastgard and the marines, and our returns exclude those entirely. Our returns being purely taken for statistical purposes of disease, we only admit the men actually serving afloat in the Royal Navy. We include the coastguard men during the six weeks of their training when they go to sea in the coastguard squadrons, and we include

men who are borne as able seamen, "pensioners," as they are called in some of the home ships; but we exclude marines, coastguardsmen, and Royal Naval Reserve men, all of whom are included in the number returned to Mr. Burt. That, I am told, is the reason why there is such a difference.

3312. Perhaps the same explanation would apply to the discrepancy between the number of deaths from small-pox in your returns and that given to Mr. Burt?—Undoubtedly so.

3313. Apparently, upon the whole there has been a large diminution of the mean strength of the navy from 1860 to 1888?—Yes, there has been a gradual diminution owing to certain changes and to certain requirements of the Imperial service.

3314. I think you gave us the small-pox attacks and deaths for three periods; what were those periods?—1861–70, 1871–80, and 1881–88.

3315. Should I be right in saying that from 1861 to 1870 the death-rate from all diseases in the navy would vary between 7 and 11 per 1,000, roughly speaking; if you have the mean I should like to have it?—The mean death-rate from disease alone from 1861 to 1870 would be about 8·2; from 1871 to 1880 it would be about 5·8, and from 1881 to 1887, 0·4. I am sorry to say that we cannot include the death-rate from disease alone in 1888. I endeavoured to get the statistics, but the statistical branch have not completed the work for 1888, and I was obliged to leave it.

3316. Could you give us similar figures of the zymotic death-rate of the navy for those periods?—No; I endeavoured to obtain some statistics on that point, but in searching through the returns I find that from about the year 1874 the whole of the eruptive diseases were classified together, and it would be a task occupying certainly some months to get it out.

3317. From the information that has come to your knowledge, can you say whether the zymotic death-rate or the death-rate from eruptive diseases is large or small in the navy as compared with the civil population?—I think it is small.

3318. Has it been increasing or decreasing in the period under consideration?—I think, myself, it is decreasing.

3319. (*Mr. Savory.*) I thought you mentioned just now certain forms of zymotic disease which you said had been stationary?—I did; and I took that into consideration, because if we added small-pox to that, we should find that there would be a decrease on account of small-pox.

3320. (*Dr. Collins.*) Those diseases which you have enumerated would not exhaust the class of zymotic diseases?—No; because I omit dengue and epidemic rose-rash, which diseases sometimes appear in returns of the service, and, of course, have an effect upon the ratio of eruptive diseases.

3321. Did you specify typhus, which, I believe, is a disease to which ship life is particularly predisposed?—I have gone through the returns of the service for some years back, and I have found within the last ten years one case of typhus which occurred on board one of our home ships, and was contracted in Ireland.

3322. Have you been able to find any record of typhus as far back as 1860?—I have not searched s far back as that, but I do not remember coming across any case.

3323. Then I should be right in saying that during the last ten years there has been only one case of typhus in the navy?—I find that there have been 11 cases.

3324. I think you gave us just now some figures showing the results of re-vaccination practised during the year 1871?—Yes, the practical results.

3325. As the result of an Admiralty order?—As the result of the order.

3326. In your answer to Question 2659, in reference to that order of March 7th, 1871, you said:—"Very little "effect from this order for compulsory re-vaccination "was felt until two years afterwards." Did you mean by "effect," its effect upon the reduction of small-pox, or its effect in extending re-vaccination in the navy?—I referred to the number that died. Very little effect was felt until about two years afterwards in the decrease of the number of deaths.

3327. But, as a matter of fact, as appears from the figures which you have given us to-day, the order was very largely carried out in the year 1871, was it not?—It should have been so.

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3328. Was it not?—It should have been so; that is all I can say.

3329. Did I not correctly understand you to say that the figures which you gave us with regard to the practical results of re-vaccination applied to the year 1871? Was not the order made on March 7th, 1871, carried out, to a large extent, by way of re-vaccination, especially, I think you told us, in the Mediterranean squadron during the latter months of the year 1871?—The results of this order for re-vaccination would, I believe, have been more manifest had there not been an unfortunate epidemic which broke out at Portsmouth, and which gave us nine deaths in the year 1872. Out of this epidemic I have a history of 38 cases admitted into Haslar Hospital, all of whom had been successfully vaccinated in infancy, and two re-vaccinated. Therefore we may presume that 36 out of the 38 had somehow or other eluded this order of 1871. It might have been, and probably was, the fact that those men who had eluded the re-vaccination had joined the receiving ships, the "Duke of Wellington," and the "Asia," and others, on return from foreign service, and that no re-vaccination had taken place during the period they were remaining on board the ships, because the vessels have a complement of about 3,000 men, and are constantly changing, men being drafted abroad and men coming home. But out of this number of about 3,000 men, there seem to have been only 38 cases admitted into Haslar, and only two of those 38 were re-vaccinated. The medical officer remarks:—"The protection afforded to the ships' companies of the "depôt ships," that is the "Duke of Wellington" and the "Asia," "by the re-vaccination last year, has "been most effectual; especially was it observable in "the 'Asia,' as three-fourths of the men are accustomed to live and sleep on shore, many of them in "the heart of the most infected district of Portsmouth, "and yet only eight cases occurred out of a complement "of 1,165."

3330. (*Mr. Meadows White.*) Were there nine deaths among those 38?—No; the nine deaths were distributed throughout the whole of the station.

3331–2. (*Dr. Collins.*) Referring to the year 1879, you were asked this in your former examination, at Question 2668: "I see that of the 52 cases, 39 were on the West "Coast of Africa?" And you answered, "Yes, those "would be nearly all Kroomen." Then Professor Foster asked you: "All unvaccinated?" and you replied:—"All unvaccinated at that date: they are compelled to "be re-vaccinated now." That seems to be inconsistent with some of the explanation which you gave us to-day with reference to the outbreak on the "Boadicea"?—That is the case, but, having read my evidence over, I find that I evidently did not understand the question as it was put, and I have corrected my evidence in the proof, which will be found to accord with the statement I have made to-day.

3333. In that outbreak on the "Boadicea," I think you told us there were in all nine cases among the Kroomen?—There were nine Kroomen attacked out of 37.

3334. And the remaining 28 cases were white men?—Yes, white men.

3335. Have you any information as to their vaccination?—The only report that I can get is this, that the one white man who died with confluent small-pox had two infantile vaccination cicatrices only.

3336. Were they well marked?—Presumably not, but I have no documentary evidence upon that point.

3337. Are you familiar with the Navy Report, West Coast of Africa Station, 1879?—I cannot say that I am familiar with it.

3338. In which it is stated that of the 25 cases received, one white man who had two well-marked vaccinal cicatrices on his arm, died of the hæmorrhagic form of the confluent variety?—I cannot say that I am well acquainted with the report. Of course I have read it through.

3339. Finding that information in the printed Navy Report I presume I may take it as correct?—Yes.

3340. Did the commander of the "Boadicea" suffer from small-pox?—He might have done so, I do not know

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3341. You are not aware that he had a confluent attack?—I believe he had.

3342. And did three others amongst the white men also have confluent attacks?—Yes.

3343. With regard to the Kroomen, I find it stated in the same report that 16 of them had evidence of having had small-pox in their youth, two had vaccine marks on their arms, and the remainder had doubtful scars on various parts of their bodies; can you enlighten me with regard to the scars on various parts of their bodies?—No, I have no evidence as to that.

3344. Does that refer to vaccination marks or small-pox marks?—Marks of previous small-pox, I should think.

3345. (*Mr. Meadows White.*) I understood you to say that there were 14 deaths, all of which were among Kroomen except one white man?—There were 12 deaths on the West Coast of Africa that year.

3346. Out of the 14?—Yes.

3347. All of them being Kroomen except one?—No, I must have made a mistake. There were nine Kroomen attacked and seven died; the remainder must have been white men.

3348. (*Dr. Collins.*) Then, apparently, all the Kroomen had had small-pox except the two who had vaccine marks on their arm?—16 Kroomen, according to the Blue Book, had had small-pox.

3349. And two had vaccine marks?—Two had infantile vaccine marks.

3350. And the remainder had doubtful scars on different parts of their bodies?—Yes.

3351. You could not give us any further information about those Kroomen than that?—No, I have no further information. If I may be allowed to add a rider, I may say that I believe that the neglect of re-vaccination in this instance called forth a severe letter, or a letter of severe censure, from their Lordships. I think attention might also be drawn to the fact that out of the ship's company of 305, there was a very large per-centage of white men attacked. Such a large per-centage, I believe, has never been found subsequently in any ship in the service, but it was attributed entirely to the neglect of the instructions as to re-vaccination.

3352. Was not it the fact that both the officers and all the white men, with one exception, who had faint marks, showed good vaccination cicatrices, some of them being due to re-vaccination, as stated in the report?—It might have been so.

3353. Did it come to the knowledge of their Lordships that any of those white men who had been attacked, had not been re-vaccinated?—I believe it did.

3354. In the shape of an official communication?—In the shape of an official communication.

3355. Would that letter of censure to which you have referred exist in print?—I should think not.

3356. I suppose it could be found at the Admiralty?—Yes, probably so, on application.

3357. From whom would that communication probably emanate?—It would come from their Lordships.

3358. I mean the information upon which their Lordships' letter was based?—I should think in all probability the Medical Department would call for a special report from the medical officer of the ship, and upon that special report their Lordships would most probably ask further questions, and so the truth would gradually be elicited.

3359. Did I rightly understand you to speak from your own knowledge of the existence of information to the effect that re-vaccination had been neglected in the case of the white men on the "Boadicea"?—I am not speaking authoritatively, only from hearsay, one knows it as historical fact in the service.

3360. Have any instances been brought to your knowledge of ulceration of the arm following vaccination?—No, none, beyond those few cases that I have taken note of during the last seven years on the Home station. I have searched very carefully to find if there was the least evidence of men having had bad ulcers or abscesses, or anything of that description, following vaccination, but I have been unable to find any such case.

3361. (*Sir James Paget.*) Have you ever known a case of latent syphilis being brought out by vaccination?—Your question is a very interesting one, and brings to my recollection a curious circumstance which I noticed in working up the history of this subject; that is, that it appears that some of the medical officers noticed, about 20 years ago, in some of the cases of small-pox that took place, I think, on the South American station, that an eruption of syphilis appeared to have some modifying effect upon the eruption of small-pox; but that was in the pre-vaccination days.

3362. Nothing of the kind, so far as you know, has been brought out by re-vaccination?—Nothing of the kind, so far as I know.

3363. (*Dr. Collins.*) I understand you to say that you have had some evidence brought before you of syphilitic poison exercising a modifying influence upon subsequent small-pox?—It was quite in the early years; it must have been about the end of 1839, or in 1840, when we used to get some cases from that station. The medical officers remarked that the eruption of secondary syphilis appeared to exercise some modifying effect upon the eruption of small-pox. In the pre-vaccination times, in the service, whenever a case of small-pox arose, it was always confluent.

3364. (*Sir James Paget.*) Do you mean, supposing a man who had a syphilitic eruption were attacked by small-pox, then the small-pox eruption would be modified by the pre-existing syphilis?—It appeared to be so.

3365. (*Professor Michael Foster.*) Modified in the direction of making it less confluent?—It appeared to be so.

3366. (*Dr. Collins.*) Can you give us the name of the officer making that report?—I could search for it.

3367. (*Sir James Paget.*) Do you know of any case in which, when a person was attacked with small-pox, secondary syhilitic eruptions appeared, the disease having previously been hidden?—No, I have no knowledge of any such case.

3368. (*Dr. Collins.*) So far as your recollection goes, did the modification of the subsequent variola result only in cases in which there was a secondary syphilitic eruption present upon the body at the time?—I cannot answer that question. All I can say is that a medical officer, perhaps more observant than others, had noted this fact in his journal.

3369. I think you told Mr. Picton that a comparison between the small-pox incidence of mortality in the navy and that of the civil population would be fallacious, because of the opportunities which the men in the navy would have of coming into contact with small-pox at different ports?—I intended to imply that.

3370. Would not a fair addition to that statement be that inasmuch as a large number of men in the navy are on ship-board from one year's end to the other, they would have on the whole rather less communication with other populations than the civil population would have?—No, I cannot think so. Men are not now-a-days on ship-board for a year, or anything like it. If a man is on ship-board for three months it is considered very hard lines. There is as much leave as possible given to the men; the ships do not make long sea journeys now. Leave is given to well-conducted men, and I need hardly say that at the present day the majority of the men in the service are well-conducted men, so that instead of men being a year without getting on shore, such a thing is absolutely unknown.

3371. Still, a large proportion of their time being spent in going from port to port, they would be subject to a system of involuntary quarantine during those periods?—Yes, but a long time is not spent in going from port to port; our ships are navigated by steam now—coal is required, and that costs money—ships make short and economical passages from port to port, it being in the interests of commerce that the flag shall be shown in every little seaport town wherever a station may be.

3372. Should I be right in assuming that a larger proportion of the navy is on land than afloat?—No; but a ship goes into harbour and remains there perhaps six weeks or two months, and even more, as the case may be. Often little troubles occur in different parts of the world where Her Majesty's Consuls require the presence of a man-of-war to act as a sort of deterrent—to overawe perhaps troublesome people—and so the ship remains in one position in harbour for many weeks or months together. Thus it is that we found our ships unfortunately contracted a few cases of small-pox in China.

3373. You spoke of the results of re-vaccination as being either successful or unsuccessful or abortive. May I ask you how you interpret the abortive results?—What we would call no results—that is, no physical results; we can see no result at all of the introduction of the vaccine lymph, the only result attained being the mark made by the puncture of the lancet or instrument used.

3374. Which do you believe to be the better evidence of protection against small-pox: successful, unsuccessful, or abortive re-vaccination?—I should say successful re-vaccination.

3375. Then you do not think successful re-vaccination implies susceptibility to small-pox?—I think that if the re-vaccination was successful within a period, say of seven years after the primary vaccination, the protective effects of the primary vaccination had died out, and that the man had been, previous to re-vaccination, susceptible to small-pox in a greater or less degree.

3376. If, on the other hand, antecedently successful vaccination were followed seven years later by unsuccessful re-vaccination or abortive re-vaccination, would you consider that man's condition one of susceptibility or insusceptibility to small-pox?—As far as I understand, you wish to imply that ——

3377. I only wish you to answer that question?—You ask me whether a man vaccinated successfully in infancy, and whose re-vaccination has failed, is susceptible to small-pox or not.

3378. I want to know what your opinion is?—I should think that man was susceptible to small-pox; and probably for that reason the Queen's Regulations contain that order, that a man is to be re-vaccinated a second time in order to make sure that he is insusceptible to the vaccinal disease.

3379. I am not quite sure whether I understood you correctly to say that a successful re-vaccination did imply that at the time of the re-vaccination the man's previous protection had worn out?—I think so. I will not say entirely worn out, but to a certain extent worn out.

3380. Is there any means of measuring by the results of the re-vaccination how far the effect of primary vaccination is worn out?—I think we have some means of measuring it, if I refer you to the tables which I drew out of the re-vaccinations on the Home station that took place after their Lordships' order of 1871. We found that out of the total number of re-vaccinated more than one-half had lost all protective influence of primary vaccination.

3381. How do you know that?—From the results, because we found, of 10,154 re-vaccinated 5,936 presented a perfect vaccine vesicle.

3382. Then I should be right in assuming that a perfect vaccine vesicle as the result of re-vaccination implies that the protective influence of primary vaccination is wholly worn out?—Practically so, in half of the cases.

3383. (*Dr. Bristowe.*) Do you mean wholly worn out?—That the protective influence had wholly worn out in the 5,000 odd cases. In the Report of the Health of the Navy at the time, I find these remarks: "Re-vaccina-" tion at a greater distance of time than seven years " would seem to give no greater protection from the " vaccine virus than primary vaccination alone. On " the other hand, within a period of seven years it " appears to confer an impunity greater than that " conferred by small-pox in childhood or in youth." That was the deduction made from an examination of these tables.

3384. (*Sir James Paget.*) By whom?—By Dr. J. D. Macdonald.

3385. (*Professor Michael Foster.*) What do you mean by wholly worn out; that they would present such a condition as they would present if they had never been vaccinated before?—I think we must admit that, that if out of 10,000 vaccinated, 5,000 presented a perfect vaccine vesicle, the protective influence if not wholly worn is almost wholly worn out.

3386. (*Chairman.*) What I should like to understand is this: There are two effects supposed to be produced by vaccination and re-vaccination; one that it protects against the catching of the disease; the other that if you take the disease it diminishes the severity of its attack, those are the two suggested results. When you say the protection is worn out, or almost worn out, I understand you to mean that it has little effect in preventing the disease being taken. Do you intend it or not also to include its having little or no effect in diminishing the severity of the disease?—I am giving principally statistics of the navy, and thinking of the men of the navy rather than the civil population—we look to protecting our men as far as we can. These 5,000 odd men who presented a perfect vaccine vesicle I should say were susceptible to small-pox, but probably in a modified degree.

3387. (*Professor Michael Foster.*) They were protected that extent?—Yes.

3388. (*Sir James Paget.*) Do you think those men would be as liable to small-pox as a person altogether unvaccinated?—No, I do not think so.

3389. And if they were attacked with small-pox it would be in a less severe form?—Yes, as far as the experience of the service goes. I am confining myself to the navy.

3390. (*Dr. Collins.*) Would you read that memorandum once again with regard to re-vaccinations?—Of the total number of vaccinations, viz, 10,154, more than one-half had lost all protective influence of primary vaccination—that is 5,936. Then the quotation which I read from Dr. Macdonald was this: "Re-vaccination " at a greater distance of time than seven years would " seem to give no greater protection from the vaccine " virus than primary vaccination alone. On the other " hand, within a period of seven years it appears to " confer an impunity greater than that conferred by " small-pox in childhood or in youth." Dr. Macdonald, I may remark, at the time was medical officer serving on board the "Lord Warden," in which ship 579 persons were re-vaccinated, of whom 535 presented a perfect vesicle.

3391. (*Chairman.*) Who gives the figures which you mentioned before you came to Dr. Macdonald's remarks?—I think Dr. Mackay, he would be Deputy Inspector-General at the time.

3392. (*Dr. Collins.*) Would you agree with the opinion given by Dr. Macdonald?—I do not think I should; in fact, I am rather of opinion that the order for vaccination which was issued in 1864 was not carried out as efficiently as it should have been, and there were a good many persons escaped because the order did not embrace the men already in the service, but only those who should enter after a certain date.

3393. Referring once again to the passage you have read to us from the Navy Report, apparently the opinion is there stated that a distinction is to be drawn between the protective influence of vaccination after seven years, and less than seven years. I understand the statement there to be that after seven years a successful re-vaccination implies a complete absence of protection and mitigation?—Almost complete.

3394. Is there any qualification of that?—Not in the words I have been quoting.

3395. Does it say, after seven years while there is no protection there is mitigation?—The quotation implies that re-vaccination at a greater distance than seven years gives no greater protection from vaccine virus than primary vaccination alone. On the other hand, within seven years it confers impunity greater than that conferred by small-pox in childhood or youth.

3396. I understood you to say that successful re-vaccination implied to your mind a relapse into susceptibility to small-pox?—Not a total relapse.

3397. A relapse to some degree?—A relapse to some degree.

3398. And that unsuccessful re-vaccination likewise implied susceptibility?—Not at all.

3399. Did not you say that if the re-vaccination failed you considered it necessary to re-vaccinate again in order to make certain?—Yes, we are ordered to do so.

3400. On what ground?—On no grounds given to us. We are simply to re-vaccinate and re-vaccinate again.

3401. (*Mr. Savory.*) How many times?—A second time, and even a third if necessary.

3402. Have you in all cases of re-vaccination a record of the result?—Yes.

3403. (*Professor Michael Foster.*) For the purpose of a second re-vaccination would the same lymph be used as was used in the first?—The medical officer would probably try a fresh supply.

3404. You would make a point of that?—Yes, cases have been recorded where medical officers have re-vaccinated five and even six times.

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3405. (*Mr. Savory.*) Does the term "re-vaccination" apply only to successful operations?—No.

3406. So that it includes a large number of cases that are not successful?—Yes.

3407. With regard to insusceptibility, is not there some confusion in the use of the term? Is not it the case that re-vaccination may not take, either from the person being absolutely insusceptible, or from defective lymph or from a defective operation—either of those causes may act?—Yes.

3408. So that to say a person is insusceptible would not necessarily imply that there was something in his constitution to prevent action of the lymph?—Not at all; so many circumstances have to be taken into account.

3409. You have been asked these questions with regard to insusceptibility to vaccination, and you have been answering them with the understanding that the term "insuspectible" is used in the more scientific sense?—Yes.

3410. That is to say, that the person is absolutely proof against efficient vaccination and good lymph?—That is what I mean.

3411. (*Dr. Collins.*) Have you ever seen a case of insusceptibility to re-vaccination in the strictly scientific sense?—Of course one has come across numbers of cases of re-vaccination which do not take—where failure ensues.

3412. What proportion of those cases of re-vaccination that are unsuccessful do you consider are due to the fact of the primary vaccination still operating on the system?—I have no statistics upon the point, but, judging from what I have seen of late years in the service, I should think that the cause of the failure of so many cases of re-vaccination has been entirely due to the fact that the primary vaccinations are now so well performed. I am speaking of the service purely. I am endeavouring not to give my own private opinions but the opinions of the service. I am looking upon all these questions entirely from the naval point of view.

3413. Representing as you do the opinion of the service, will you tell us whether a successful re-vaccination is held to imply that the individual has relapsed into susceptibility to small-pox?—Yes, we do think so.

3414. And that the re-vaccination confers a new lease of insusceptibility, as it were?—Yes.

3415. How long is that new lease supposed to last or held to last?—According to instructions, seven years.

3416. And according to experience?—We have not to go by experience in these matters; we have to obey the instructions.

3417. I understand from the regulations that you have to re-vaccinate those persons who have had small-pox before?—Yes.

3418. Can you give me any figures showing the results of vaccination in persons who have had small-pox?—No, I have none.

3419. Can you speak from your own experience?—No, I cannot. The only remark I might make is that it is a very rare thing now to find either a boy or a marine recruit who has got the marks of small-pox upon him on entering into the service. I do not think that in my experience I have ever come across more than perhaps 10 or 12 men in the service who had marks at all, and certainly very few that presented the marks of confluent small-pox.

3420. You attribute some of the cases and deaths from small-pox after re-vaccination to the re-vaccination being imperfect or improper. I should like to understand what is held in the service to be a perfect and proper re-vaccination?—I should describe proper and perfect re-vaccination as one in which there had been either a perfect or a modified result: that something more had taken place on the arm than the ordinary punctures—that is that the lymph had taken effect.

3421. Then those cases which form some proportion of the no-result cases which are in your opinion evidence of insusceptibility, would not come under your category of proper re-vaccination?—The cases which I would tabulate as "no result" are, I should think, those occurring in men who had been successfully vaccinated or re-vaccinated within the previous seven years, and of course no result having been obtained they would not be called cases of perfect re-vaccination; probably in two or three years afterwards when they were again re-vaccinated a perfect re-vaccination would be obtained.

3422. How soon after a previous vaccination have you seen a re-vaccination successful?—That is a very difficult question to answer, because we do not see the primary vaccinations at all in the service; the earliest age at which the boys are taken into the service is 15, and those boys have been primarily vaccinated, and of course they are re-vaccinated, so that we have no means of judging at all, beyond taking the time generally. In very many instances we find that the boys have been vaccinated in infancy and re-vaccinated some years afterwards, but no matter at what time they have been re-vaccinated on shore they are re-vaccinated on joining the service.

3423. If it be true that a re-vaccination which is successful implies a relapse into susceptibility to small-pox, would it not be well, to make the protection complete, to see what the result of a further re-vaccination would be?—That might be done, of course: and it is to meet such cases, I presume, that order was issued that re-vaccinations were to be performed if the first attempt was unsuccessful.

3424. But not if the first attempt is successful?—Not if the first attempt was successful.

3425. (*Chairman.*) I understood you to say that even if the first attempt had been successful there was sometimes re-vaccination performed when the ship was known to be going into a badly infected port?—Yes, if the medical officer found that the scar presented by re-vaccination was not of sufficient size or of sufficient depth, it would be his duty to re-vaccinate the man or men.

3426. One other question about the number you gave—upwards of 5,000 out of something over 10,000—in whom there were perfect vesicles on re-vaccination, that would include, as I undertand, or might include, a certain number who had entered the service before 1864, and in whose case it was not re-vaccination, but primary vaccination?—Very possibly; but what we should describe in the service as a perfect vesicle is a vesicle from which a small quantity of lymph might be drawn.

3427. You have no means of judging what proportion of the men were unvaccinated in the navy before 1864, and who remained unvaccinated afterwards until the re-vaccination order?—No, that it would be almost impossible to give.

3428. (*Dr. Collins.*) At Question 2656 you say the men in the navy are thoroughly renewed once in every 10 years?—That is the case, according to my judgment. The question within what number of years the men disappear from the navy is a difficult question to answer without getting the proper numbers from the Admiralty.

3429. (*Sir James Paget.*) Dr. Macdonald, in the quotation which you read, speaks of the influence of vaccination being lost after seven years. Is there any evidence at all that a larger proportion of cases of small-pox occur in those who were re-vaccinated seven years ago than in any others?—No, rather the reverse.

3430. Then how does that coincide with what is there stated?—This was merely an opinion expressed at that time.

3431. Do you happen to know what experience of small-pox the writer of that opinion had?—I do not know that Dr. Macdonald had more experience than ordinary in small-pox.

3432. (*Professor Michael Foster.*) Do I understand that seven years after a man has entered the service he is re-vaccinated again?—Yes.

3433. (*Chairman.*) What are the terms of the Admiralty instruction upon that point?—"All men and boys "entering the service are to be re-vaccinated; should no "result follow on the first operation a second vaccination "is invariably to be performed. All men who have not "been re-vaccinated between their first entry into the "service and the age of 18 shall be re-vaccinated as soon "as possible, however good their primary vaccination "cicatrices may appear, or even should they present "unmistakeable evidence of having suffered from small-"pox previous to that age."

3434. (*Professor Michael Foster.*) What is the regulation about the seven years?—I was certainly under the impression that seven years was the time that was laid down for re-vaccination in the service.

3435. (*Mr. Dugdale.*) As a matter of fact, if you had successfully re-vaccinated a man when he came into the

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service, and he remained under your jurisdiction to the end of seven years, would you re-vaccinate him again?—If he was going abroad.

3436. No; in the ordinary course of events. Suppose the man had been successfully re-vaccinated, and this same man remained under your jurisdiction seven years afterwards, would you consider it your duty to re-vaccinate him again?—I think it should be done.

3437. Is it done in practice in the navy?—I believe it is.

3438. (*Professor Michael Foster.*) There would be orders to that effect?—That is left to the discretion of the medical officer. What the Admiralty requires is that persons shall be re-vaccinated on entering the service after primary vaccination.

3439. (*Mr. Dugdale.*) When second re-vaccinations are performed have you any statistics to show whether they are successful or not?—No, there are no regular statistics taken. The only good statistics I was able to get were the statistics after the first order for compulsory re-vaccination in 1871.

3440. (*Professor Michael Foster.*) The medical officer would not know without inquiry whether the man had been serving seven years?—Yes, he would know at once. He would know from the man's medical history sheet the date that he entered the service.

3441. (*Mr. Whitbread.*) That sheet contains no column dealing with vaccination?—No, but the instructions are that it is to be placed in red ink here.

3442. That may account for there being no record in many cases?—When this form is reprinted there will possibly be provision made for it.

3443. Perhaps you would send to us the order for what may be termed re-re-vaccination if you can find any such order?—There is no order to that effect. The only order after the compulsory re-vaccination order in 1871 was a circular that was issued in 1881 drawing attention to the fact that as small-pox was epidemic in Great Britain, special precautions should be taken to re-vaccinate all the men, and special re-vaccination was extensively carried out in that year.

3444. I should like to ask whether, as it is a known practice in the navy that men endeavour to elude the effects of re-vaccination, any instructions have been authoritatively given to medical officers to take precautions for the future against that practice?—There have been no actual instructions given upon that point, but there are very strong instructions or orders under the head of "discipline" that any man doing anything to retard his cure, or make himself appear ill, or anything of that description, is at once punished severely. Seamen are ordered to be re-vaccinated, and if they were caught attempting to tamper with their arms in any way the punishment would be severe.

3445. That leaves it to the men. Would not it be useful that the medical officer should be instructed to take the ordinary precautions and see that a man does not tamper with his arm?—It might be advisable to do so.

3446. (*Sir James Paget.*) Are there any returns in the naval service such as we have had from many civil departments which could tell the proportion of cases of small-pox in the vaccinated and in the re-vaccinated?—I will endeavour to draw out some statistics upon that point.

3447. (*Mr. Meadows White.*) Are there any statistics in the navy as to attacks of small-pox occurring in patients who have had small-pox before?—No, no statistics to that effect. I have only the notes that I have drawn up.

3448. You cannot give the proportion?—No, there are no statistics upon that point.

The witness withdrew.

Brigade-Surg. W. Nash, M.D.

Brigade-Surgeon WILLIAM NASH, M.D., examined.

3449. (*Chairman.*) You are a brigade surgeon in the army?—Yes.

3450. Will you be good enough first to give the Commission the regulations which exist as to the vaccination and re-vaccination of soldiers?—Every recruit on being enlisted is required to state whether he is willing to subject himself to vaccination or re-vaccination or not, and to this question among others he subscribes his name on his attestation paper. Question No. 16 on the first page of the Attestation is, "Are you willing "to be vaccinated or re-vaccinated?"

3451. What is the date of that regulation?—December 1883.

3452. Was there any similar regulation prior to that date?—It was not inserted in the attestation paper; the soldier was not asked that question on enlistment.

3453. But is that the first regulation that was in force at all with regard to the vaccination of recruits?—No, every recruit was vaccinated before.

3454. Can you give us what the earlier regulation was before we come to the existing regulation?—The earlier regulation was the same. Every recruit was required to be vaccinated; but the question was not put to him.

3455. Can you tell us the date when it was first required that every recruit should be vaccinated?—In 1858.

3456. Will you proceed to state what the existing regulation is?—"Every recruit except those bearing "distinct marks of small-pox will be vaccinated on "joining the head-quarters or depôt of the corps to "which he belongs, unless the operation is certified to "have been already successfully performed subse-"quently to his enlistment." The fact of the soldier's vaccination or re-vaccination is inserted on his medical history sheet, showing the date and the result.

3457. So even if he has been primarily vaccinated, he is now re-vaccinated on joining?—Yes.

3458. I see it is "on joining the head-quarters or "depôt of the corps to which he belongs, unless the "operation is certified to have been already success-"fully performed subsequently to his enlistment." May some time elapse before he joins the head-quarters or the depôt of the corps?—It is possible, in this way: a man being recruited in a certain district might be kept till a certain number of recruits were got together before being forwarded to his own head-quarters or depôt.

3459. Militia recruits are also to be vaccinated unless they have distinct marks of previous vaccination or small-pox?—Yes. The old regulation, till last year, was that militia recruits should be vaccinated, except in the case of those bearing distinct marks of small-pox. The words, "previous vaccination" were added by the Army Order 276 of 1888.

3460. I think it would be necessary to let the Commission have, as far as possible, all the orders that at any time have existed with regard to vaccination, to see what changes have been made?—I will let the Commission have them.

3461. With regard to the method of vaccination, what is the method pursued?—The regulations state that, "The direct method of vaccination will be had "recourse to whenever practicable, in preference to "that by lymph from tubes or points; it being under-"stood, however, that in vaccination from arm to arm, "or in re-vaccination, the lymph is not to be taken "from adults, nor from a re-vaccination."

3462. Is there a regulation with regard to the number of punctures?—The next paragraph but one of the regulation states: "In re-vaccination the necessary "punctures will be made in not less than two places; "and where the evidence of original vaccination is "indistinct, or single, three punctures will be made."

3463. Supposing the operation of re-vaccination not to be successful, is there any direction as to its repetition?—Yes. "When re-vaccination has failed, the "operation will be repeated with lymph from another "source when practicable, and in the event of the "operation still proving unsuccessful, the names of the "individuals will be recorded, with a view to their "being re-vaccinated at some subsequent date."

3464. What steps are taken to ensure vaccination?—This medical history sheet which I mentioned just now, in which the vaccination or re-vaccination of the soldier is entered, travels with him wherever he goes—from one station to another—and when a regiment or part

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of a regiment comes into garrison these medical sheets are handed to the medical officer, who has to look over them to see that the vaccination is properly entered; if he sees that the entries are unsatisfactory he is to examine the man. There is this further check, that once a year—in the United Kingdom it is in March—the medical officers will make an inspection for vaccination marks of every man, woman, and child under their care, and will furnish a certificate by the 1st of April to the principal medical officer for the information of the Director-General, showing the results of the inspection and what steps had been taken for re-vaccinating those not showing marks of small-pox or of sufficient vaccination.

3465. What is the date of that order?—The regulations are dated 1885—but the order has been in force for some time.

3466. What is the source from which the lymph is obtained?—The regulations direct: "Medical officers "will endeavour to keep up vaccination in their stations "from arm to arm of infants, and by the preser- "vation of lymph in tubes or points, but should the "supply from such sources fail, or become deterio- "rated, they will make application for a new supply, "through the principal medical officer, to the Director- "General, Medical Staff." Previous to March of this year the vaccine lymph required for army purposes was obtained from the vaccine establishment of the Local Government Board. Since that date the veterinary department at Aldershot has supplied calf lymph sufficient for all demands for carrying out vaccination and re-vaccination in the army.

3467. What statistics are you able to furnish the Commission with with reference to vaccination and small-pox in the army?—The first table I have is one showing the ratio per thousand of results of vaccination and re-vaccination amongst soldiers and recruits during the ten years 1879 to 1888 inclusive. (*The table was handed in. See Appendix VIII., Table A: page* 277.)

3468. Do you know why that begins in 1879—why does it not start earlier?—It could have been taken earlier for soldiers and recruits taken together. This is just taken as a ten years' period—it could be made out for a longer period if required; but the results for recruits and soldiers separately are only from 1883, as they have been only kept separately since that time. I have here another table showing the ratio per thousand of results of vaccination and re-vaccination amongst women and children for seven years, from 1882 to 1888. *The table was handed in. See Appendix VIII., Table B: page* 277.)

3469. Then you have some statistical returns to produce relating to small-pox in the army?—I have here a table showing the average annual strength of the army during the 29 years from 1860 to 1888, the number of admissions into hospital and of deaths from small-pox in each year, together with the ratio per thousand in each case. (*The table was handed in. See Appendix VIII., Table C: page* 278.)

3470–2. This relates, I suppose, only to the English army. I mean the army other than the native armies?—Yes, the English army.

3473. It would not include the native army in India?—No, only white troops.

3474. "Admissions," I suppose, means admissions into hospital?—Yes.

3475. What other tables have you?—The next table is one showing the admissions and deaths from small-pox among soldiers during 29 years, 1860 to 1888, in the United Kingdom, Colonies, India, and Egypt respectively, together with the ratios per thousand of strength. Small-pox occurs in Egypt and in India so much more than in the rest of the Colonies and the United Kingdom that I thought it best to show it in the table separately. (*The table was handed in. See Appendix VIII., Table D: page* 278.)

3476. It would appear that during the last 10 years a very large proportion of the deaths from small-pox have been in India and Egypt?—Yes.

3477–8. I see in the United Kingdom during the last 10 years the deaths have been eight, and in the Colonies one, making a total of nine, whereas in India the deaths have been 39 and in Egypt 19?—Yes. The strength in the United Kingdom being, roughly speaking, 80,000 to 90,000, lately 100,000, as compared to 40,000 to 60,000 in India, and very much smaller in Egypt. Egypt varies. It was up to 11,000 once.

3479. What other tables have you?—The next is a table showing the number of admissions, the number of deaths, and the per-centage of mortality to attacks from small-pox amongst soldiers in the United Kingdom, Colonies, India, and Egypt respectively. (*The table was handed in. See Appendix VIII., Table E: page* 279.)

3480. Some of these numbers would be almost too small to give a per-centage that was of much value?—Yes.

3481. Because in the last 10 years there was only one death in the Colonies, and the death rate to attacks appears there to be much higher than elsewhere?—That in itself is of no value.

3482. In Egypt in one year there appears to have been 37 per cent. of deaths to attacks; it was a very small year as regards the number of attacks, there being only eight cases, of whom three died; in the subsequent year there was a considerable increase of attacks, and only about the same number died?—Yes. In Egypt the occupation has only been since 1883, so that we cannot carry that back any further.

3483. Have you any other table?—I have two small ones here, one of them comparing the death-rate among the soldiers in the United Kingdom with that among civilians for the last seven years, from 1882 to 1888, and the other showing the death-rate per thousand from small-pox among soldiers as compared with that of the civil population in the various provinces of India during the years 1882 to 1887.

3484. In India, unless you compared the death-rate of the soldiers with the death-rate of the civil population in a particular district where they happened to be, it would not be of very much value, would it, the death-rates amongst the civil populations in the different provinces differ very largely?—Yes. This was just drawn out to give a notion of what the condition was in India.

3485. The Bengal army, for example, would include soldiers in the Punjab?—Yes.

3486. Then if you take 1883, the death-rate of soldiers in Bengal was ·20, the death-rate of the civil population in Bengal was ·14, but in the Punjab it was ·64?—Yes.

3487. Would not it be more useful, if you compare it at all, to take the average death-rate of the civil population in all those parts of India over which the Bengal army was distributed?—That would be the best way if you could get the original figures; these ratios are taken from the Report of the Sanitary Commission with the Government of India.

3488. It is a comparison of two things that do not compare?—It is only to give a general idea.

Adjourned till Wednesday next at 1 o'clock.

Seventeenth Day.

Wednesday, 13th November 1889.

PRESENT:

THE RIGHT HON. THE LORD HERSCHELL IN THE CHAIR.

Sir JAMES PAGET, Bart.
Sir CHARLES DALRYMPLE, Bart., M.P.
Sir W. GUYER HUNTER, K.C.M.G., M.P.
Sir EDWIN HENRY GALSWORTHY.
Mr. WILLIAM SCOVELL SAVORY.
Dr. JOHN SYER BRISTOWE.
Dr. WILLIAM JOB COLLINS.
Professor MICHAEL FOSTER.
Mr. JONATHAN HUTCHINSON.
Mr. J. ALLANSON PICTON, M.P.
Mr. SAMUEL WHITBREAD, M.P.
Mr. F. MEADOWS WHITE, Q.C.

Mr. BRET INCE, *Secretary*.

Brigade-Surgeon WILLIAM NASH, M.D., further examined.

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3489. (*Chairman.*) Are you able to furnish information now with reference to the regulations earlier than the one that is now in force?—Yes, the first regulations were published in the year 1859. That was in the days when medical officers belonged to regiments, so that the regulations read in a different manner. "The regi- "mental surgeon or medical officer in charge of a "regiment is required to report yearly whether every "man, woman, and child belonging to the regiment "bears unequivocal marks of either small or cow-pox; "and is to keep a register of the names and appear- "ances, on the days of examination, of all patients "vaccinated. In all stations where fresh virus can be "procured every doubtful case, not only of soldiers, "but of their wives and children, should undergo "re-vaccination. Any cases of small-pox are to be "immediately reported to the Director-General in a "special report, specifying the name and age of each "individual, and whether bearing satisfactory marks "of vaccination, and by whom vaccinated. If the "patient be a soldier, and no marks of vaccination "exist, such fact should be mentioned in the said "report, with a statement showing the date of his "joining the corps, by what medical officer examined "on enlistment, and with a copy of any note or memo- "randum transmitted by that officer to the regimental "surgeon. Whenever the medical officer has reason to "believe that re-vaccination is necessary he should "proceed to re-vaccinate those who may require it.

3490. Am I right in gathering that at that time there was no order enjoining re-vaccination in all cases, and that the re-vaccination was only to take place when there were no satisfactory marks of primary vaccination, or of the person having had small-pox?—I think I can give you a little information upon that point. On the 31st May 1858, a circular was issued by the Director-General of the Medical Department to the medical officers to this effect: "As small-pox has "during the last 12 months been of frequent occur- "rence among persons who, to all appearance, had "been satisfactorily vaccinated, and in not a few "instances has proved fatal; and as it is now very "generally believed that the period during which the "vaccine virus affords full protection against small- "pox is limited only; I am of opinion that it is "highly desirable to re-vaccinate at least all recruits "joining the service, in whose cases it cannot be "without doubt ascertained that they had been "vaccinated subsequently to arrival at the age of "puberty."

3491. Then the order issued in the following year does not appear to have enjoined it?—I am going on a little further. On the 21st of September in the same year another circular was issued with reference to the former one.

3492. To whom would that circular be issued?—To the medical officers throughout the service. This is the order which was issued to the medical officer in charge of any particular regiment or station: "With "reference to the circular from this office, dated "31st May 1858, on the subject of vaccination, I have "now the honour to request, in addition to the steps "which are therein recommended to be taken, that "every recruit, without exception (whether he bears "marks of natural small-pox, of successful vaccina- "tion, or otherwise), may be vaccinated on joining the "headquarters or depôt of the corps to which he "belongs, unless the operation is certified to have "been already successfully performed subsequently to "his enlistment into the service." The regulations which I first read were evidently founded upon that order.

3493. I should gather that the order applied to all recruits entering after that date, but that as to those then in the service the order was only to vaccinate those who did not show satisfactory marks of vaccination?—That was the previous order.

3494. So that from some time in the course of the year 1859 at all events, that would be acted upon, and all recruits ought to have been re-vaccinated?—Yes. The regulations were carried on up to 1878 when another volume was published. The regulations in that book are very much in the same form, but they are amplified; in fact, they are more like those which I first read to you, the present regulations.

3495. Are they in the same terms?—They are very much in the same terms.

3496. They incorporate the order to vaccinate every recruit?—Yes.

3497. That was not in the order of 1859?—Not in the first one.

3498. Otherwise these regulations appear to be in much the same terms as the former regulations?—Yes.

3499. The date of these last regulations which you have produced is 1878?—Yes.

3500. Can you give an idea of what proportion the recruits entering would bear to the total strength? For example, how soon would the order coming into operation in 1859 apply to the whole of the force; that is to say, how soon would the whole of the force have entered since the year 1859?—It is difficult to answer that question for this reason, that the number of recruits varies every year, even now-a-days, according to the requirements of the service, and I do not know, without referring to books, what number of recruits entered the service in each year.

3501. Can you give any rough idea of how many years it would take before the recruits from any given year represented the bulk of the army? 1859 would be before the short service?—Yes, that is the point that I was thinking of at that moment. It makes a difference.

3502. It would take longer at that time than it would take now?—Yes, because the requirements were not so great and there were not so many recruits coming in.

(*Dr. Collins.*) I think the number of men entering the service in each year from 1860 to 1882 appears in the return which was made to Mr. Burt, and which I have in my hand.

3503. (*Chairman.*) By the end of the year 1870 about the same number of men had entered as represented the strength in 1870?—Yes.

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3504. When did the short service commence?—The first short service was about the year 1873.

3505. Would there be re-entries for longer service prior to that date?—Yes.

3506. We have a return of the number of men entering the service each year; would they be recruits?—Yes.

3507. So far as you could see, it would take about 10 years at that time before the old army was worn out?—Yes.

3508. Is there any other order with regard to vaccination that you wish to call attention to?—No, those are all the orders, I think. I have one order here which refers to the method of vaccination and re-vaccination, which is another point.

3509. With reference to the carrying out of the orders, that would depend upon the regimental surgeons, I suppose?—It would depend upon the regimental surgeons in the days when there were regimental surgeons. At present it depends upon the medical officers in charge of stations.

3510. But that is a comparatively recent arrangement, is it not?—Yes, it has been going on for about 13 years.

3511. It has been suggested that the men sometimes get rid of the lymph by sucking it from their arms, or that they in some other way prevent the operation from being successful; are you able to say how far in cases of re-vaccination the re-vaccination was successfully carried out?—A good many men, I daresay, have tried some means of preventing the operation from being successful at times, but I do not think it was very common.

3512. Is a record kept of when the operation is successful, and when it is unsuccessful?—Yes; I have here a fasciculus taken out of the vaccination register. It shows the date, the place, the man's regiment, his name, the source of the lymph, his age, whether he had satisfactory marks of previous vaccination or doubtful marks, or no marks, the date of vaccination and the results for each man.

3513. But can you give any statistics as to the proportion of successful to unsuccessful vaccinations?—Yes, the returns after 1883 have been kept separately for recruits and soldiers other than recruits. Out of a thousand recruits re-vaccinated in the year 1883 there were 417 returned as presenting perfect results, 329 as modified, and 254 as failures.

3514. That is almost exactly 25 per cent of failures?—Yes. You will see that it runs in very much the same proportions in other years. In 1884, for instance, the number with perfect results was 428, with modified results 326, and failures 246.

3515. (*Dr. Bristowe.*) I thought I understood that the modified results were practically failures?—I do not think so; I did not say that, I think.

3516. (*Professor Michael Foster.*) Could you define what a modified result of re-vaccination would be?—Yes. I have here the circular containing the directions as to vaccination and re-vaccination, and it is as follows:—

"Army Medical Department,
"20th November 1865.

"*Vaccination and Re-vaccination.*

"With a view to obtain uniformity in the record of "the results of vaccination and re-vaccination in the "army, medical officers are requested to classify the "cases (in the monthly returns of vaccination at home, "W.O. Form 1118, and the annual returns of sick at "home and abroad, W.O. Form 298, page 6) in accord-"ance with the following description:—

"'1. When vaccination has been successfully per-"'formed on a healthy infant, the puncture may be "'felt elevated on the second or third day, and soon "'afterwards, if examined with a magnifying glass, "'appears surrounded by a slight redness. On the "'fifth or sixth day a distinct vesicle is formed having "'an elevated edge and depressed centre. On the "'eighth day it appears distended with a clear lymph. "'The vesicle, on this, its day of greatest perfection, is "'circular and pearl-coloured; its margin is turgid, "'firm, shining, and wheel-shaped. Late on the "'seventh, or early on the eighth day, an inflamed "'ring or areola begins to form around the base of the "'vesicle, and with it continues to increase during "'the two following days. This areola is of a circular "'form, and its diameter extends from one to three "'inches. When at its height, on the ninth or tenth "'day, there is often considerable hardness and swell-"'ing of the subjacent cellular membrane. On the "'tenth or eleventh day the areola begins to subside, "'leaving, as it fades, two or three concentric circles "'of redness. The vesicle now begins to dry in the "'centre, and acquires there a brownish colour. The "'lymph which remains becomes opaque, and gradu-"'ally concretes; so that about the fourteenth or "'fifteenth day the vesicle is converted into a hard "'round scab of a reddish-brown colour. This scab "'contracts, dries, blackens, and about the twenty-"'first day falls off. It leaves a cicatrix, which com-"'monly is permanent in after life, circular, somewhat "'depressed, dotted or indented with minute pits, "'and in some instances radiated. The above described "'local changes while in active progress are attended "'by feverishness; first, from the fifth to the seventh "'day, so slightly that often the fact passes unob-"'served, and again more considerably during those "'days when the areola is above its height; the infant "'now being restless and hot, with more or less "'disturbance of stomach and bowels. About the "'same time, especially if the weather be hot, children "'of full habits not infrequently show on the ex-"'tremities and less copiously on the trunk, a lichenous "'roseolar or vesicular eruption which commonly "'continues for about a week. When vaccination is "'performed on such adults or adolescents as have "'not previously been vaccinated, and likewise when "'lymph is employed which has recently been derived "'from the cow, the resulting phenomena, as com-"'pared with the preceding description, are somewhat "'retarded in their course; and the areola is apt to "'be much more diffuse. There is also more feverish-"'ness, but eruption is less frequently seen.

"'When persons who have once been efficiently vac-"'cinated are some years afterwards re-vaccinated "'with effective lymph, there sometimes result "'vesicles which, as regards their course and that "'of the attendant areolæ, cannot be distinguished "'from the perfect results of primary vaccination.'

"Such cases, and such only, are to be returned "under the head of 'a perfect vaccine vesicle.

"'2. But in cases of re-vaccination far more usually "'the results are more or less modified by the influence "'of such previous vaccination; often no true vesicles "'form, but merely papular elevations surrounded by "'areolæ; and these results having attained their "'maximum on or before the fifth day, afterwards "'quickly decline. Or if vesicles form, their shape "'is apt to vary from that of the regular vesicle, and "'their course to be more rapid; so that their maturity "'is reached on or before the sixth day, their areolæ "'decline on or before the eighth day, and their scab-"'bing begins correspondingly early. In either case "'the areolæ tend to diffuse themselves more widely "'and less regularly, and with more affection of the "'cellular membrane, than in primary vaccination; "'and the local changes are accompanied by much "'itching, often by some irritation of the axillary "'glands, and in some cases on the fourth or fifth day "'by considerable febrile disturbances.'

"Such cases are to be returned under the head of "'a modified vaccine vesicle.'

"3. Cases in which no papular elevations nor vesicles "are formed, and in which no result beyond slight local "inflammation follows the operation, are to be returned "under the head of 'failure.'

"J. B. Gibson,
"Director General."

3517. (*Chairman.*) Is there in the army any order with reference to attempting to re-vaccinate a second time, as we have been told there is in the navy, if the first attempt is unsuccessful?—The present order is as follows:—"When re-vaccination has failed, the opera-"tion will be repeated with lymph from another source "when practicable, and in the event of the operation "still proving unsuccessful, the names of the indi-"viduals will be recorded, with a view to their being "re-vaccinated at some subsequent date."

3518. Have you any other tables besides those that you have put in, that you desire to put before the Commission?—No.

3519. (*Mr. Whitbread.*) Have you found that soldiers express much dislike to being vaccinated or re-vaccinated?—As a rule, no. I have occasionally heard men object to it.

3520. Is it an increasing dislike?—I do not think so. The cases that I have heard of where men have expressed any absolute dislike to it, are very rare. I think in many of these cases, it is more that they dislike the inconvenience that they are put to during the time the arm is painful.

3521. (*Mr. Meadows White.*) I observe that Question 16 on the attestation paper is, "Are you willing to be vaccinated or re-vaccinated?" To which the answer is "Yes" or "No." Supposing that a man answers "No," what happens?—He would not be enlisted. He must agree to all these things. However, I am scarcely competent to answer that question, because it is not part of our duty.

3522. (*Professor Michael Foster.*) Apparently before the year 1883, this question was not asked?—It was not in the attestation.

3523. (*Mr. Meadows White.*) Supposing that it was not in the attestation paper before 1883, what happened to him? Was vaccination compulsory in the army then?—Yes, it was. My answer to the first question would be merely supposition.

3524. (*Professor Michael Foster.*) If he was not willing to be vaccinated, then he would not be accepted as a recruit?—No.

3525. Before 1883, if when he entered as a recruit he refused to be vaccinated, a trouble arose?—So I understand it.

3526. And now that trouble is anticipated by this question?—Yes.

3527. (*Mr. Meadows White.*) Therefore, so far as you understand the case, no person is accepted as a recruit unless he expresses himself willing to be vaccinated?—So far as I understand.

3528. Does that order which you read as to the modified vesicle contain any statement as to what is considered satisfactory for re-vaccination?—It does not contain anything more than I have read to you.

3529. But does it not state with what the army surgeon or the person charged with the duty is to be satisfied?—He is not to be content with a failure.

3530. But there were three categories as I understood; there were the perfect vesicle, the modified vesicle, and the failure; is there not any definition as to what the perfect vesicle should be?—The definition of the perfect vesicle is the first definition in the same paper.

3531. (*Professor Michael Foster.*) That, I suppose, is the ordinary description of the so-called Jennerian vesicle?—Yes.

3532. (*Mr. Meadows White.*) I suppose that applies to both primary vaccination and re-vaccination?—Yes.

3533. (*Chairman.*) Where would the men be chiefly who were in the colonies, apart from Gibraltar and Malta which would form two principal places?—There would be some at the Cape of Good Hope, China, the West Indies, Ceylon, Bermuda, and so on.

3534. (*Mr. Meadows White.*) Do you return the number of vesicles in successful cases?—No; there is no return of that.

3535. Does the regimental surgeon consider it a successful case where one vesicle only is produced?—The regulations prescribe the number of punctures in the arm, but do not give the number of vesicles.

3536. For placing the case in the first category are they content with one vesicle, or do they require two or three?—There is no rule laid down as to that.

3537. It is presumed that one would be sufficient?—I think so; but it is not laid down as a rule. The returns are made now from stations where formerly they were made from regiments.

3538. (*Mr. Whitbread.*) Paragraphs 1 and 2 in the paper which you have put before us on "Vaccination and Re-vaccination," dated the 20th of November 1865, and addressed to medical officers serving at home and abroad, appear as extracts; where are they extracted from?—I do not know where they come from.

3539. (*Mr. Meadows White.*) The circular is signed by J. B. Gibson, Director-General?—Yes.

3540. (*Professor Michael Foster.*) Are they quoted from some previous regulations?—No, I think not; I do not know where they are taken from.

3541. (*Mr. Picton.*) I suppose we may assume that the order of 1859 had affected the whole army in the course of 20 years?—Yes.

3542. We may assume, then, that in 1879 the army was thoroughly well vaccinated and re-vaccinated?—It is well vaccinated, and, I hope, thoroughly.

3543. Do you think that there is any better vaccinated population in the country?—I do not know, but I should think it is as well vaccinated as any other part of the population.

3544. You have given us in Table C. the number of admissions and deaths from small-pox in the army from the year 1860 to the year 1888. Let me call your attention to the fact that there were 39 cases in 1879, 14 in 1880, 38 in 1881, 64 in 1882, 126 in 1883, 114 in 1884, and the number had risen to 140 in 1888. Have you any explanation to offer, or any observations to make upon this large number of small-pox cases?—Under the column of "Remarks" wherever there has been a great amount of small-pox the greatest amount has been pointed out in that column. For instance, out of the 39 cases in 1879, 33 cases and three deaths occurred in India.

3545. Then does vaccination fail to protect in India?—No, I do not think so, but in India there is always a great amount of small-pox among the people.

3546. But are we not right in supposing that vaccination is intended to protect against contagion?—Yes, certainly.

3547. Then it did not protect in India in this case?—It did not confer perfect immunity evidently.

3548. You would say the same thing about the year 1883, and also 1884, I presume; those cases occurred principally in India?—Principally in India.

3549. Was it because of any imperfect vaccination of those soldiers in India; was there any difference between their vaccination and that of other troops?—I should think not. They would all be vaccinated at home before they went to India.

3550. Then the explanation that you give is that in India they were more exposed to contagion?—Yes.

3551. So far as you know is that the only explanation to be given of the excessive amount of small-pox in India, that the men are more exposed to contagion there?—That is the great point.

3552. You are not aware of any other reason, because I am anxious to get at the real state of the case?—No, I think that is the reason.

3553. I observe that in Egypt there had been a considerable number of cases of small-pox in 1885, 1886, 1887, and 1888; would you give the same explanation there?—Yes.

3554. That they were exposed to contagion?—Yes; in most parts of Egypt I believe vaccination is very imperfectly carried out if at all, there is a great deal of small-pox, and our troops are necessarily very much exposed to contagion.

3555. When you said that vaccination is not perfectly carried out you did not refer to our troops, I presume?—No, I referred to the civil population.

3556. Then you would not, from your experience, trust well-vaccinated men in the neighbourhood of contagion?—I do not think they would have perfect immunity, but they would have relative immunity; they would be very much less liable to contract disease than if they were unvaccinated.

3557. Is there any year since 1860 in which there have been no deaths from small-pox in the army?—I think not.

3558. Are you aware that many large populations are free from small-pox deaths for several years in succession?—It may be so; I do not know; I have never studied the subject.

3559. (*Dr. Collins.*) In the opinion of the Army Medical Department is the vaccination and re-vaccination of the army thoroughly satisfactory?—It is satisfactory, but, like any other large undertaking, you cannot say that it is absolutely perfect; it is as perfect as endeavours can make it.

3560. Is there any suggestion that could be made that would be practicable to increase the thoroughness of the re-vaccination in the army?—I do not know of any.

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3561. You told us, in answer to Question 3466, that the veterinary department at Aldershot had supplied calf lymph for re-vaccinations in the army; could you give the Commission any information as to the source of that lymph?—I know that they have an institution down there recently opened, where they have these calves, but the working of it I do not understand. I only know that we have been supplied, as I think I read, with lymph by that department since March of this year.

3562. Who would be responsible for the management of the calf lymph establishment there?—The veterinary department. It is under the charge of the veterinary department there.

3563. Who is the superintendent of the veterinary department?—I do not know the name of the officer down there, but the principal veterinary surgeon at the War Office in London is Mr. Fleming, I think.

3564. Do you, as a matter of fact, find any difference in the results of re-vaccination with calf lymph and with humanized lymph?—It has only been going on for a short time and I have had no experience of it myself; but the other day, when I first heard that I was to present myself before this Commission, I asked this question from those who receive the reports: "Will "you be good enough to say if the reports regarding "the calf lymph supplied by the veterinary depart- "ment at Aldershot was satisfactory as regards "efficiency, and, further, if the results compare "favourably or otherwise with those obtained from "humanised lymph"? The reply I had was that they had not very much to go upon, but that the results at first from the vaccine lymph at Aldershot were not very satisfactory. "This was believed to be due to the "lymph supply not being properly arranged, and "being kept too long before being issued or used. "Latterly a better system has been arranged, and the "reports sent in have been highly satisfactory." That is all the information I have.

3565. They do not happen to say in what direction the unsatisfactoriness consisted?—Not beyond this; that they say: "This was due to the lymph supply not "being properly arranged, and being kept too long "before being issued or used."

3566. Are we to understand that the unsatisfactoriness was as regards the results?—As regards the results, as I understand it.

3567. (*Professor Michael Foster.*) The lymph is distributed in tubes, I suppose?—In tubes and points, I believe.

3568. (*Dr. Collins.*) Is it not kept up by a supply from calf to calf?—I think it is, but I do not know; I have not seen the working of this.

3569. (*Professor Michael Foster.*) My question only referred to the distribution from the station to wherever it was required, whether in Ireland or elsewhere. I imagine that in Aldershot itself it must be kept up from calf to calf?—I think so.

3570. (*Dr. Collins.*) I have before me the Army Medical Report for the year 1887, and on page 26 I see the results given of the re-vaccination of soldiers and of recruits; and I find that the failures in the case of the primary vaccination of the soldiers and recruits were 279·4 per 1,000; whereas the failures in re-vaccinations of soldiers were 280·7 per 1,000, almost the same; would those figures suggest that the failures were the result of the abiding influence of previous vaccination?—You are taking the soldiers and the recruits together, I think?

3571. Yes?—Yes, I think it would. It suggests that.

3572. What explanation do you offer of the failure of 280 per 1,000 of the re-vaccinations?—It is difficult to say what was the reason for all of them. Many having been vaccinated before were not susceptible.

3573. Do you attribute any proportion of the 280 failures per 1,000 to the influence of previous vaccination?—Yes.

3574. Then why do I find 279 failures per 1,000 (practically the same figure, you see) in the case of primary vaccination?—It is pretty nearly the same. The term "primary vaccination" as it is used with regard to these tables in connexion with soldiers and recruits, embraces all those men who, at the time of the operation, bear no marks. I do not think that is in that table.

3575. What difference would exist between these soldiers and recruits who were dealt with under the heading of "Primary vaccination" in this table, and those who are dealt with under the heading of "Re-vac- "cination" in this table?—Under the heading of "Primary vaccination," as appears from the note at the foot of the table that has been handed in, are embraced those men who at the time of the operation bore no marks of vaccination. It does not say that they never have been vaccinated but that there are no marks; they may have been vaccinated in infancy but we do not know anything about them before they enter the army.

3576. So that they would be either unvaccinated or without evidence of vaccination?—Yes.

3577. Now will you tell me what would be the condition of those included under the column of "Re-vacci- "nations"?—They would either have been known to have been vaccinated or they would have marks of vaccination.

3578. At any rate the figures in the second column of "re-vaccinations" would include presumably a much better or more vaccinated class of persons than those in the other column; would not that be so?—Yes, I think so certainly.

3579. Then I am afraid I must ask you again to what you attribute the fact that the failures are the same practically in the case of re-vaccination, and in the case of primary vaccination in the technical sense that you have given us?—I have not a perfect explanation to offer, but I would call your attention to the figures upon which these results depend. The total number of soldiers and recruits who were primarily vaccinated is only 451, whereas the number re-vaccinated was 34,705.

3580. Have you looked through previous reports to see whether the number of failures in the class technically called "primary vaccinations" varies greatly from that which is given in this case?—They do vary.

3581. Taking a larger number do you find a considerable departure from the proportion of 279 per 1,000?—I am afraid I have not got the figures to show where that larger number of men is, but I do not think that there was ever a very large number.

3582. (*Professor Michael Foster.*) Are we to understand that the statement that there were 279 failures per 1,000 is based on a total of 451, which is less than half a thousand?—There were 126 failures out of 451 operations.

3583. (*Dr. Collins.*) I have before me a report for the year 1886 which gives the total number of primary vaccinations as 715, and the total number of re-vaccinations as 40,824; and the calculation based upon those figures is that 250 per 1,000 of the primary vaccinations failed, and 263 per 1,000 of the re-vaccinations failed. There is a difference, but not by any means a great difference, in the failures of the two classes. I think I understood that there was no explanation which occurred to you at the present moment?—No explanation occurs to me at the present moment.

3584. I see in the annual reports for each year, a certain number of re-vaccinations of children; for instance, on page 28 of the Report for 1887, could you give me any information as to the age at which the children had been re-vaccinated?—I have no figures to show that. They would be probably children of from 7 to 10 years of age.

3585. (*Professor Michael Foster.*) Are children included in either of those figures that you have given?—No.

3586. (*Dr. Collins.*) Under what order would that re-vaccination of children take place?—The regulations direct: "Medical officers will re-vaccinate not only the "wives of all soldiers on the married establishment, "but also as far as possible, as a measure of public safety, "the wives of soldiers married, but not on the married "roll; and all soldiers' children will, as a rule, be re- "vaccinated whenever 10 years have elapsed since the "date of their having been vaccinated."

3587. Could you give me any figures to show the results of the re-vaccination of the children?—I have a table here that shows them. In 1882 out of 1,000 children re-vaccinated, 865 gave perfect results, and 135 were failures.

3588. Could you give us the successful results for later years?—In 1883 the number of successful results was 751 per 1,000; in 1884, 745 per 1,000; in 1885, 873

per 1,000; in 1886, 793 per 1,000; and in 1887, 779 per 1,000.

3589. (*Chairman.*) Were there more than 1,000 vaccinated, or is that a ratio?—That is the ratio.

3590. What were the numbers?—I can tell you as to one year, but I have not the numbers here as to all of them. In 1887 the number of arm-to-arm re-vaccinations amounted to 126, of which all but nine were successful. The re-vaccinations with preserved lymph numbered 155, out of which there were 53 failures. The total re-vaccinations among children were 281, or 779 per 1,000, so that the numbers are small.

3591. (*Mr. Meadows White.*) Do your figures give the number of primary vaccinations successful or otherwise in the vaccination of infants by army surgeons?—Yes; I have them in the next column.

3592. Were they uniformly successful?—Fairly so. In 1882 the primary vaccinations of children were successful in 918 instances out of 1,000; in 1883 in 906: in 1884 in 891; in 1885 in 913; in 1886 in 889; in 1887 in 859; and in 1888 in 880 per 1,000. So that they do not vary very much.

3593. (*Dr. Collins.*) Taking seven years together, so as to avoid the fallacy of small numbers for the re-vaccination of children, would it be correct to say that from 700 to 800 per 1,000 of the re-vaccinations of children are successful?—It would be more correct to say from 750 to 850.

3594. That would apply, I think you said, chiefly to children in whom 10 years have passed since their infantile vaccination?—The wording of the regulation is that, as a rule, it should be done within 10 years of the previous vaccination; but it is very probably between 7 and 10 years.

3595. (*Chairman.*) Or might be more than 10 years?—It might be more than 10 years.

3596. (*Dr. Collins.*) Taking the successful results of re-vaccinations of children at from 750 to 850 per 1,000, how does that compare with the success of the re-vaccinations in the case of the recruits and soldiers?—The proportion of failures is less in the case of the children, speaking generally.

3597. Speaking generally, would the recruits, or the children at the age of their re-vaccination, be the older class?—The recruits.

3598. So that the re-vaccination is more successful in the younger class?—Yes, it appears so from these figures.

3599. In those who are nearer to the time of their primary vaccination?—Yes.

3600. In answer to Question 3464 you said, "There is "this further check, that once a year—in the United "Kingdom it is in March—the medical officers will "make an inspection for vaccination marks of every "man, woman, and child under their care, and will "furnish a certificate by the 1st of April to the prin-"cipal medical officer" and so on. Could you tell me the date of that order coming into force?—I cannot tell you the exact date when the order came out that the report should be sent in in March, but in the regulations of 1878 it is ordered that the medical officer will report yearly whether every man, woman, and child belonging to the regiment bears unequivocal marks of either small-pox or vaccination.

3601. Would it be fair to assume that since that date by virtue of the order issued in 1878, any recruits who had not been vaccinated on joining the army, would be re-vaccinated then?—They would be re-vaccinated on the yearly inspections if they were found for any reason not to have been re-vaccinated.

3602. Do you happen to be familiar with the appendix to the Army Medical Report for the year 1885, on page 442 of which there appears a report by Surgeon Boulger of a series of cases of small-pox which occurred amongst the British troops in Cairo from January to October 1885?—I do not remember it.

3603. Are you aware that he deals there with 50 cases of small-pox, and four deaths among the British troops in Cairo?—I see it there, but I do not know the report.

3604. Have you any figures to show the cases and deaths from small-pox among the troops in Egypt for this year?—We have not our annual returns in yet, but I know that there have been a good many cases this year.

3605. It has come to your knowledge that there have been?—Yes, it has come to my knowledge that there have been a good many cases.

3606. In Cairo especially?—In Cairo especially.

3607. Was re-vaccination practised largely there in the early part of this year?—I believe so. I have not any absolute proof of this, but it is my belief from what I have heard.

3608. Are you familiar with any cases of bad arms which resulted from vaccination there?—No, I was not in Egypt, at the time and I have not heard any particulars about it.

3609. In the Army Medical Report for the year 1872, page 17, I see it stated that there were 45 cases of admission into hospital for vaccination; could you give any explanation with regard to that?—I cannot.

3610. I find in subsequent years similar entries, and I thought, perhaps, you might give some information to the Commission as to the nature of the effect upon the arm which necessitated admission to hospital?—I think I can answer that question in this way: that, of course, it is very hard to keep a soldier quiet, and his arm sometimes gets more or less inflamed, and then in order to prevent his getting worse, and becoming ill, he is kept in hospital. As a rule a man is kept off active duty during the time his arm is sore after he has been vaccinated.

3611. (*Professor Michael Foster.*) If a man's arm was so inflamed as to unfit him for active duty in the barracks he would be sent into hospital?—Yes.

3612. That would not mean that his case was very dangerous, but only that it was the quickest way of excusing him from active duty?—Yes, they excuse every man who is vaccinated from a certain amount of duty; he is about the barracks, and does light duty.

3613. (*Dr. Collins.*) Out of many thousand re-vaccinations I notice that there were 45 cases of admission into hospital; and I wondered whether there was any information specially relating to those 45?—I have no special information about them.

3614. (*Mr. Savory.*) Would a man be admitted to the hospital if he were unfit for duty in consequence of vaccination?—The more severe cases that required any treatment would go into hospital.

3615. But not necessarily if the man was simply unfit for duty?—No. He would do light duty.

3616. (*Professor Michael Foster.*) But he would not be sent into hospital?—Not necessarily.

3617. (*Dr. Collins.*) I observe in Table E., which you have put in, that there is some variation in the mortality, or, as Dr. Barry termed it, the fatality from small-pox. It appears to be usually higher in Egypt, being 10·6 per cent. there; in India, 12·3 per cent; in the United Kingdom, 7·1 per cent.; and in the Colonies 8·9 per cent.; can you give any explanation of that variation?—No.

3618. (*Professor Michael Foster.*) The fatality in one year is calculated on eight admissions and three deaths, is it not?—Yes, in one year.

3619. (*Dr. Collins.*) I purposely took the summary; is the summary the average of the per-centage?—It is calculated on the total number of deaths to attacks.

3620. Apparently, in Table C., you deal with 3953 cases and 391 deaths; that would give a total fatality of about 9·9 per cent., would it not?—About that.

3621. We have had evidence before us that in the German Army by satisfactory re-vaccination, small-pox has not caused a death since the year 1874; do you think there is any suggestion which can be made with regard to our own army, as regards vaccination and re-vaccination which would bring about the same result?—I have not seen those figures, and I can hardly answer the question at once without studying them.

3622. Does the experience of the Army Medical Department induce them to take the view that re-vaccination affords complete immunity against small-pox?—No, not complete immunity.

3623. Or against fatal small-pox?—No, not complete immunity, but it affords relative immunity; and I believe it is the universal opinion (it is my own), that the deaths are far fewer than they would be if there were not re-vaccination.

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3624. In what way is the relative immunity shown?—By the number of attacks being less than they would be without re-vaccination.

3625. With what experience are you comparing it?—With what I have read of the times before vaccination. I have no figures here to go upon; it is my opinion.

3626. Have you any figures or any reports which would show what is the shortest length of time after successful vaccination within which small-pox has occurred or has proved fatal?—I have no figures.

3627. (*Dr. Bristowe.*) I think I understood that in reply to Dr. Collins you pointed out that the statistics with regard to re-vaccinated children were divided into two categories, one category in which the children were re-vaccinated from arm to arm, and the other in which they were vaccinated from preserved lymph; is that carried out in the reports for successive years?—Yes. It is for a certain number of years, but I do not know how many.

3628. You quoted a particular year and showed that the failure to "take" in re-vaccination was much greater amongst those children who were re-vaccinated from preserved lymph than amongst those who were re-vaccinated from arm to arm?—Yes, I did read that.

3629. Would it be possible to get such statistics for a considerable number of years?—I do not think it would be possible to get them for a great number of years. I cannot tell without reference to the reports, but I do not think it could be carried back for many years.

3630. The figures you gave just now would seem to imply that the failures were largely due to defects in the quality of the lymph employed?—In that particular instance that I read it may have been so.

3631. Do you know whether soldiers are generally vaccinated from preserved lymph or from arm to arm?—If it can be done from arm to arm it is done in that way.

3632. Is that often done?—It is done wherever it is possible. Often they have not the lymph and they have to apply for lymph to Aldershot.

3633. I suppose all medical officers coming into the army are required to have instruction in vaccination?—Yes, naturally they would.

3634. How long has that been required?—They naturally would have instruction in vaccination.

3635. But it is only of late years that that has been required in medical schools?—I do not know how long.

3636. (*Mr. Meadows White.*) There is no special examination, I think?—No, there is no special examination.

3637. (*Sir James Paget.*) I suppose they are not compelled to be instructed in vaccination after obtaining their diplomas before joining the army?—No.

3638. They have all received that instruction or are certified as having received it before they can obtain their diplomas?—Yes.

3639. (*Dr. Bristowe.*) But that only goes back a few years, I think?—For some years.

3640. (*Mr. Savory.*) Are you acquainted with the fact that different vaccinators obtain very different degrees of success?—I am.

3641. It is a well-known fact that the statistics of vaccination in this respect vary very widely?—Yes, I know that.

3642. And under circumstances so similar that the strong presumption would be that it depended upon the skill of the vaccinator or upon the manner in which the vaccination was performed?—Yes.

3643. You would have no doubt about that?—I should not have any doubt about it. It does vary according to the skill of the vaccinator.

3644. (*Dr. Collins.*) Is the vaccination of children performed by the same medical officers as perform the vaccination of recruits?—Yes, probably the same.

3645. (*Professor Michael Foster.*) But I suppose that there might be a large number of children vaccinated by one officer and a large number of recruits vaccinated by another officer?—Quite so.

3646. (*Mr. Savory.*) The same surgeon does not necessarily vaccinate the child and the adult?—No, not necessarily, but in a hospital, perhaps, there are two or more medical officers, and there are a lot of men, women and children to be vaccinated on a given day or days, and certain medical officers on duty at that time carry out that vaccination.

3647. (*Chairman.*) It might chance that the same man vaccinated both these sets of people, or it might chance that one would vaccinate the children and another the adults?—Quite so.

3648. (*Mr. Whitbread.*) Is not that circular from the Army Medical Department on the subject of "Vaccination and Re-vaccination," which you have handed in reality the basis upon which the whole of the statistics upon vaccination in the army are piled up?—I should think it had a great deal to do with it.

3649. That lays down the three categories under which the returns of vaccination are made, does it not?—It does.

3650. And I assume that the returns have since been faithfully made upon the basis of that circular?—I conclude so.

3651. That circular was dated, I think, in 1865?—Yes.

3652. I will ask you a question to which you can give the answer when you have consulted the records. Will you tell the Commission by whom the paragraphs in that circular which are in inverted commas were written, and at what date?—I will try and find out.

3653. (*Mr. Meadows White.*) Are there any statistics accessible at the War Office or elsewhere which would give us the attack-rate or the death-rate from small-pox in the army prior to the issue of the vaccination orders so that they might be compared with the attacks and deaths since that date?—I do not think that there are any perfect statistics before this series that began in 1859, but I daresay I could get some statistics.

3654. It seems to me material to compare the attack rate and the death rate since vaccination was introduced into the army under these orders and before if that can be done?—I will endeavour to get the statistics. (*See Appendix VIII., Table F.: page* 279.)

3655. (*Chairman.*) I understand that there are no perfect statistics prior to 1859?—Not kept up in perfect form till 1859, which was the first time when these Annual Reports were issued.

3656. (*Mr. Meadows White.*) But would there be any record of any severe death-rate or any severe attack-rate of small-pox or any special case or special reports?—I have not seen any.

3657. (*Sir Guyer Hunter.*) Is that circular which you have put in issued to every medical officer?—Not now-a-days; it was issued in 1865. I do not remember to have seen it myself.

3658. Is it still in force or has any recent order superseded it?—I have not seen any order to supersede it.

3659. You do not know whether that circular is obsolete or whether a new order has been circulated since?—I do not know whether any new order has been circulated since.

3660. (*Sir Charles Dalrymple.*) If the army regulations require that recruits should be vaccinated, does the Medical Department of the army take any security for the character of the lymph used?—Of course, in arm-to-arm vaccination, they take care to examine the children, and now-a-days we have the lymph from the Veterinary Department at Aldershot.

3661. I was not asking about children so much as about recruits?—It would be the same thing.

3662. I understood that these classes of successful and modified-successful and failures applied to re-vaccination?—And to primary vaccination too,—the primary vaccination that I have spoken of amongst soldiers and recruits.

3663. Then where you have had failures, as they were called, in cases of re-vaccination, do you consider that the men so described are unprotected so far as re-vaccination is concerned and have only the protection of their original vaccination?—They have only the protection of their original vaccination. The regulations state that a man is to be re-vaccinated a second time to see whether a different result will be obtained.

3664. And if his re-vaccination is a failure he takes his chance?—He is recorded, and he will be re-vaccinated again at a future time; but if not, he will, as you say, not be vaccinated any more.

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3665. (*Chairman.*) Have you any division of children who have been vaccinated a second time in the same way that you have of others, as to whether it is really a re-vaccination of a person bearing marks or is a vaccination which may or may not be a re-vaccination?—I have not that clearly set out. The table simply shows vaccination and re-vaccination. One would suppose that it is known to be re-vaccination.

3666. Supposing the case of a child 10 years of age, it would be re-vaccinated or vaccinated whether or not it bore marks of previous vaccination?—Yes.

3667. Those are all recorded together, are they?—Yes; they are all recorded together.

3668. Then when you take the proportion of re-vaccinations in the case of the adults, those are really cases of re-vaccination, that is to say, cases of vaccination of persons bearing the marks of prior vaccination?—Yes.

3669. When you take the case of the children, might there be some of the children who bore no marks of original vaccination?—I think so.

3670. You divide the adults into two tables of primary vaccination and re-vaccination; you do not seem to make any such division in the case of the children?—The primary vaccination is stated in the table.

3671. (*Sir Edwin Galsworthy.*) If re-vaccination fails, at what distance of time does the second re-vaccination take place?—It would be done as soon as practicable.

3672. Within how long?—I can hardly say; probably it might be done within a week or two. The direction is that lymph shall be obtained from another source.

3673. If the second re-vaccination is a failure is a third practised?—I think I had better read to you the regulation again: "When re-vaccination has failed, "the operation will be repeated with lymph from "another source when practicable, and in the event "of the operation still proving unsuccessful, the names "of the individuals will be recorded, with a view to "their being re-vaccinated at some subsequent date."

3674. (*Professor Michael Foster.*) I suppose the annual inspection would lead to their being re-vaccinated?—Yes.

3675. They would be noticed on that occasion?—Yes; everything is reported each year from every station; they report the results of vaccination, and whether the results are satisfactory, and if not, what steps are taken.

3676. (*Sir Edwin Galsworthy.*) What is the largest number of re-vaccinations that you have ever known to take place on one patient, in your experience?—I never knew more than two, I think.

3677. (*Chairman.*) In the case of the women, I see there is a division into perfect vaccine pustule, modified, and failure, and in the case of the children there is a straight line drawn;—why is that?—Because in the case of the children, it must be either successful or not successful; there is no modification with them; if they are not successful they are failures.

3678. I am speaking of the re-vaccination, not of the primary vaccination. Why, if it is a re-vaccination, should there be no modified results? It strikes one as an extraordinary thing that among the children during all these years there was not one single case of a modified vaccine pustule; or is it that in the case of the children they did not make any distinction?—These are the tables which have to be made up (*handing them to the Chairman*).

3679. I see in the case of recruits and soldiers, and women, the form provides for the distinction between perfect success, modified success, and failure, and in the case of children it only provides for success and failure?—Yes.

3680. (*Dr. Collins.*) As a matter fact, do you often find, or in several cases find, as the result of re-vaccination in children the series of phenomena which you read as a description of modified success in the adult?—In re-vaccinations I have seen results not so perfect as primary vaccination, but I have no knowledge of what medical officers generally find.

3681. (*Professor Michael Foster.*) You gave us about 20 as the per-centage of failures in re-vaccinations of children; that would really include failures and imperfect cases?—Yes; it would include all failures.

3682. So that would not fairly compare the children with the recruits; in the recruits you have three classes, viz., perfect vaccination, imperfect vaccination, and failures?—I take it that the failures are returned in that way.

3683. (*Chairman.*) Suppose you re-vaccinated a child of 10 or 11 years of age, and you saw all the symptoms you see commonly in the re-vaccination of an adult, you do not mean that would be returned as a failure?—No.

3684. (*Professor Michael Foster.*) Would that be returned as a success?—Yes.

The witness withdrew.

Mr. R. D. R. Sweeting, M.R.C.S.

Mr. R. D. R. Sweeting, M.R.C.S., examined.

3685. (*Chairman.*) You are a member of the Royal College of Surgeons, a Licentiate of the Society of Apothecaries, and you hold a Diploma of Public Health of the University of Cambridge?—Yes.

3686. You are medical superintendent of the Western Hospital, formerly the Fulham Hospital?—Yes.

3687. And you have been so from the year 1880?—Yes.

3688. You have prepared some tables with reference to the protective value of vaccination as observed in small-pox cases treated at the hospital?—Yes.

3689. How many cases of small-pox do the tables refer to?—The first refers to 2,584 cases of small-pox admitted into the hospital during the years 1880-85, and distinguishes between good vaccination, imperfect vaccination, doubtful vaccination, and admitted absence of vaccination. The table is as follows:—

Age.	No Vaccination.			Doubtful Vaccination.			Imperfect Vaccination.			Good Vaccination.			Total Vaccinated Fatality.	Age.
	Cases.	Deaths.	Mortality per cent.	Cases.	Deaths.	Mortality per cent.	Cases.	Deaths.	Mortality per cent.	Cases.	Deaths.	Mortality per cent.		
0-5 -	83	47	(Fatality.) 56·62	14	5	(Fatality.) 35·71	33	—	(Fatality.) —	2	—	(Fatality.) —	—	0-5
5-10 -	85	31	36·47	40	9	22·50	112	2	1·78	1	—	—	1·76	5-10
10-15 -	55	13	23·63	40	6	15·00	256	8	3·12	12	—	—	2·98	10-15
15-20 -	50	27	54·00	44	15	34·09	394	13	3·29	10	—	—	3·21	15-20
20-30 -	55	31	56·36	51	17	33·33	639	71	11·11	9	—	—	10·95	20-30
Over 30 -	30	16	53·33	77	36	46·75	487	81	16·63	5	—	—	16·44	Over 30
Totals	358	165	46·08	266	88	33·08	1,921	175	9·10	39	—	—	8·92	Totals.

3690. That bears upon the question of the protection afforded by vaccination at particular ages?—Yes.

3691. It deals with cases admitted during the years 1880 to 1885?—Yes.

3692. I see you distinguish between good vaccination, imperfect vaccination, doubtful vaccination, and no vaccination?—Yes, I do.

3693. Will you tell us what "no vaccination" means?—It means that the fact of there having been no vaccination is admitted by the patients or his relatives; that the patients were confessedly unvaccinated.

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3694. Then what is "doubtful vaccination"?—Doubtful vaccination is where patients were stated, either by themselves or their friends, to have been vaccinated, but on whom no marks could be found.

3695. Then what is "imperfect vaccination"?—Imperfect vaccination is anything of a lower standard than good vaccination, which under the Asylums Board means a scar of a third of a square inch area, and of thoroughly good foveation and definition; anything lower than that would be imperfect vaccination.

3696. Taking the age up to five, there were 83 cases admitted with no vaccination?—Yes.

3697. And 47 died?—Yes, 56·6 per cent.

3698. Fourteen were admitted with doubtful vaccination and five died?—Yes, 35·7 per cent.

3699. Thirty-three with imperfect vaccination and none died?—Yes; none were fatal.

3700. Two with good vaccination, of whom none died?—Yes; again no deaths.

3701. So that by far the larger proportion of children admitted under five years of age were unvaccinated?—Yes, the largest proportion; and in these children small-pox was very fatal.

3702. Then between 5 and 10 the fatality is less amongst the unvaccinated?—Yes, less than in the same class at 0—5 years, and it is less in the doubtfully vaccinated than in the previous age-period. It begins to be fatal in the imperfectly vaccinated, though it remains non-fatal in the well vaccinated. The numbers, however, are very small in the good vaccination column.

3703. The total admitted with "good vaccination" were only 39?—Yes.

3704. Of those none died?—None died at all.

3705. Then the number between 5 and 10 years of age of the unvaccinated was about the same as between 0 and 5?—Yes, the number at each age-period in the unvaccinated was very similar.

3706. But the number with doubtful and imperfect vaccination was very much larger?—Yes, very much larger than in the same classes at ages 0–5 years.

3707. In fact there the proportions were reversed?—Yes; at ages 5–10 years many imperfectly vaccinated children can get small-pox.

3708. And that progress continues from 10 to 15?—Yes, the imperfectly vaccinated become more numerous as age advances. The mortality per cent. of attack in the unvaccinated becomes less at 10–15 years than it was at antecedent ages. It gradually decreases to 15 years of age, and after that it rises again. The fatality amongst the unvaccinated is the lowest at the age of 10 to 15.

3709. The proportion of imperfectly or doubtfully vaccinated to unvaccinated appears to be highest between 20 and 30?—Yes, the numbers admitted rise considerably between 20 and 30, and also the fatality amongst the imperfectly vaccinated jumps from 3.29 to 11·11 per cent. between the age-periods 15–20 and 20–30 years, showing the waning protection of imperfect vaccination.

3710. Taking all ages, the mortality is 46 per cent. in the unvaccinated?—Yes.

3711. Thirty-three per cent. in the doubtful vaccinated?—Yes; also at all ages.

3712. 9·10 per cent. in the imperfectly vaccinated?—Yes.

3713. Making the total vaccinated fatality, including all cases of good vaccination and imperfect vaccination, 8·92?—Yes; I would like to point out that fatality in the class of "doubtful vaccination" bears a very close relation to that in "no vaccination." A great many cases which are put down as "doubtful" are in all probability unvaccinated.

3714. (*Sir James Paget.*) Did any of them bear marks of vaccination?—No, none of them at all.

3715. (*Professor Michael Foster.*) Any marks of vaccination would bring them within the category of imperfect vaccination?—Yes; they were stated to be vaccinated, but no marks whatever could be found.

3716. (*Chairman.*) The mortality in doubtful cases, taking them at all ages, is 33 per cent. as compared with 46 per cent. in the unvaccinated?—Yes.

3717. Then what is the next table?—My next table shows the fatality at different ages of 1,888 vaccinated cases admitted to the hospital during the years 1880–85 according to the number of vaccination marks presented by them, to be as follows:—

Age.	Mortality per cent. (fatality) in unvaccinated.	One Mark.			Two Marks.			Three Marks.			Four Marks.			Five or more Marks.			Age.
		Cases.	Deaths.	Mortality per cent.	Cases.	Deaths.	Mortality per cent.	Cases.	Deaths.	Mortality per cent.	Cases.	Deaths.	Mortality per cent.	Cases.	Deaths.	Mortality per cent.	
0–5	56·62	4	—	(Fatality.) —		—	(Fatality.) —	8	—	(Fatality.) —	10	—	(Fatality.) —	4	—	(Fatality.) —	0–5
5–10	36·47	17	1	5·88	23	1	4·34	29	—	—	23	—	—	16	—	—	5–10
10–15	23·63	42	1	2·38	47	1	2·12	71	4	5·63	68	2	2·94	28	—	—	10–15
15–20	54·00	83	6	7·22	108	3	2·77	118	1	0·84	66	—	—	30	—	—	15–20
20–30	56·36	135	15	11·11	205	22	10·73	165	16	9·69	84	4	4·76	43	2	4·18	20–30
Over 30	53·21	124	19	15·32	149	20	13·42	165	16	15·23	50	7	14·00	27	4	14·81	Over 30
Totals	46·08	405	42	10·37	538	47	8·73	606	37	7·45	301	13	4·31	148	6	4·05	Totals

Under Four Marks.	
Cases	1,439
Deaths	125
Mortality per cent.	8·75

Four Marks and over.	
Cases	449
Deaths	19
Mortality per cent.	4·23

The numbers of vaccinated cases in this table and in the one I first read do not tally; altogether there are over 1,900 vaccinated cases in the first but in the latter there are only 1,888; it includes only the cases in which I have any record of the marks. This table shows fatality according to the number of marks, without any distinction of quality of marks. My first table referred to quality, but the second mainly refers to the number of marks presented by the patients irrespective of quality. It shows from 0 to 5 years of age very few cases indeed, and no deaths; and would seem to indicate that any kind of vaccination that is really "vaccination" is up to the age of five protective against death however few the number of marks; there are no deaths at all among children under five, however few marks they had. In other age-periods, though the numbers are small, there is a general indication that the greater the number of marks, the less is the fatality; it is not universally true, but it is generally; that is to say, the more marks you have, the less the fatality. For instance, with one mark, and taking all ages, the fatality is 10·37 per cent.; with two marks, 8·73 per cent.; with three marks, 7·45 per cent.; with four marks, 4·31 per cent.; with five marks, a little over 4 per cent.; and altogether in cases having less than four marks the mortality per cent. was 8·75, whereas in cases having four marks and upwards the mortality was only 4·23 per cent.

3718. The rule that the more marks the less fatality does not apply absolutely at every age?—No, it is not universally true as regards each age-period, but the

general indication is that the fatality is less the greater the number of marks.

3719. Between 0 and 5 there are no deaths; between 5 and 10 only two deaths are recorded with one and two marks respectively?—Yes, there are in cases with three or more marks, no deaths between the ages of 5 and 10, and only two deaths in cases with four or more marks between the ages of 10 and 15.

3720. There were four deaths among the cases between the ages of 10 and 15 where there were three marks?—Yes.

3721. (*Sir Edwin Galsworthy.*) Taking all ages together, the fatality is absolutely less according to the number of marks?—Yes, taking all ages together there is a diminution of fatality with increasing number of marks.

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3722. (*Chairman.*) What is your next table?—The next shows the fatality at different ages in 311 vaccinated cases in which the scars were accurately measured; the area of scar was calculated after measurement of the diameters of the vaccination marks. These observations were made in the last epidemic in 1884–1885. The table is as follows:—

Age.	Mortality per cent. (fatality) in the unvaccinated.	More than Half a Square Inch Total Area.			Less than Half a Square Inch Total Area.			Age.
		Cases.	Deaths.	Mortality per cent.	Cases.	Deaths.	Mortality per cent.	
				(Fatality.)			(Fatality.)	
0–5	*56·62*	—	—	—	4	—	—	0–5
5–10	*36·47*	—	—	—	7	—	—	5–10
10–15	*23·63*	4	—	—	22	2		10–15
15–20	*54·00*	15	—	—	41	3	7·31	15–20
20–30	*56·36*	24	2	8·33	76	13	17·10	20–30
Over 30	*53·33*	17	1	5·88	101	22	21·78	Over 30
Totals	*46·08*	60	3	5·00	251	40	15·93	Totals.

These numbers are very small, but there is a general indication that the fatality is very much less among those with more than half a square inch total area than among those with less than half a square inch total area of scars. Up to the age of 10, patients seem to escape death altogether. There were no admissions at all under ten years with more than half a square inch, and only 11 with less than half a square inch; and none of the 11 died, so that even vaccination falling short of the standard seems to be a considerable protection to children up to 10 years of age; over 10 years of age the numbers both as regards attacks and deaths seem to increase amongst those having less than half a square inch more rapidly than with those presenting more than half a square inch of scar; and, taking them at all ages, the fatality amongst those with more than half a square inch is 5 per cent., whereas with those with less than half a square inch it is nearly 16 per cent.

3723. Have you also a table showing the relation between the severity of small-pox and the observed condition of vaccination?—Yes, it deals with the 2,584 cases admitted into the hospital during the years 1880–85, and shows the proportion in each class of mild cases:—namely, in the well-vaccinated nearly nine-tenths; in the imperfectly vaccinated, nearly four-fifths; in the doubtfully vaccinated about one-fourth. On the other hand, in the not vaccinated only 8 per cent. were mild cases. The figures are as follows:—

Vaccination.	Number of Mild Cases.	Number of Severe Cases.	Per-centage Proportion of Mild Cases to the Total.
Good	35	4	89·71
Imperfect	1,497	424	77·92
"Doubtful"	62	204	23·30
Unvaccinated	29	329	8·10
Totals	1,623	961	62·80

Mild cases in this table include varioloid, and the abortive, varicelloid, discrete, and the partially coherent forms of small-pox. *Severe cases* include the generally coherent, the confluent, the petechial, and the hæmorrhagic forms of small-pox. The 29 "mild cases" amongst the un-vaccinated include two cases of second small-pox. Out of 39 good vaccination cases 35 were mild cases; out of 1,921 imperfect cases 1,497 were mild cases; out of 266 doubtful cases 62 only were mild cases; and out of 358 unvaccinated cases, including the two second attacks by small-pox, only 29 were mild. The table shows that the severity of attack by small-pox bears a very close relation to the observed condition of vaccination.

3724. (*Mr. Whitbread.*) What happens to a patient when he comes into the hospital; is he examined and his vaccination ascertained immediately?—Yes, if he comes in the day-time it is done at once, if at night it is usually left till the next morning, as it is almost impossible to satisfactorily judge of scars by gaslight; the first thing we do, almost before thinking of treating patients, is to try and define their vaccination.

3725. That is recorded at once?—Yes, on the bed-card of the patient.

3726. (*Mr. Meadows White.*) Can you tell us what number of infants under three months go to the hospital?—I cannot tell you the exact number, we have had a fair number under three months.

3727. Have you kept any record of re-vaccinated cases?—We rarely get definite evidence of re-vaccination; some few patients are stated to have been re-vaccinated, but the evidence as a rule is very faulty. I have tried to follow up several cases of small-pox in persons said to have been re-vaccinated, but I have not met with any cases in which re-vaccination has been successful, I think.

3728. Have you observed many cases in which the marks were obliterated by confluent small-pox when they entered the hospital?—Very few indeed. When a severe case comes in later than the fourth day of a fully confluent eruption, then the marks have perhaps been obscured, but such a case has very rarely occurred; we have not had more than three or four such cases. As a rule cases come to us very early after attack, and usually in the papular stage, and then it is very easy to see the marks; it is in very few cases indeed that we have not been able to decipher the marks.

3729. Would you consider your hospital typical in that respect, have you had experience in other hospitals?—No, I have not, but I should think patients would be brought to the other hospitals at about the same stage as they would to us.

3730. Taking the cases of "doubtful vaccination" a very small proportion of them would be cases where the doubt was attributable to obliteration of the marks?—Very few indeed in which the vaccination marks were obscured by the small-pox eruption.

3731. (*Professor Michael Foster.*) How many would you say?—I cannot remember more than three.

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3732. (*Chairman.*) Would those who come into the hospital, whether children or adults, generally come from the same district and would they be in the same class of life?—Yes, I think on the whole they would.

3733. (*Mr. Meadows White.*) Have you any statistics in your hospital as to the hospital staff?—Yes, the total staff during the time the hospital has been in use for small-pox has been 362, 48 of whom had had small-pox before they came to the hospital. Of the 314 persons who had never had small-pox seven took small-pox while on the staff of the hospital; of these seven, two were not re-vaccinated on entering the hospital, they escaped by some error in administration; two were unsuccessfully re-vaccinated and the operation had not been repeated—one of these latter being a case of second small-pox; the fifth was not re-vaccinated early enough as the operation was not performed till the fifth day; and in the other two cases there is no record of any result. These occurred in my predecessor's time. Then I should like to give some statistics of the ambulance station adjoining the hospital. The total staff employed there when the hospital was in use for small-pox was 42. Of the total number only one took small-pox and he was the coach smith, who was not re-vaccinated; his arrival was not reported. He took small-pox 13 days after he arrived on duty, and died of the disease. Of these 42 persons employed at the ambulance station, only three had had small-pox before they came. I may state that it is our practice to re-vaccinate all the staff immediately they come and to repeat the operation if it is not successful; if it does not take after these two attempts, then we let them take their chance.

3734. (*Professor Michael Foster.*) Do you have much failure in re-vaccination?—Not very much, probably half of them take unmistakeably.

3735. (*Mr. Picton.*) With regard to the column showing the fatality in the unvaccinated in your second table, how does that general proportion of fatality of 46·08 compare with the fatality before the introduction of vaccination?—There are no accurate data, I believe, as to pre-vaccination fatality. The fatality at the London Small-pox Hospital at the end of the last century was, I believe, close on 30 per cent.; amongst hospital patients, it would perhaps be higher than among the general population. I am not aware of any trustworthy statistics of the actual fatality in pre-vaccination times.

3736. Do you think that the London Small-pox Hospital reports from 1746 to 1863 could be relied on?—I should think they could, age for age.

3737. Is not the general result held to be that the fatality was a little over 18 per cent. on the whole?—That has been stated, but I do not think it has ever been proved that it was so low as that; there are no accurate data to go on.

3738. Just now you said that in the London Small-pox Hospital the fatality was said to be 30 per cent.?—Speaking from memory, I believe it was 30 per cent. at the end of last century.

3739. That would appear to be 16 per cent. lower than this fatality in the Western Hospital?—Yes.

3740. Do you think there is any explanation to be given of that?—I do not know what explanation can be given of it.

3741. Has small-pox become more fatal in this century?—I cannot say.

3742. (*Dr. Collins.*) With reference to the London Small-pox Hospital, do you happen to be acquainted with the sanitary condition of it in the last century?—No, I do not.

3743. You are not aware that hospital gangrene was troublesome in its wards?—No.

3744. Will you kindly give me the fatality again for your cases with four, three, and two marks?—Total fatality at all ages with one mark, 10·37 per cent.; with two marks, 8·73 per cent.; with three marks, 7·45 per cent.; with four marks, 4·31 per cent.; with five or more marks 4·05 per cent.

3745. Have you seen Mr. Marson's statistics with reference to marks?—I have seen them; I do not remember them.

3746. He gave the mortality amongst the vaccinated having three cicatrices as 1·8 per cent. in the years from 1836 to 1851, and 3·07 per cent. in the years 1852 to 1867. I understand in your hospital among cases with three cicatrices the per-centage is 7·45?—These are the statistics with regard to my hospital: the number of cases is small.

3747. With regard to cases with four or more marks Mr. Marson gives ·7 as the mortality in the years 1836 to 1851, and ·9 per cent as the mortality from 1852 to 1867, you give 4·31 in cases with four marks, and 4·05 in cases with five or more marks?—Yes; but I do not, however, deduct cases in which death might be referred to superadded disease.

3748. From your experience, do you find any deterioration in the protective influence of vaccination?—I cannot say; my experience is not large enough to enable me to answer that question.

3749. You have not made a comparison of these figures of Mr. Marson's?—No.

3750. Did I rightly understand you to say that you thought that the unvaccinated and the vaccinated classes were strictly comparable statistically?—I did not say so, but I can say so.

3751. Dr. Gayton was asked, "Do I rightly understand that the unvaccinated are as a rule drawn from "a more neglected class than the vaccinated"? to which he answers, "I should think certainly from a poorer class," and then he is asked, "Do you consider "that that is likely to operate detrimentally by way "of raising the unvaccinated mortality?" and his answer is, "Undoubtedly, I think so." Do you agree with Dr. Gayton?—I agree with him that the unvaccinated are drawn from a more neglected class, but I do not agree with him that that would necessarily raise their mortality *quâ* small-pox.

3752. I have before me the Report of the Medical Superintendent to the Committee of the Fulham Hospital for the year 1879, and I see on page 11 it is said, "Many of these unvaccinated cases were labourers "driven from the country to the metropolis on account "of the depression in agriculture and trade in search "of occupation, and had unknowingly lodged themselves in infected haunts. Further, the number of "unvaccinated children under five years during the year "was the same (namely 34) as during the year previous, "and the high mortality in them must needs tell "heavily on a smaller aggregate number of cases." Do you think that would be a just criticism upon a comparison between vaccinated and unvaccinated mortality?—That is simply the opinion of Dr. Makuna my predecessor. I am not responsible for that statement.

3753. I only wish you to tell us, if you will kindly do so, whether you think that statement would apply to cases that come under your observation?—It certainly does not agree with my own figures in my first table, which shows that under five years of age there were 83 unvaccinated, 14 doubtful, 33 imperfect, and 2 good; so that the small number that Dr. Makuna speaks of does not tally with these at all.

3754. Then as regards the character of the patient?—As regards the character of the patient, I do not agree with what Dr. Makuna says, it does not agree with my experience at the hospital. I have no experience of unvaccinated cases lodging in infected haunts.

3755. Do I correctly understand you to be of opinion that there is no difference such as would operate upon small-pox mortality between the vaccinated and the unvaccinated, except the fact of vaccination?—And age; the two factors together.

3756. The distinction as regards age you have taken account of in your table?—Yes; I should say vaccination and age. I should put age with it, not vaccination alone.

3757. Apart from those two conditions, you consider the two classes are strictly comparable?—Strictly comparable as regards attack; as regards progress and course of the disease, undoubtedly there might be a difference, according to the state of life and previous history of the patient; antecedent circumstances unfavourable to health might have some effect upon the severity of the disease, but, in my opinion, would not have any effect upon the liability to attack. Vaccination and age are the only two factors which determine liability to attack.

3758. As regards fatality, do I understand that there are other factors that would influence it?—Possibly fatality might be affected by other circumstances, the previous history of the case and the family history. I was speaking of attack.

3759. Let me ask you whether you consider those other factors would be such as would in any way in-

validate the comparison between the two classes?—I think they might possibly affect the fatality in some degree.

3760. In which direction?—According to the history and state of the patient the fatality might be greater or less; but not liability to attack.

3761. But would that operate equally upon both classes?—Certainly.

3762. So it would not invalidate the statistical results?—No; I do not think it would.

3763. Not in any way?—No.

3764. As regards the distinction to be drawn between good marks and otherwise, is that distinction based upon area, or area and quality?—Do you mean in my first table?

3765. I mean throughout the tables where such distinction is made?—The first table refers to a given area, but especially to quality; the second refers to the number of marks alone, and the third is a kind of supplementary table dealing with cases in which the area of the marks was accurately measured.

3766. Apparently a few deaths occur in those cases which are described as cases of more than half a square inch total area, so that the question of quality apparently would operate as well as area, upon mortality?—Yes, certainly, especially among older people.

3767. What is the quality to which you attach importance?—A thorough foveation and definition of margin.

3768. Out of a total unvaccinated class of 358 I observe that 329 are recorded as severe cases?—Yes.

3769. Can you tell us whether that would or would not be a large proportion of severe cases as compared with pre-vaccination times?—I could not tell you at all; these are my own observations, but I have no data with regard to pre-vaccination times.

3770. From your experience, would you say that vaccination confers as much protection as, or more protection, or less protection than a previous attack of small-pox?—Decidedly less; infantile vaccination is less protective to adults than previous small-pox.

3771. Does that apply to protection against attack as well as reduction of fatality?—Yes, to both in my experience.

3772. Have you any figures to show the fatality that occurs in second cases of small-pox?—No, I have no figures to show that.

3773. (*Chairman.*) What are the data upon which you say that a previous attack of small-pox would be more protective than good vaccination?—I make the statement because having had so few cases of second attacks of small-pox admitted into the hospital I incline to the conclusion that vaccination is very much less protective than a previous attack of small-pox.

3774. (*Dr. Collins.*) Have such secondary cases as have come under your observation been mild or severe cases?—The few cases I have had have been very mild, there were no deaths among them.

3775. You mentioned that the total staff employed at the hospital while it has been in use for small-pox cases has been 362; what proportion of that total number would be habitually employed in the wards?—I have not got out the figures. I could get them for you.

3776. Could you tell us whether it would be a large proportion or not?—At present we have a staff of about 80, and about 40 are employed in the wards; roughly, half would be employed habitually in the wards.

3777. You make it a practice to re-vaccinate all the members of the staff when they enter the hospital?—Yes; we make it a practice to do so, unless the persons are conspicuously scarred by small-pox.

3778. What are the results of re-vaccination that you usually find?—Roughly, about half of them take unmistakeably.

3779. Are half failures, or do you mean the results are modified?—Half of them do not take the first time; some of them take afterwards; we always do them twice, and if they do not take the second time we let them take their chance.

3780. About how many of the 362 would have failed twice?—I could not tell you; I have not the figures.

3781. I understand you that about half fail the first time?—Yes; but most of them take on the second re-vaccination; probably two-thirds of them take on the second re-vaccination; after that if they do not take, then they take their chance.

3782. How long after the first re-vaccination do you perform the second?—Usually on the 7th or 8th day.

3783. Do you use a different lymph for the second re-vaccination?—Not necessarily; very often the same.

3784. Do you find whereas half failed on the first occasion the majority of these succeed on the second?—Yes.

3785. Do you notice any difference as regards liability to small-pox in those in whom re-vaccination has been successful, and in those in whom it has failed?—In the cases of two of the staff who were unsuccessfully re-vaccinated, and in whom the operation was not repeated, both of them took small-pox.

3786. Have none of the staff, in whose cases vaccination has been successful, taken small-pox?—None of them in my time.

3787. (*Professor Michael Foster,*) Had those who took small-pox been re-vaccinated twice?—No. They were only re-vaccinated once; it was not repeated, and they took small-pox.

3788. In the normal state of things they would have been re-vaccinated again?—Yes; it ought to have been done; it was a neglect; they had been overlooked.

3789. (*Dr. Collins.*) Are you speaking of the hospital only during your own tenure of office?—No; I am now speaking of the whole period in which the hospital has been in use for small-pox.

3790-2. In the Report for 1881, speaking of five who took small-pox, it says, "four of these had been re-"vaccinated, the disease in their case was mild, and "their recovery rapid." Was that referring to cases of unsuccessful re-vaccination?—Two of the five I afterwards found, on looking again into the old reports, had really not been re-vaccinated; one was unsuccessful and was not repeated; and in the other two there was no record of success. During my own time there have been only three cases of small-pox amongst the staff, in two of which the re-vaccination was unsuccessful and not repeated, and in the other not done early enough (5th day) to prevent attack. All these were domestic officials.

3793. (*Dr. Collins.*) From the experience you have had, have you been able to note any difference in the protective influence of the different lymphs which have been employed, calf lymph as opposed to humanized lymph, for instance?—I found calf lymph better for re-vaccinating the staff, I found it more efficacious; we used to get human lymph from the Local Government Board, but we found it not so efficacious for re-vaccination. I have been using calf lymph for some years, and I have found it more efficacious.

3794. You mean as regards results?—Yes, its "taking quality."

3795. What calf lymph do you employ?—We use Dr. Warlomont's calf lymph, which comes from Brussels; we get it from the Association for the supply of lymph.

3796. Do you know how that lymph is obtained?—I believe it is obtained directly from Brussels.

3797. How is it obtained?—I do not know how he obtained it originally.

3798. Have you from your experience been able to form any impression as to the relationship subsisting between cow-pox and small-pox?—I would rather not give any impressions upon that obscure subject; I would rather leave that to others.

3799. (*Sir Edwin Galsworthy.*) Speaking of the staff you said that 50 per cent. were employed in the wards, but you have no small-pox there?—None amongst the staff employed in the wards; those attacked belonged to the domestic departments.

3800. In your first table under the columns "No vaccination" and "Doubtful vaccination," there is a low mortality down to the age of 15, and then there is a jump to a large increase. Have you formed any opinion as to the cause of that?—In the "No vaccination" the low mortality at ages 10–15 years is due to age; it is the common behaviour of small-pox, and, as I have said, "Doubtful" vaccination in the matter of different fatality at different ages runs parallel to "No vaccination."

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3801. Had you any cases of small-pox admitted into the Western Hospital at the last epidemic?—We had, I think, about 500 or 600 at the last epidemic. We only took about 30 or 40 at a time, but there were some hundreds admitted.

3802. Have you any statistics of the mortality in cases treated in the Hospital Ships and in the Small-pox Camp?—No.

3803. You have not compared your experience with that experience?—No.

3804. (*Chairman.*) With reference to your impression from what you have seen in the hospital as to the superior protection of previous small-pox; you had, as I understand, out of those cases that you dealt with, two cases of previous small-pox?—Yes.

3805. You had only 39 cases of good vaccination; would not the proportion of people with good vaccination be as much as 19 to 1 who had small-pox?—I could not say.

3806. Unless the proportion of people who had good vaccination to those who had small-pox was less than 19 to 1, there would be nothing in the experience in the hospital to show that good vaccination was not as good a protection as previous small-pox?—No; but then the two cases I have spoken of were not all the second cases of small-pox; there were among the imperfectly vaccinated others who had a second attack of small-pox.

3807. What was the total number with prior small-pox?—Five or six.

3808. You had five or six people who had already had small-pox; you had only 39 who had good vaccination marks?—Yes.

3809. That would hardly seem *primâ facie* to indicate that previous small-pox was a better protection than vaccination?—Perhaps the number of cases does not afford a sufficient basis for generalisation.

3810. (*Sir James Paget.*) You said that under the "good vaccination" there were no known cases of re-vaccination?—No record of successful re-vaccination.

3811. Would not this table show an abiding good influence from a single good vaccination?—It seems to show a good protection against any sort of attack up to the age of 10. They were all asked whether they had been re-vaccinated, and there was no evidence of any of them having been re-vaccinated.

3812. If so the protection goes beyond the ages of 10 to 15, because you get only five cases over 30?—Yes.

3813. Does not that indicate the abiding good influence of a single vaccination?—The numbers are very small. I should be disinclined to deduce much from them. Moreover, I do not know the number of persons living with "good vaccination" at ages over 30 years.

3814. Take them up to the age of 20?—Take them up to the age of 10; there would be a strong influence up to 10, protecting against death in all vaccinated persons.

3815. Take the number of persons who were attacked, who were well vaccinated, and compare it with the number of persons attacked who were not vaccinated, it would show a much greater immunity in the well-vaccinated than in the others?—Yes; it certainly seems to show a greater immunity, though I do not profess to know the numbers living in each class.

3816. It has been suggested that the whole influence of vaccination dies out in a certain number of years; would this indicate that?—Certainly not.

3817. It shows that the influence abides up to 20 or more years of age?—Yes, at any rate as a protection against death by small-pox.

3818. (*Mr. Savory.*) Is there any difficulty in recognising a genuine vaccination scar?—Not the least.

3819. It is a distinct mark?—Yes; sometimes we have patients with burns, but they are perfectly different marks.

3820. Suppose there was a scar in the situation of the vaccination scar, should you be deceived?—No.

3821. There is a typical character about the vaccination mark which shows that the person has been vaccinated?—Yes.

3822. (*Professor Michael Foster.*) Do you take other cases besides small-pox cases in the hospital?—We took fever cases at the same time as we took small-pox cases.

3823. Not a large number?—We had some 150 cases of fever at the same time as some 20 to 25 cases of small-pox; now we take fever cases only.

3824. Have you any data with regard to those cases of fever, whether vaccinated or not vaccinated?—No; I have no data with me; but when small-pox began amongst the scarlatinal convalescents, I began re-vaccinating them, and many of them took.

3825. (*Mr. Picton.*) Have you any means of knowing at all roughly what proportion of the vaccinated population have five or more marks? Is it a common thing to give five marks?—We have had 148 people admitted with five or more marks.

3826. In the general operation of vaccination is it an ordinary thing to give five or more marks?—No, I do not think it is common throughout the country.

3827. It would be a very small proportion having five or more marks?—Not, perhaps, a large proportion, even in London.

3828. Do you think the column in your second table, "Five or more marks," indicates anything more than that there are but few people with five or more marks? Do you not think they had their fair proportion of small-pox, the 148 cases?—It has not struck me that way.

3829. (*Professor Michael Foster.*) Do you think there is a considerable number of people with six marks?—There must be in London a fair number with five marks At the Lamb's Conduit Street calf lymph station I believe they vaccinate with five marks.

3830. Always?—Yes.

3831. In the last 10 years has the number of people who have five or six marks been increasing?—Certainly.

3832. (*Dr. Bristowe.*) I suppose it is not impossible that a person who has only one mark, and that an imperfect one, is as fully protected as a person who has five marks?—I should not regard him as being so fully protected as a person with five marks. He might, perhaps, be as fully protected against attack but not against death by small-pox.

(*Professor Michael Foster.*) He might escape small-pox, and, therefore, as far as the result goes, he would be protected.

3833. (*Dr. Bristowe.*) You did not mean that, did you?—No.

The witness withdrew.

Adjourned till Wednesday next at 1 o'clock.

Eighteenth Day.

Wednesday, 20th November 1889.

PRESENT:

THE RIGHT HON. THE LORD HERSCHELL IN THE CHAIR.

Sir JAMES PAGET, Bart.
Sir W. GUYER HUNTER, K.C.M.G., M.P.
Sir EDWIN HENRY GALSWORTHY.
Mr. WILLIAM SCOVELL SAVORY.
Dr. JOHN SYER BRISTOWE.
Dr. WILLIAM JOB COLLINS.
Professor MICHAEL FOSTER.
Mr. JONATHAN HUTCHINSON.
Mr. J. ALLANSON PICTON, M.P.
Mr. SAMUEL WHITBREAD, M.P.

Mr. BRET INCE, *Secretary.*

Mr. RICHARD THORNE THORNE, M.B., F.R.C.P., recalled and examined.

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3834. (*Chairman.*) Are you prepared to give evidence as to the administration of the Vaccination Acts so far as it is carried out by the Medical Department of the Local Government Board?—I am.

3835. They have, as I understand, the general superintendence of the public vaccination in the country?—They have.

3836. The Vaccination Acts of 1867-74 are locally administered by the guardians of the poor in their respective unions, are they not?—That is so.

3837. The first step taken in the direction of enforcing vaccination is that notice is given by the registrar of births to the parent of every child whose birth is registered of the requirement of vaccination?—Yes, he is compelled to give that notice and it is called a Notice of Requirement. That Notice of Requirement (a copy of which I produce) contains a statement as to the times and places where the public vaccinator of the district will attend and where vaccination can be performed gratuitously. It also contains the form of a medical certificate of postponement of vaccination in case the public vaccinator or other medical practitioner thinks fit to postpone vaccination; and also a form of certificate of insusceptibility of vaccination, or of the child having had small-pox. It further contains a form of medical certificate of successful vaccination; and one or other of these certificates has to be filled in by the public vaccinator or the private practitioner, as the case may be.

3838. I believe two sets of officers are appointed by the guardians for the purposes of the Vaccination Acts?—That is so, the so-called public vaccinators and the vaccination officers.

3839. What are the duties of those two officers?—The public vaccinator is always a legally qualified medical practitioner, and he is obliged in every district into which the country is divided for the purposes of the Act to perform vaccination gratuitously. He receives for his duties payment which for primary vaccination varies somewhat according to the distance that he has to travel to the vaccination station; for re-vaccinations he receives two thirds of the fee which he would receive for primary vaccination. It is his duty, further, to attend to any ill-results that may follow from vaccination when he sees the child at the date of inspection on the eighth day after vaccination; and it is his duty to fill in one or other of those certificates which are contained in the Notice of Requirement, to which I have just referred. I may say, further, that he is not limited to the specified stational attendances in case there is either danger or risk of small-pox, or if he sees other sufficient reason why he should vaccinate at other periods than those specified in the contract. But he is bound to secure the concurrence of the guardians for his departure from the terms of his contract.

3840. What are the duties of the vaccination officers?—The duties of the vaccination officers are to see to the enforcement of the Vaccination Acts generally. They are bound to issue notices to those who are in default; or, in districts where the vaccination is periodical, to remind the parents that the vaccination will fall due at certain dates. They are bound, subject to certain limitations, to attend the vaccination stations; and after the vaccination period is over, and the period at which the children become legally due for vaccination has passed, they have to inquire into the circumstances of any case of default that may have arisen, and to issue notices, or to report defaulters to the guardians, as the case may be. Subsequently, if need be, they have to take proceedings against the defaulters.

3841. Do you produce the Instructions to Vaccination Officers issued by the Local Government Board on the 31st of October 1874?—Yes. The instructions to Vaccination Officers are contained in the Appendix to the Order I now hand in. (*See Appendix IX., page* 280.)

3842. Was there any substantial variation in these instructions from those previously issued?—There was only one Order issued previously to this one as regards vaccination officers, because vaccination officers were only generally appointed under the Vaccination Act of 1871. The reason why the Order was changed was because there was some legal doubt as to the validity of the first Order, and the short Act of 1874 which contained one clause, was passed to make any such Orders valid. The existing Order was issued to vaccination officers generally.

3843. Do you also produce the Instructions to Public Vaccinators issued by the Local Government Board on the 28th of February 1887?—I do. (*The paper was handed in. See Appendix IX., page* 283.) The public vaccinators had, before 1887, been under certain definite instructions as to the method of performing vaccination. These new instructions were issued in 1887, owing to the fact that reason had been found for making some of the regulations somewhat more stringent, especially with regard to the use a second time of any points that had been used for the collection of lymph, and also with regard to the number of separate vesicles or group of vesicles that the public vaccinator should produce on each child.

3844. It is the case, is it not, that vaccination officers have to make returns which are submitted half-yearly and yearly to the Local Government Board?—Yes; they relate to the number of births which are returned as successfully accounted for as regards vaccination in the districts over which they act. Of these returns analyses are prepared at the Local Government Board, and inquiries are made of the guardians in cases where the number of vaccinations falls markedly short of the number of births; also where the number of removals, or the number of insusceptible cases is regarded as being in any way excessive; and in many instances supplementary returns are required of the vaccination officer a few months later, especially if it is held to be his own fault that the returns are incomplete.

3845. Are the public vaccinations carried out at public stations in all cases?—Not in all cases, but in almost all cases the public vaccinator is required to perform his duties at a vaccination station; the exceptions being those which are named in an Order dated the 18th of February 1868, where it is provided that in cases of risk of small-pox, or where people live more than two miles from a public station, vaccination may then be performed elsewhere than at a public station. A note of the circumstances has, however, to be made in the register by the public vaccinator.

3846. How often are the stations attended?—The frequency of the attendance at the stations depends almost entirely upon the population of the district, and

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the number of people who come habitually for public vaccination. In towns one may take it, generally, that the attendance is weekly; but where vaccination could not be carried on consecutively week by week from arm to arm, and where the public vaccinator would hence be obliged to resort to stored lymph, the practice is to have the stations attended for three successive weeks every quarter, so as to give an interval of two months for the births to accumulate. In villages where the number of births is still fewer, the vaccination is held half-yearly for three consecutive weeks,—for example, in April and October; the object being—if there are only 20 children born in each half-year—to aggregate them together, say in the month of April, so that the public vaccinator, having once commenced can carry on his vaccination by means of fresh lymph taken from arm to arm. He then ceases his work until there has been an accumulation of births which would enable him to carry on the same system again at the next half-yearly period in the following October.

3847. Do you produce the memorandum on arrangements for the performance of public vaccination of the 23rd of August 1887?—Yes. (*The paper was handed in, See Appendix IX., page* 285.) That memorandum explains to the guardians, amongst other things, both the reasons for these arrangements, and how they may best be carried out.

3848. The arrangements so described are embodied in each public vaccinator's vaccination contract, are they not?—The actual arrangements that he undertakes to follow out are embodied in his contract.

3849. Do these contracts require the assent of the Local Government Board?—They do.

3850. What further supervision is there of vaccination by the Local Government Board?—The supervision is mainly carried out by means of the visits of their medical inspectors. The object of the Local Government Board is to visit every public vaccinator in the kingdom through one of its medical inspectors once in every two years—except in London where the visits are paid more frequently; and at these visits, as far as possible, the actual work of the public vaccinators is supervised, the inspector going, if he can do so, at the particular hour when the public vaccination is being carried on. In addition to this the register of the public vaccinator is examined. This register contains an entry of the date of each vaccination, the name, the age, and the residence of the child vaccinated, and the source of the lymph from which the child was vaccinated; then follow entries of the date at which, and place where, the public vaccinator inspects the results of the vaccination; and, finally, the result of the vaccination, and the date of the transmission of the necessary certificate to the vaccination officer.

3851. How many medical inspectors are there?—There are nine who are in part engaged on this work; they do not devote the whole of their time to it.—The inspector having examined the register, and having examined children who have been vaccinated by the public vaccinator, makes a report on forms, of which copies are before the Commission, and in certain cases recommends the public vaccinator to the Local Government Board for award; that is to say, the Local Government Board have power to grant an extra sum of money to those public vaccinators who have in all respects done their duty well. At the same visit of the inspector the books of the vaccination officers are examined by him in order that it may be seen whether all the children whose births have been registered, and whose names and residence these officers have received from the local registrar, are properly accounted for; that is to say, each birth must be accounted for by an entry of a certificate of successful vaccination, a certificate of postponement of vaccination, a certificate of insusceptibility, or by evidence of the child having removed from the district or of having died before the vaccination could be performed.

3852. Are communications made by the Local Government Board to the guardians in case there appears to have been default?—Yes; anything that may have transpired during the inspection, and as to which the inspector reports to the Local Government Board, is made, if need be, the subject of correspondence with the guardians, the default of either class of officer being pointed out, and in many instances the officers having to submit an explanation of their default.

3853. I believe the Local Government Board has made, for some years past, special inquiries where there have been allegations of injury from vaccination?—Yes; that has been done systematically ever since the year 1882. All cases as to which they receive complaint or that otherwise come under their notice have been inquired into.

3854. Since November 1888 there has, I believe, been personal inquiry made whenever vaccination was referred to directly or indirectly in the certificate of death?—Yes; the registrars of deaths have orders throughout the country immediately to transmit to the Local Government Board a copy of any certificate in which vaccination is mentioned, either directly or indirectly, as the cause of death; and all such cases have since that date been personally inquired into by the medical inspectors of the Board.

3855. Have you had cases before the Local Government Board for inquiry such as have been mentioned here to-day?—Yes. The one case of tetanus referred to is, I think, the only case of death from that cause that we have heard of.

3856. But I meant these two cases that we have had before us to-day?—I do not know what they were.

3857. You have heard Sir James Paget's description of them?—So far as I can judge I do not think that we have received any information as to these particular cases.

3858. (*Sir James Paget.*) Have you heard of any cases of the kind referred to?—Yes, from time to time a number of them.

3859. They would not be limited to cases involving great danger of life or of death?—As a matter of fact we have made inquiry into every case of complaint however trivial.

3860. (*Professor Michael Foster.*) How does the information of there being a case in which vaccination has appeared to have been injurious reach the Local Government Board?—It is usually an allegation either from the parent or from a medical man; but at times it comes from other sources.

3861. How is that allegation made to your office?—A letter sent up would receive the earliest possible attention by means of the visit of a medical inspector.

3862. Have you only attended to those cases that have been brought to your notice by a letter to the office?—We have no means of hearing of any other cases except when the medical inspector is on his visit, and then he would inquire into any such case and embody the results of that inquiry in his report to the Local Government Board.

3863. Have the reports of those cases of inquiry come mainly from the medical inspectors?—No, I should say that in the majority of them it has been a distinct allegation which has come by letter.

3864. Direct to your office?—Direct to the Local Government Board.

3865. (*Sir James Paget.*) From parents or friends?—From parents or friends or from anyone.

3866. (*Professor Michael Foster.*) How many are there in the course of a year?—I am afraid I am not, at the moment, able to answer that; they are not a large number.

3867. (*Mr. Hutchinson.*) Have you any list of the cases?—I believe a list is being prepared which is absolutely complete from a certain date, in order that the Commission may judge precisely what is done in that respect.

3868. (*Sir Guyer Hunter.*) Does that include alleged cases?—Any case of allegation of injury by vaccination which has come under the Board's notice from a certain date will be submitted, I believe, in a tabular form to the Commission.

3869. (*Chairman.*) You have given us information as to the officers throughout the country who are engaged about vaccination, and you have given a sketch of their duties and of the relation of the Local Government Board to them; what establishments are there for vaccination purposes in addition to the vaccination stations which you have mentioned?—The only establishments that there are in connexion with vaccination are those from which lymph is supplied; that is to say, there is an establishment the headquarters of which are at the Local Government Board for the supply of lymph.

3870. Is that the National Vaccine Establishment?—That is the National Vaccine Establishment, and there

is also the Calf Station; but all the lymph, whether humanised or from the animal, passes through the Local Government Board before it is transmitted to medical practitioners for their use.

3871. Who is the superintendent of the National Vaccine Establishment? — An inspector named Mr. Farn; he acts under the direction of the medical officer of the Board.

3872. Who has the charge of the Calf Institution in Lamb's Conduit Street?—Dr. Cory is the director of the Calf Station.

3873. (*Professor Michael Foster.*) The result of the vaccination is stated by the public vaccinator himself?—He records it in his register, and he is also required to give a certificate of successful vaccination in the case of each child whom he has successfully vaccinated.

3874. But is that the only evidence that you have to rely upon in determining the amount of successful vaccination?—No, the vaccination officers receive all certificates of successful vaccination whether performed by a public vaccinator or other medical practitioner.

3875. But if the public vaccinator should be mistaken in thinking that his vaccination was successful, have you any check on him?—Only the check that when the medical inspector goes round to inspect the district he takes the register in his hand and says, "Show me so and so; show me this child."

3876. Practically it is checked by the medical inspector?—It is checked in that way.

3877. (*Mr. Whitbread.*) If instead of making a complaint to the Local Government Board the parent had made his complaint to the vaccination officer whom he knows, what course would be taken then?—That would depend entirely upon the guardians, whose servant the vaccination officer is.

3878. Would any record reach the Local Government Board of complaints of that sort?—Strictly speaking, I should imagine that it would be the duty of the vaccination officer to go to the public vaccinator of the district who had vaccinated the child and tell him of it; but not unfrequently the Guardians would report such a case to the Board.

3879. Supposing that complaint was made to the public vaccinator of a bad arm would that appear anywhere?—If it were a bad case in many instances the public vaccinator would communicate with the Local Government Board; but there are complaints made which are so trivial that they certainly would not all be reported. Vaccination itself involves a certain amount of inflammatory action.

3880. You have heard the two cases which have been brought to the Commission described here to-day; would such cases as those come to the knowledge of the Local Government Board?—It would depend entirely upon the local people, and the public vaccinator. The administration of the Vaccination Acts is local so far as that is concerned, but if the facts were communicated to the Local Government Board there is no doubt that in cases of that sort inquiry would be made.

3881. Has he any instructions to communicate such cases to the Local Government Board?—There are no printed instructions. As a matter of fact, the communication is generally carried out through the inspector. The inspector of the district is supposed to have a sort of general supervision over it, and the public vaccinators and vaccination officers very often place themselves in communication with the inspector rather than with the central office.

3882. Then I take it from you that the Board require a return of successful vaccinations, and of insusceptibility to vaccination, but that they do not require any return of cases in which evil results have followed vaccination?—The returns of successful vaccination and of insusceptibility are merely numerical; it is only that there have been such and such number of cases; there is no reference to an individual case at all. But I may say you are right as to there being no printed instructions to the public vaccinators to communicate with the Local Government Board, though, as a matter of fact, they do communicate with the Board, or with the inspector, as I have already stated.

3883. Occasionally?—Yes.

3884. And depending upon the public vaccinator?—Very largely.

3885. (*Sir Guyer Hunter.*) Do the interests of the public vaccinators lie in concealing the cases or in making them as public as possible?—My own conviction is that as a rule they do not study any interests. I know as an inspector that when anything has gone wrong I have been generally told by the public vaccinator of the district, and he has specially taken me to places where children have been ill, or has had them ready at his surgery for me to see.

3886. There has been no tendency or desire to conceal such cases?—I have never met with the slightest desire to conceal them.

3887. (*Mr. Whitbread.*) The record is a record of successful vaccination but gives no clue as to the number of cases in which evil results may have followed vaccination?—No, there is no absolute record of that. The forms of certificate embodied in the Notice of Requirement have been decided by Parliament and that Notice does not contain any reference to injuries.

3888. (*Mr. Picton.*) Will you tell us what your experience is of the number of children who would be vaccinated in the course of an hour at a crowded station?—I do not think you could have asked me a question as to which I could give you a less satisfactory answer. If you will allow me I will explain. You may go to one station to watch the work of the public vaccinator; the vaccination officer is in attendance and a woman also; the vaccination officer has taken down the names and the ages and the residences of all the children; the woman has got all the children, attending for vaccination or for inspection ready; their arms are bare and they are arranged in order; there is a clerk to take down the details and enter them in the register as the vaccinator does his work; the woman will see that the children are placed so that they should not injure the vesicles or, in the case of those just vaccinated, so that the lymph may dry. At such a station the public vaccinator has little or nothing to do but actually to vaccinate. He may then get on his horse and go to another station where he has the whole of the work which I have described to do himself. Hence I should say that the variation in the numbers that can be vaccinated in a given time may be as much as the distance between one pole and another.

3889. But you have experience of town stations in populous districts, have you not?—I have some, but I never counted how many children a man vaccinated in an hour; I only went to see that his work was properly done.

3890. But I hoped you could help us to some information upon that point. Would there be 30 vaccinated in an hour?—I can conceive that a man under the first circumstances that I have named, might, if he were a skilled vaccinator, easily vaccinate 30, and vaccinate them admirably in the hour.

3891. Might he do more?—I must distinctly say that I am merely guessing, if I answer you at all. I never counted the number that a man vaccinated in a given time; I do not know that I ever saw a man vaccinate 30 in an hour; I merely say I can imagine that a man might vaccinate 30 in an hour under the first circumstances, whereas he probably could not do more than 12 under the other circumstances that I have named to you.

3892. May I refer you to the first paragraph in the Instructions for Vaccinators under Contract, and call your attention to the directions there given as to the examination of the physical condition of the infants to be vaccinated? I must necessarily read the directions in the second line: "As regards infants, ascertain that "there is not any febrile state, nor any irritation of the "bowels, nor any unhealthy state of skin; especially "no chafing or eczema behind the ears, or in the groin, "or elsewhere in folds of skin. Do not, except of "necessity, vaccinate in cases where there has been "recent exposure to the infection of measles or "scarlatina, nor where erysipelas is prevailing in or "about the place of residence." Are those directions minutely carried out?—There is necessarily some variation in the action of a large number of men; it will depend very much upon the men themselves; but as a rule I should say that the public vaccinators do endeavour to carry out those instructions, perhaps not absolutely to the letter in every case, but certainly in spirit.

3893. Is it not a case in which matter is more important than spirit?—I did not say matter, I said "letter."

3894. You said that they endeavoured to carry them out in spirit?—I said that although he might not carry them out absolutely in the letter, the spirit of the instructions, I believe, is always carried out.

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3895. You will excuse my referring to the word "spirit" again, because I read such minute material directions here, which it appears to me would occupy some time in carrying out. Is it not necessary to strip an infant entirely in order to carry out these directions?—I should say, no, but sometimes you vaccinate others than infants, and I do not suppose you wish every girl to be stripped and exposed before she is vaccinated.

3896. I am referring to infants in this first paragraph: "As regards infants ascertain that there is not any "febrile state, nor any irritation of the bowels, nor "any unhealthy state of skin; especially no chafing "or eczema behind the ears or in the groin, or "elsewhere in folds of skin." There is nothing here said about others than infants, and it is about infants that I am asking; and I think it is necessary to ask whether in order to carry out these directions an infant is not necessarily stripped?—No, I should say it is not necessarily stripped. The habit that I have seen at stations is for the child just to have its napkin removed, besides which the vaccinator looks at the neck and behind the ears, and that I believe as a rule suffices for that purpose.

3897. Does that fulfil the directions as to "elsewhere in folds of skin"? "Elsewhere" does not refer only to those parts which you have mentioned, but anywhere in the body. Is it possible to carry out that direction without having the child entirely stripped?—My own impression is that a medical man who knows his work can perfectly well judge after the examination which I have described.

3898. Under pressure of time is there not a temptation to somewhat scamp these directions?—I really cannot answer for any temptations there may be. I believe that this instruction is honourably carried out.

3899. Are there not evidences of disease which require a minute examination?—There are in some cases, and I believe such an examination as I have named would so reveal them, that a more minute examination would then follow.

3900. Does not what you say amount to this: that it is impossible minutely to carry out these directions in a crowded vaccination station, and that they must be carried out in spirit and not in letter?—I do not know what you mean by a crowded vaccination station. The operator does not work in a crowd.

3901. What I mean is that there is a crowd of children waiting to be vaccinated, say 50 or 60?—If there be, he has time at his disposal, and he can go on as long as he likes, and many a stational attendance lasts a couple of hours.

3902. Still you have said that you think 30 might be vaccinated in an hour; that only leaves two minutes to examine each and to inquire into the question of recent exposure to infection of measles or scarlatina. Do you think two minutes is enough for all that?—I am thankful that I told you I was only guessing when I mentioned that number.

3903. It would be more satisfactory to the Commission to have distinct information as to the number of children vaccinated in an hour?—I am sure, if the Commission desired it, somebody could easily go and count the number vaccinated in an hour. I never went to count the number; I went to see if the work was done properly.

3904. You think it sufficient if these directions are carried out in spirit?—I did not say so, pardon me.

3905. I find in the seventh paragraph of the directions for vaccinators under contract: "Be careful never "to transfer blood from the subject you vaccinate to "the subject from whom you take lymph." Is it always possible to be sure that you have not transferred blood?—No; I do not think there is anything there to say that a microscopic particle of blood is not to be transferred.

3906. A microscopic particle of blood might contain germs of disease, might it not?—I should be sorry to say that a microscopic particle of blood could not contain a germ.

3907. You have given us in these documents which you have laid upon the table a copy of the letter addressed to the Board of Guardians of the Evesham Union, dated the 17th of March 1876. I observe that that letter distinguishes between prosecutions under section 29 of the Act of 1867 and under section 31 of the same Act. Will you kindly explain the difference of the operation in the two cases? Section 29 is the first referred to?—As a rule, first proceedings are taken under section 29 of the Vaccination Act of 1867, but it has been held that proceedings under that section must be taken within 12 months of the offence arising. Therefore, as regards older children, the primary proceedings have to be taken under section 31. It is also held, I believe, that under section 29, if default has been made and the parent or guardian is punished, the offence is completed, and nothing more can be done under it, but under section 31 the magistrate makes an order directing that the child shall be vaccinated within a certain time, and as long as the child remains unvaccinated the default still remains, and therefore multiple proceedings can, up to the age of 14, be taken under section 31; whereas only one proceeding can be taken under section 29. Those are, I believe, the essential differences between the two sections.

3908. It is on section 31 entirely that the possibility of repeated prosecutions depends?—On section 31.

3909. Is not it the fact that in the letter to the Evesham Board of Guardians the Local Government Board express an opinion adverse to unlimited repetition of prosecutions?—They do in that case, and I think I may say generally that it is the view of the Board, that in most cases some limit should be placed to the number of proceedings; but they have declined in some special cases to give the same advice.

3910. Are you aware that cases do occur in which the father is prosecuted from 20 to 30 times?—I know there has been one such case, if not more.

3911. With regard to the mode of giving information in cases of injury, am I right in supposing that there are three ways of making complaint; first to the inspector on his visits, next to the vaccination officer?—Not to the vaccination officer; I said that if the vaccination officer heard of any case of injury his duty would be to communicate with the public vaccinator.

3912. But should the parent or the suffering person complain to the public vaccinator?—It is left to the parents to take what course they choose.

3913. If they do not take either of those courses, that is to say, complain to the inspector, or to the public vaccinator, they may write a letter to the Local Government Board?—Yes.

3914. How often may an inspector be expected to visit any particular district in the discharge of his duties?—For the general purposes of his inspection, and, speaking of the country generally, he goes to a district once in every two years; or on receiving a certain special communication or instruction he might start off the next morning.

3915. For a special visit a letter would be necessary, he would have to be informed by letter that there was a necessity for a special visit?—He would have to get the needed information somehow; he would not, in the ordinary course of his duties, go more than once in two years to the districts comprised in any one union.

3916. What is the feeling of parents whose children are suffering from vaccination in regard to the public vaccinator; is it generally a very friendly one?—I do not think I can judge of people's feelings towards anybody.

3917. Do you think it likely that they would go to him to complain of any case of injury?—In nine cases out of ten he is their own doctor, the man they turn to in all their physical ailments and troubles; as a rule, they do go to him.

3918. Are you aware that amongst the ill-educated class of the community to write a letter is a matter sometimes of a little difficulty?—There are people who cannot write.

3919. Or who write with difficulty?—No doubt.

3920. Then to write a letter to the inspector or to the Local Government Board would be a matter of difficulty?—They would never write to the inspector as a rule, they do not even know his name; they might write to the Local Government Board—where people cannot write themselves they sometimes get the letter written for them.

3921. You have heard of cases of injury indirectly, concerning which no complaint has been made in those ways?—We have.

3922. You do not know how many they may be?—There is no record of them—no means of recording cases as to which no complaint is made to the authorities.

3923. *(Dr. Collins.)* Are you prepared to give us information with regard to the current lymph in use at the different establishments?—Mr. Farn would know more about that than I do.

3924. Who would be able to give us the most authoritative information as to the sources of the current lymph sent out by the Local Government Board?—Mr. Farn has a record of every child from whom lymph has, for the Board's purposes, been taken for years past, and also of those who have received such lymph for vaccination purposes.

3925. I was referring to the original sources?—I do not know anyone who knows anything absolutely definate as to the original sources; that is to say, in the sense in which I suppose you are talking of origin.

3926. Does the Local Government Board make no inquiry as to the source of new stocks of lymph which are introduced?—Certainly, if the Local Government Board issues any new stocks, but it has issued no new stock except when the calf-lymph station was established.

3927. Did they make inquiry into the nature of that lymph?—As I explained in my previous evidence, I was not located at Whitehall at that time; I am not aware of the details of the steps that were taken when the calf-lymph station was established. I could not give you proper information upon that point.

3928. Would Mr. Farn be able to tell us?—I am afraid I cannot answer for Mr. Farn; Dr. Cory would be able to tell you.

3929. Do I understand you that no other new stock of lymph has been introduced at any of the public vaccination stations beyond that which was obtained at the institution of the calf lymph establishment in Lamb's Conduit Street?—I am speaking of public stations from whence we receive humanised lymph for distribution; they are very limited in number. I believe no new source has been introduced.

3930. No other source has been introduced at the calf lymph establishment?—I could not give you information about the source of the lymph at the calf lymph station.

3931. In answer to Question 805 in your previous evidence you said, "We have, as far as the Local "Government Board is concerned, adhered absolutely "to the original sources, namely, that at Lamb's Con-"duit Street, and the humanised source from specially "selected public vaccination stations; I know of no "change"?—I think I have repeated that to-day.

3932. Do I understand you to be aware of no new introduction of lymph at the calf lymph establishment within a recent period?—I am afraid I ought not to give evidence upon this point. Now you mention it, I believe there was some new lymph introduced, but I have no information about the source of lymph at the calf lymph station; therefore I would rather you asked someone who knows more about it than I do myself.

3933. Dr. Cory would know about it?—Yes.

3934. Has the Local Government Board at any time used or distributed lymph which has been derived from the inoculation of a cow with small-pox?—I am not aware that we have.

3935. Does the Board accept that as a source of vaccine lymph?—I really do not know what the Board accept; I have told you the only two lymphs they distribute.

3936. Have they not distributed any of Ceely's lymph or Badcock's?—I could not tell you.

3937. You do not know that they have not?—I do not know that they have or that they have not. I do not know anything about it.

3938. Do you happen to know of an inquiry that was instituted by the Local Government Board in regard to certain injuries alleged to have resulted from vaccination at Norwich in the year 1882?—There was an inquiry at Norwich at that date. I have read the report; beyond that I have no authoritative knowledge concerning it.

3939. Can you tell me what was the result of that inquiry?—I am afraid I could not without refreshing my memory by looking at the report again.

3940. Are you aware that the inspectors, Mr. Henley and Dr. Airy, attributed those cases of erysipelas following vaccination, some of which proved fatal, to some contamination of the lymph which had escaped detection?—I believe generally that was the conclusion of the inspectors, but, as I say, I am afraid I should have to refresh my memory by looking it up in order to give any sufficient answer with regard to that inquiry.

3941. To whom could we look for information with regard to that inquiry?—I imagine Dr. Airy would be the best witness as to what he reported on.

3942. Do you happen to be acquainted with an outbreak of erysipelas following vaccination which occurred at Gainsborough some years ago?—I know one did occur, beyond that I could not tell you anything about it. I was not in any way concerned with it, either as reporter or as having to read the report.

3943. Has the Medical Department of the Local Government Board formed any opinion as to the origin of erysipelas in cases of this kind?—I was hardly prepared to enter into questions of injuries following vaccination to-day, but I can answer generally if desired.

3944. I will put it this way: Has the Local Government Board been able to trace the origin of erysipelas arising in connexion with vaccination to any want of care in the way in which the Act is administered?—Speaking quite generally I should say that the vast majority of cases of erysipelas following vaccination that come under our notice are cases in which the erysipelas does not begin till certainly as late as the middle of the second week of vaccination, and then according to our experience it is more than doubtful whether the injury was due to the lymph at all; the probability being that it was due to the circumstance that some septic matter got access to a wound which happened to be the wound produced by vaccination; but I have not prepared myself to speak on this point, and, therefore, I am only speaking quite generally.

3945. What instructions are issued with regard to the management of the vaccinated arm for the week or two following vaccination?—We issue none except as regards the use of a shield. Every public vaccinator is a qualified medical man, and he is supposed to look after his own work. The Board does not intervene as to this unless we find that there is something on which to issue a caution, and such a caution was issued as regards the use of shields.

3946. Was the recommendation in favour of or against the employment of shields?—Against the use of them.

3947. Is it considered preferable to leave the arm open?—It is considered preferable to leave it open, for the simple reason that a shield is so made that if put on to-day it may absorb septic matter, and therefore should not be used to-morrow, and would possibly do a great amount of harm if so used; some cases of injury which we have met with have followed on the use of those shields.

3948. Do you consider the presence of erysipelas at any time in the course of the maturation of the vaccine vesicles an integral part of the local manifestation of the disease?—No.

3949. Are you aware that Dr. Jenner considered it to be so?—I am not, and I should think if he said so he must have used the word erysipelas in a very different sense to that in which I should use it.

3950. Are you aware that on one occasion he obtained true vaccine lymph from an "erysipelatous swelling on "the upper part of the thigh of a sucking colt"?—I have no special knowledge of the details of Dr. Jenner's investigations; I never heard of the case you speak of.

3951. Do you think that vaccination is more or less liable to occasion erysipelas than an incision by a perfectly clean instrument?—I am unable to answer that; but I am perfectly convinced of this, that in nine cases out of ten where erysipelas has followed vaccination, it has been through the introduction of septic matter from without, that is, apart from vaccination itself.

3952. Is that shown to be the case in the outbreak at Norwich?—I should have to refresh my memory to enable me to answer that question.

3953. Are there any means of ascertaining by examination of the lymph, microscopically or otherwise, whether in any case it is likely to occasion erysipelas or not?—I know of none; of course no lymph is sent up to the Local Government Board except that which comes from children who certainly present no indication of erysipelas, and hence there arises the natural inference that it does not contain anything like erysipelas; the results, too, certainly justify that inference.

3954. Do you think that under any circumstances vaccination *per se* in the ordinary way in which it is carried out at public vaccination stations has occasioned

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erysipelas?—I have no doubt there have been cases in which erysipelas has followed vaccination and has been actually due to the lymph used, but I more than doubt whether anything like the organism which some people believe to be invariably associated with erysipelas is introduced by means of the lymph itself.

3955. You are alluding, I suppose, to a special micro-organism?—Yes.

3956. Are you aware of Dr. Pfeiffer's experiments with regard to that?—I do not recall them at the moment.

3957. I think the report of the Committee of 1871 recommended with regard to penalties that "whenever "in any case two penalties or one full penalty have "been imposed upon a parent the magistrate should "not impose any further penalty in respect of the same "child"?—I believe that was recommended.

3958. I believe that recommendation was adopted by the House of Commons?—It was.

3959. And was rejected in the House of Lords?—That was the case, I believe.

3960. Can you tell me what was the first occasion on which repeated penalties were recovered under any Act?—No, I cannot. On this general question of the compulsory administration of the Acts I think the Commission is almost certain to get the evidence of one of the administrative staff of the Board. I am no authority on the question of legal compulsion.

3961. I was going to ask you whether it was before the Act of 1871?—I do not know.

3962. Has the Local Government Board through its Medical Department issued any recommendations or advice or orders with regard to the vaccination of children in workhouses?—Yes, it has issued a memorandum.

3963. Would you tell me what the recommendation was? — The memorandum to which I refer was a circular issued by the Poor Law Department of the Local Government Board, on the 27th of January 1881, to boards of guardians in the metropolis, and it contained this statement: "Some boards of guardians have "passed a resolution requiring the medical officer, "subject to the exercise of his judgment as to making "an exception in particular cases, to secure the vaccina-"tion of all children born in the workhouse as soon as "possible after birth, and it has been found practi-"cable, as a rule, to vaccinate the children when six "days old and to inspect the results on the thirteenth "day, as the mothers in such cases rarely leave the "workhouse within a fortnight after their confine-"ment." It is thus rather a statement of fact than a recommendation.

3964. Where such a practice has been adopted, has it been on the strength of that recommendation or on account of the action of the guardians themselves?—I have no doubt that in some cases it has been on the strength of this letter, but this letter was, you see, based upon an actually existing practice which had been adopted by boards of guardians beforehand.

3965. Would it be true to say that "the practice of "vaccinating children shortly after birth was not "adopted under any advice of the Local Government Board"?—I am not quite certain that I follow you; are you speaking of a date before the issue of the letter or after.

3966. I am speaking of the present time; would it be correct to say that the practice of vaccinating infants almost immediately after birth or within the first week of life was not initiated under any advice of the Local Government Board?—The practice has been adopted in some instances, I have no doubt, on account of the issue of the Board's circular.

3967. Has any information come to your knowledge in regard to guardians who are prosecuting sitting on the bench as magistrates?—No, except when I take up a daily paper and read of such cases, as anyone else might. I have nothing whatever to do with the legal part of the administration of the Acts.

3968. Do you consider that it would be true to say that if vaccination were properly done at the public vaccination stations no evil result would follow?—I could not say that. I think most of the evil results arise in the homes of the parents.

3969. I mean would no evil results arise from vaccination if properly done?—Of course erysipelas which comes on owing to a child being nursed by a woman with an ulcer on her leg is, in one sense, the result of vaccination, but I should be obliged to discriminate between direct and indirect results if you ask me a question of that sort.

3970. May I take it that the result of such inspections as have been made in answer to complaints that have been made would lead you to the opinion that if an evil result did ensue in the case of any of these public vaccinations, it would be referable to an improper mode of vaccination or to improper conduct of the case subsequently?—I should say in by far the majority of instances the injuries that ensue are due to what happens subsequently to the vaccination; but there, again, actual details will be laid before the Commission of all the injuries of which we have heard since a certain date, and the Commission will be able to judge for themselves how far the injuries are due to one or other cause.

3971. Have verdicts been given at coroners' inquests in which it has been stated that the child had died as the direct result of vaccination though the vaccination was properly performed?—I do not know that I ever noticed the word "direct" in any verdict given by a coroner's jury.

3972. You are not aware of any verdict of a coroner's jury in which vaccination has been the only assigned cause of death?—I did not say that.

3973. I am asking you a fresh question?—There unquestionably have been cases in which vaccination has been set down as the cause of death.

3974. And the same would apply to injuries which were not fatal, which were traceable to vaccination?—Unquestionably injuries have been directly or indirectly, traced to vaccination.

3975. Do you happen to know of any instance in which an action has been instituted on account of malpractice against the vaccinator?—I do not recall any such case.

3976. You are not aware of any single instance?—I cannot recall one at the moment.

3977. Can you give us any information with reference to the storing of lymph?—Mr. Farn would give you much more satisfactory evidence upon that point.

3978. And also as to precautions in avoiding the admixture of blood?—Yes, he would tell you how the lymph is examined under the microscope and what are the precautions that are taken as to that.

3979. Did I rightly understand you to say, in answer to Mr. Picton, that in case of any injury following vaccination at a public vaccination station, the public vaccinator would probably become aware of the fact, because in nine-tenths of the cases the public vaccinator would be the medical attendant?—I did not say so. When I made the statement that in nine out of ten cases the public vaccinator would be the medical attendant, Mr. Picton was asking me as to the sort of feeling that existed between people and the public vaccinator—he was not referring to injuries then. But the mere fact that the public vaccinator is the medical attendant in the majority of cases does, in country districts, enable the public vaccinator to know of such injuries as may occur.

3980. At what period subsequent to vaccination does the responsibility of the public vaccinator terminate, according to his contract?—I am afraid that the point you raise is not free from difficulty. He is bound under his contract "to do such acts and give such directions "and otherwise treat the cases as upon such inspection" —that is, at the eighth day—"shall appear to him to "be necessary." I cannot go beyond the words, because the exact legal meaning is differently interpreted, I believe; but, as a matter of fact, the public vaccinator generally regards it as his duty to see the child through the whole process of vaccination if the child is brought to him for that purpose.

3981. I apprehend, in the great majority of cases, on the eighth day the appearances are such as to be recorded as satisfactory?—In the great majority of cases, certainly so.

3982. In such cases would it be the duty of the public vaccinator to keep the case under observation after the eighth day?—In answer to your question I must refer again to those words: he is required "to do such acts "and give directions and otherwise treat the cases as "upon such inspection shall appear to him to be neces-sary."

3983. Does his conduct in the carrying out of that particular instruction in any way operate as regards the

premium which is awarded to him by the vaccination inspector?—Certainly; if the public vaccinator had been known to neglect that portion of his duties it would influence the granting of an award.

3984. You have been a vaccination inspector?—Yes.

3985. From the experience you have had do you think, as a matter of fact, in the great majority of cases, any observation is made of a vaccinated child after the eighth day?—Not unless the public vaccinator's attention is drawn to the child either by the parent or someone else. There is in the vast majority of cases no need for it; it would be mere waste of time so far as the public vaccinator is concerned.

3986. With regard to the instructions issued to public vaccinators under contract, which are very detailed, which apparently require some time for carrying out satisfactorily, do you happen to know that in an inquiry which was held, touching an alleged injury from vaccination at Gloucester in the year 1884, the public vaccinator stated that it would be an outrage to comply with the law in its minutest particulars?—I do not remember the case.

3987. Have any cases occurred in which public vaccinators have been suspended from their duties on their work proving unsatisfactory on inspection?—There have.

3988. Have they been numerous?—I do not think they have been numerous. A point of that sort I should only have known of within comparatively recent years since I have been assistant medical officer: during those years they have not been numerous. In a certain number of cases the public vaccinator, if he suspects that anything of the kind is in progress, resigns of his own accord in advance.

3989. Is the fact of untoward circumstances resulting from vaccination taken into consideration in connexion with the award made to the public vaccinator at the subsequent inspection?—If any injurious consequences have resulted the matter is always very carefully considered in connexion with the award, but there are many cases of injury following vaccination for which the public vaccinator is distinctly not responsible, and then the case would be submitted for the judgment of the Board, and the award if recommended would not be withheld.

3990. Could you tell me, with regard to the Norwich case, whether the public vaccinator on that occasion in any way was held responsible for the untoward circumstances?—As I have said I should be obliged to read the case again in order to give any answer that would be of value to the Commission.

3991. (*Mr. Picton.*) With regard to paragraph 7 of the Instructions for Vaccinators under Contract, does not that paragraph instruct public vaccinators to take lymph only from children whose circumstances they know?—No; it does not.

3992. I find this instruction in paragraph 7: "Take "lymph only from subjects who are in good health, "and as far as you can ascertain of healthy parentage, "preferring children whose families are known to you "and who have elder brothers or sisters of undoubted "healthiness"?—It does not say they are only to take lymph from children known to them. It says, "preferring children whose families are known to you."

3993. What do the words mean, "as far as you can ascertain of healthy parentage"?—They mean that a man who is registered and qualified for the practice of medicine should use his proper judgment in ascertaining what he can as to the health of the child and as to the health of the parents.

3994. Only one parent usually comes with the child?—That would limit him; he could not inquire of the father if the father were not there.

3995. He is to take lymph only from subjects who are in good health, and as far as he can ascertain, of healthy parentage?—The instruction is elastic, it says, "as far as you can ascertain."

3996. Then do the next words in reference to elder brothers or sisters imply that he should not take lymph from the first child of parents?—Generally that is understood; we prefer as a rule that lymph should be taken from a second or third child rather than from the first.

3997. Is that always carried out?—I do not say it is; it is generally understood that lymph from the second or third child should be used in preference to lymph from the first, but that cannot always be carried out. If the public vaccinator knew the two parents perfectly well, if he knew they were healthy, and had known them from childhood upwards, he would be quite entitled to take lymph from their first child.

3998. Is a special examination made of the vaccinifer or intended vaccinifer before the lymph is taken?—Such examination should be made, and whenever I have inspected such examination has been made.

3999. A complete examination of the whole body?—There is nothing about a complete examination of the whole body. If two respectable people bring a baby to the station, and the public vaccinator has known those people from childhood upwards, as often happens in these country districts, and has known their whole health history, it obviously cannot be necessary for him to strip the vaccinifer from head to foot to look for that which he knows perfectly well does not exist.

4000. Let me call your attention to the direction, and ask you, does not the direction, taken as a legal document ought to be taken, require that the vaccinifer should be fully examined before the lymph is taken?—"Carefully" examined; and that is what is done.

4001. In order to institute repeated prosecutions, what steps are necessary? Can the vaccination officer institute a fresh prosecution of his own motion?—May I ask you what you mean by a fresh prosecution?

4002. After the parent has been fined once and refused to comply with a magistrate's order. I am speaking of proceedings under section 31?—If you look to the instruction to vaccination officers at page 5, Article 16, you will see that after directions have been given to the vaccination officer to prosecute, "no such "directions shall authorise the vaccination officer to take "further proceedings under section 31 of the Vaccina-"tion Act of 1867 in any case in which an order has "already been obtained, and summary proceedings taken "under that section until he shall have brought the "circumstances of the case under the notice of the "guardians and received their special directions there-"on."

4003. Have the guardians themselves any discretion as to repeated prosecutions?—The administration of the Vaccination Acts in respect of repeated prosecutions lies absolutely with the guardians; their discretion is absolute.

4004. (*Chairman.*) Could no one other than the guardians prosecute?—Yes; the next article says, "The "vaccination officer shall take such proceedings as may "be necessary under the Vaccination Acts in any case "in which the Local Government Board may direct "him to do so"; but no vaccination officer has ever received instructions from the Local Government Board to proceed to further prosecutions in cases in which the guardians have not desired to do so.

4005. Though practically the discretion of the guardians is absolute, there is nothing in the Vaccination Acts to give to the guardians a power to prosecute which is not given to others?—I could not say; practically there have been no prosecutions by others.

4006. (*Dr. Collins.*) What knowledge of the theory and practice of vaccination is required for candidates for the office of public vaccinator?—In the first place, the candidate must be qualified in medicine and surgery, and in the second place he must have a special certificate of proficiency in vaccination, which he must have procured at one or other of the stations in the United Kingdom which are termed Educational Stations for that purpose.

4007. Is that certificate additional to that which is required before ordinary medical registration?—Yes, but for some years past, owing to the fact that there was inconvenience to registered medical practitioners in having to get this special vaccination certificate, colleges and other bodies granting diplomas now refuse to accept any other for the purpose of their examination; so that any recently qualified medical practitioner now has this certificate, which is obtained from an educational station, authorised by the Local Government Board.

4008. What amount of attendance is required of such a student of vaccination at an educational establishment before a certificate is granted?—Six consecutive weeks' attendance; but there is at least one officer, Dr. Cory, who may give it to a registered medical practitioner as the result of a single attendance and examination. It often happens, for example, that a man who has vacci-

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nated all his professional life wants to hold the office of public vaccinator, and then it is deemed that one single examination of him in such matters as his work as a vaccinator, and in taking lymph and charging tubes and points is sufficient. Under special circumstances, one attendance is held to be sufficient.

4009. Would these special circumstances only apply to such as had previous experience as vaccinators?—That is left to the judgment of the medical officer giving the certificate; but all such applicants must be registered medical practitioners, and in order to become a registered medical practioner they must already have procured a certificate as to vaccination.

4010. Under what order or statute is that special indulgence granted?—I believe it is an order of the Privy Council Office.

The witness withdrew.

Adjourned till Wednesday next at 1 o'clock.

Nineteenth Day.

Wednesday, 27th November 1889.

PRESENT:

THE RIGHT HON. THE LORD HERSCHELL IN THE CHAIR.

Sir JAMES PAGET, Bart.
Sir CHARLES DALRYMPLE, Bart., M.P.
Sir W. GUYER HUNTER, K.C.M.G., M.P.
Sir EDWIN HENRY GALSWORTHY.
Mr. WILLIAM SCOVELL SAVORY.
Dr. JOHN SYER BRISTOWE.
Dr. WILLIAM JOB COLLINS.
Professor MICHAEL FOSTER.
Mr. JONATHAN HUTCHINSON.
Mr. J. ALLANSON PICTON, M.P.
Mr. SAMUEL WHITBREAD, M.P.
Mr. F. MEADOWS WHITE, Q.C.

Mr. BRET INCE, *Secretary.*

Mr. Albert Brydges Farn.

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MR. ALBERT BRYDGES FARN examined.

4011. (*Chairman.*) You were in 1871 appointed examiner of vaccine lymph?—Yes.

4012. And you have since that time examined all tubes of humanised lymph distributed from the National Vaccine Establishment?—Yes.

4013. And the business generally of that establishment is under your supervision?—Yes.

4014. I believe, when absent on leave from the office, the lymph has been sent to you for examination, so that it has all been subjected to your examination?—Yes, without exception.

4015. What is the source of the humanized lymph which is distributed from the National Vaccine Establishment?—We derive it from various public vaccinators throughout the country; some have been specially appointed, and when we have been hard pressed, we have derived it from men whose vaccination was considered to be of high quality. The list is given each year in the Board's report.

4016. Are they public vaccinators who vaccinate from arm-to-arm?—Yes.

4017. And those are generally chosen who have special opportunities of selection from the large number of children they vaccinate?—Yes.

4018. How is the lymph received?—In tubes, with slight exceptions.

4019. Are empty tubes supplied to vaccinators from your establishment?—Yes, we supply all the apparatus necessary.

4020. Besides tubes, what do you supply?—Small slips for putting the tubes in from each individual source, so as to keep them quite distinct; and boxes for sending them up in; and canvas envelopes, and so on, I have brought some of the slips here so that you might see the sort of thing they are. The name of the station, the date on which the tubes were charged, the total of tubes from the case, and the number of the case appearing in the public vaccinator's register are filled in on that slip, so as to render it easy to trace the child from whence the lymph came.

4021. This is filled in by the public vaccinator before he returns it to you?—Quite so. All the lymph from any one child is kept distinct.

4022. (*Mr. Meadows White.*) Does each tube only contain the lymph from one child?—Yes. There may be two or three tubes of lymph from any one child, but they are never mixed by any chance.

4023. (*Chairman.*) I see upon that slip there is a number, which you say is filled in by the public vaccinator; what number does that correspond with?—That is the number of the child in the Public Vaccinator's Register. He enters therein full particulars of the residence of the child, the date when it was vaccinated, the source of the lymph and various details. Opposite the child's name there is a number prefixed, and that number is put on our slip.

4024. Is such a register kept by every public vaccinator?—By every public vaccinator.

4025. So that if it were properly kept you would see the source from which the lymph was taken with which the child was vaccinated?—Yes.

4026. At the office of the National Vaccine Establishment of the Local Government Board do you keep an account of the particulars of the lymph received?—Yes, I have here the book in which we keep it. There is for each individual station, an entry of the date on which the lymph is taken, the date on which it was received, and the number of the source.

4027. Is any examination made by you of the tubes? Yes, every tube is examined.

4028. In what way?—As a rule every tube is examined under the microscope. Occasionally when I am very hard pressed for time tubes that you can see at once are opaque are not examined under the microscope.

4029. Are they examined on their reception?—Yes, within a few days. There are certain days only in each week when the public vaccinators are taking lymph, and it is received by us in batches; my examination therefore extends over every day in the week.

4030. Are the tubes examined only when they are received or are they examined again before distribution? They are re-examined just before distribution to see that there has been no change making the lymph opaque.

4031. Under what circumstances do you reject tubes, that is to say, not distribute them for use?—If the lymph in a tube is not clear, or if it contains any trace

of blood, or foreign matter, or if the tube is not hermetically sealed, it is rejected.

4032. Do you reject the tube if there is insufficient lymph in it?—Yes; that, of course, would be quite a minor point.

4033. What becomes of the rejected tubes?—We keep them in the office for three months in case any of the vaccinators are dissatisfied with my decision and would like to see them, and then if no question has been raised they are destroyed.

4034. Do you give notice to the public vaccinator?—Yes; from time to time we give him notice. I have here the form in which we give him notice. It gives the date on which the lymph is taken, the number of the source, and the reason for rejection.

4035. So that whenever there is a rejection the public vaccinator has notice of it, and has notice of the reason?—Yes; that I might perhaps explain is limited to those tubes which are not paid for. There may be tubes that are rejected either when they are looked at a second time just before sending out, or it may be that there is a very small quantity of blood in a tube, and it would not be fair to the public vaccinator, who is not expected to examine every tube under the microscope, to deduct it from payment.

4036. That is to say, you may reject some tubes as a result of your examination for which, nevertheless, he is paid, and of which therefore you do not give him notice?—Quite so.

4037. The notice is given to him as explaining the reason why the tube has been rejected, and therefore not paid for?—Yes.

4038. So that when you reject the tube on inspection, when you receive it, you would, as a rule, give this notice?—Yes.

4039. I understand that each public vaccinator receives 9*d.* for every tube accepted by the Board?—Yes, that is so.

4040. When you distribute the lymph do you keep a record of the source and the name of the station?—Yes. I have brought the book to show you; it gives the name of the applicant and his address. All the applications are collected each day and put into a separate cover.

4041. The calf lymph distributed comes wholly from the Board's animal vaccine station in Lamb's Conduit Street, does it not?—Yes.

4042. How is that supplied?—On points. We send up uncharged points and they are returned charged. These are the points.

4043. (*Professor Michael Foster.*) Is the calf lymph supplied exclusively by means of points?—Except in cases where lymph for the vaccination of a calf is required, and then we send it in tubes.

4044. (*Chairman.*) To whom is the lymph distributed?—To any registered medical practitioner in this country, and also to practitioners abroad. Any medical man writing from abroad will have a supply. It is also sent to the Navy Medical Department and to various Colonial Officials, Civil and Military, Secretaries, and Medical Officers, and so on.

4045. Do you distribute either calf or humanised lymph as it may be applied for?—Yes.

4046. Do you only supply on application or do you supply sometimes without application?—There are certain Colonies, that have a periodical supply without making a fresh application on each occasion.

4047. Do you supply private practitioners as well as public vaccinators?—Yes.

4048. What is the amount of the supply which you afford on application?—If any special quantity is asked for we endeavour to meet the demand as far as we can; but, as a rule, we send out one or two tubes to a private practitioner, or two or three, or if it is specially required, four tubes perhaps to a public vaccinator. As to points we send out two, four, six, or eight, or a dozen, according to the requirements of the applicant.

4049. Do you endeavour to obtain from the vaccinators who receive the humanised lymph from your department a report on any departure from the normal in the vaccination?—Certainly. We are anxious to know as far as possible the result, although we do not ask them specially to report upon it, but in a case of calf lymph being supplied there is a special form on which we apply for information as to the results.

4050. Has calf lymph been supplied during the whole time that you have been at the national vaccine station?—No.

4051. That is more recent?—Much more recent. 1881 was the first time calf lymph was supplied.

4052. (*Mr. Savory.*) Have you any practical acquaintance with the operation of vaccination itself?—I have seen vaccination but I do not pretend to have any knowledge of it.

4053. Do you recognise any difference between the lymph obtained from the human subject and the lymph obtained from the calf?—The calf lymph contains blood I have noticed.

4054. More frequently than humanised lymph?—Oh yes.

4055. Is it a rule that calf lymph contains blood?—Yes, I fancy it is.

4056. Is the blood in calf lymph sufficient in quantity to be recognised by the naked eye, or can you only recognise it by the microscope?—You can very often recognise it with the naked eye.

4057. It gives a distinct tinge?—Yes.

4058. What is your test for the presence of blood in lymph in extremely minute quantities?—I determine it for humanized lymph in tubes, by the microscope.

4059. In what way?—The microscope has a flat glass field, and underneath there is white paper. It is in the tubes, and you get great reflection of light on the surface of the tube, unless you specially guard against it as far as possible. A strong light is thrown up from underneath, in excess of the light on the surface of the tube; the tube is passed underneath the object glass; and I rotate the tube as I slowly pass it underneath.

4060. To look for blood?—For blood corpuscles.

4061. (*Mr. Savory.*) The red cell?—Yes.

4062. You hold the presence of those in the lymph to be a ground of objection?—My instructions are that it is an objection.

4063. But, apart from the structure of the lymph itself, have you any experience of any difference of effect between vaccinating from calf lymph and vaccinating from humanised lymph?—No, I do not know that I have at all from our reports.

4064. From your knowledge would you say that the effects are different?—I have no knowledge on the point.

4065. (*Professor Michael Foster.*) What power do you use?—For the purposes of examination as regards payment, an inch; but for other purposes a quarter of an inch.

4066. What power do you use to look for the presence of blood?—A quarter of an inch. I am not able to use any higher power unless the lymph is blown out.

4067. The presence of how much blood determines you to reject a specimen?—If I saw a single corpuscle in a tube, it should not be sent out.

4068. Have you formed any estimate as to how far you can judge by your method of the presence of blood in the tubes?—On one occasion I took some to Professor Burden Sanderson with a view to ascertain whether we could learn anything from him as regards opacity, and he said, "I cannot understand how you "can have found out this. Under my very high power "I very rarely in the field get a single blood corpuscle, "and yet you have marked it blood." In his estimation my examination was a pretty good one.

4069. Are you able to make any numerical statement as to what is the limit of your power of detecting blood?—No, I could not do that. The examination in practice can be only carried to the point short of blowing the lymph out of the tube. I have never knowingly sent out a tube of lymph with a single blood corpuscle in it.

4070. Have you been able to form any judgment as to how accurate your method is? Supposing that the matter were blown out and very carefully examined by millemètres under the microscope what difference would you expect to find between your method and that method?—I should expect it would be on a very rare occasion only that I had passed one. I do not know that I have ever tested it in that way.

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4071. You have great confidence that lymph, which you say is free from blood, is free from blood?—I believe so; I have every confidence.

4072. (*Mr. Savory.*) Do you happen to know what is the diameter of the lymph tube?—It varies very much. I have here a box of tubes and you will see that they vary greatly.

4073. (*Chairman.*) You cannot say what would be the maximum or within what limits the variations would be?—No, I do not know that I could.

4074. (*Mr. Meadows White.*) Are those, which you have brought, tubes of the ordinary size?—Yes. I think you might take that as a perfectly fair sample. I simply went to the cupboard where they are kept and took out the first box that came to my hand.

4075. (*Professor Michael Foster.*) What do you look for, besides blood, when you examine under the microscope?—If the lymph is at all opaque it is placed on one side; or if under the microscope it shews granular bodies, the like, and the lymph is put on one side.

4076. You put on one side all the lymph that is opaque to the naked eye?—Yes, to begin with.

4077. Then in the lymph in a tube which to the naked eye is apparently clear you look for blood corpuscles?—Yes.

4078. What else do you look for?—Extraneous bodies. I have found for instance various things in the lymph. One of the commonest things is pearl powder, which I fancy, they put on the child's arm.

4079. You have no difficulty in recognising that?—No difficulty. Then I find dust that may have got into tubes which perhaps have not been carefully kept; or I may find the shreds of a child's clothing, a piece of cotton or a piece of wool: but such particles are very minute.

4080. (*Chairman.*) But still they are recognisable under the microscope?—Yes.

4081. (*Professor Michael Foster.*) They would escape the naked eye but are recognisable under the microscope; all those tubes you reject?—Yes.

4082. How do you judge that the tubes are hermetically sealed?—Also by examination under the microscope. I can detect it very readily. Under the microscope I can trace the inside closing of the glass very clearly indeed.

4083. So as to find out whether the tube has actually been closed, you do not apply any test as to whether air can enter or issue?—No.

4084. Do you happen to know why tubes are used exclusively in the case of the humanised lymph and points exclusively in the case of the calf lymph, save when the calf itself is vaccinated?—There is difficulty, I believe, in getting the calf lymph out of the tubes, because it coagulates so much.

4085. Why do you have tubes when it is desirable to vaccinate the calf?—Those are my instructions, I do not know why.

4086. You have records of the calf lymph results?—Yes.

4087. Are they in your possession or in those of Dr. Cory?—They are in my possession. The reports are made on these sheets and a précis is subsequently made in a book.

4088. (*Chairman.*) Have you that book?—Not here.

4089. (*Professor Michael Foster.*) Are you able to express any opinion with regard to the relative efficiency of calf lymph and humanised lymph?—I have no practical knowledge of my own on the subject.

4090. I understood you to say that in all cases of calf lymph vaccination the results were sent back to your office?—Yes.

4091. (*Mr. Savory.*) Then you do know what the results are?—Yes. I thought you spoke of my own practical experience in the use of lymph.

4092. (*Chairman.*) These returns are in your department?—Yes.

4093. (*Professor Michael Foster.*) With regard to these points which you distribute, on what day of the progress of the vesicle in the calf are they taken?—Usually at 120 hours, and occasionally at 96 hours.

4094. Is that distinguished in your record?—Yes.

4095. How do the results of the calf lymph vaccination compare with the results of humanised lymph vaccination with regard to success?—We have not reports as to the humanised lymph returned to us at the office, only as regards the calf lymph, so that I could not make any comparison.

4096. Have you the per-centages of success?—I could get them out for you, but they vary immensely. With 50 points distributed on the same day from one calf to 8 or 10 different medical practitioners the reports as to the results obtained would vary greatly. There is no useful comparison to be made even as regards the lymph from any one calf, I fancy.

4097. (*Mr. Savory.*) It depends upon different vaccinators?—Yes. One gentleman will say that he failed at every single insertion from it; another that he has had excellent vesicles.

4098. (*Professor Michael Foster.*) Are those public or private vaccinators?—Both public and private vaccinators. I have never drawn any distinction between the public vaccinators and the private as to the results.

4099. Would it be possible to obtain data as to the calf lymph and the humanised lymph in the hands of the same public vaccinator?—Dr. Cory could give you information on that point in his own hands.

4100. If there were any untoward result from the calf lymph, would that be placed on record and contained in the record sent to you?—Yes.

4101. Have you had many statements to that effect?—Simply that there had been undue inflammation; nothing serious beyond that.

4102. Your records again will not permit you to make any statements as to whether there is undue inflammation?—No, not as regards human lymph.

4103. (*Mr. Savory.*) In perfectly pure healthy lymph what microscopic forms would you expect to see?—I should hope to see nothing.

4104. (*Professor Michael Foster.*) No white corpuscles or leucocyte?—No, I should hope not to see any.

4105. Would you object to a tube that contained leucocyte?—Yes.

4106. (*Mr. Savory.*) You would reject a tube that contained any forms?—Yes.

4107. (*Mr. Whitbread.*) You told us that it is possible that in these tubes blood should still lie without your being able to discover it with the power that you use; would it not be a satisfaction to try a certain number of tubes by blowing them out and making a more complete examination?—I have done that, and I have not found blood.

4108. To what extent have you done that?—I am speaking of 1872 and of 1873 when I was first appointed examiner; I did it pretty freely then. I could not tell you exactly the per-centage.

4109. (*Professor Michael Foster.*) That is to say, you verified your examination of the intact tubes by blowing out the material and examining it afterwards on the surface?—That is so.

4110. And that led you to believe that blood corpuscles in the lymph within the tube would not escape your notice by the method you adopt?—That was my impression, but, of course, I can conceive it as quite possible that I might unknowingly pass one.

4111. You might pass one on the surface when they were blown out, might you not?—Yes, certainly.

4112. You have been led to believe by your comparative trials that practically your method of examination of the lymph within the tube is as trustworthy as if you blew the lymph out?—It is as trustworthy I think as it is possible to be. I should not like to say that you would never find any blood, but I should think it would be quite the exception.

4113. (*Mr. Whitbread.*) When you say that you used that inspection of lymph blown out pretty freely, do you mean that you used it in ten cases in a hundred?—No, I did not do that.

4114. You do not use this method of examination now?—No.

4115. During the time that you were using it did you use it in one case in a hundred?—That would be at least 2,000 tubes or more. I do not know that I should blow out 200 tubes in a year; I should say not.

4116. Would you blow out 50?—I may have done it with 50.

4117. How is the tube charged?—By capillary attraction; after the vesicle has been pricked the lymph of its own accord runs into the tube.

4118. And it is simply blown out when it is used?—The ends are broken off and it is blown out.

4119. (*Mr. Meadows White.*) Is blood in calf lymph recognised as an objection?—I believe not. My instructions are not to that effect.

4120. What payment do you demand for the supply of lymph?—None whatever; it is entirely gratuitous.

4121. To foreign applicants?—Yes; there is no charge for any lymph distributed.

4122. There is no charge for any lymph to any person?—No.

4123. How are the tubes identified, by a paper put upon them?—Yes. In these slips the name of the station is inserted.

4124. (*Chairman.*) Is this slip pasted round the tube?—No; the tube is placed inside the slip.

4125. (*Mr. Picton.*) Are you responsible for the purity of the lymph; is your responsibility the highest for the purity of the lymph distributed?—To the extent of my examination, certainly.

4126. But if you approve it, then it is passed?—It is.

4127. And if there were any failure you would be responsible?—Well I do not know that I should be responsible, because, as I was saying with regard to the calf lymph, one gentleman will fail and another will succeed admirably. It depends, I think, very much upon the individual vaccinator quite apart from our lymph.

4128. I am only putting the case hypothetically, because I want to bring out quite clearly what your position is. If it were proved that in any case the lymph was poisonous to the subject of vaccination, would you be responsible for having passed bad lymph as good lymph?—I have no experience, but I assume that I should be reprimanded if it could be proved in any way that the lymph was not clear.

4129. That is to say, it depends entirely upon your decision?—Yes, as to the lymph going out.

4130. You are not a medical man, are you?—No.

4131. Your qualification is rather scientific, I suppose?—Yes. I have done a good deal of microscopic work; in fact, during the whole of my life I have been engaged entirely in distinguishing small differences. I am a student of Natural History, and I have collected multitudes of small objects.

4132. And it was as a microscopist, I suppose, that you were appointed to your present position?—Yes, in a measure.

4133. Have you made any special study of microbes?—No.

4134. Will you oblige me, as a non-professional member of the Commission, with a little further explanation about the blood. You said, in answer to one member of the Commission, I think Mr. Savory, that you could not pass any lymph that had a trace of blood in it, and from your use of the term "red corpuscles," I gathered that you meant, by blood only, red corpuscles; but afterwards, in reply to Professor Michael Foster, you said that you would reject it if it had white corpuscles; that is the case?—That is so.

4135–6. They are easily perceptible under the microscope, I suppose?—I would not say that they would be easily detected in the tubes.

4137. If you saw them you would reject the tube which contained them?—Certainly; I would never knowingly send them out.

4138. May I ask on what grounds you would reject lymph in which there were white corpuscles?—By instructions from the medical officer.

4139. Not upon any scientific grounds of your own?—No, entirely from my instructions.

4140. (*Dr. Collins.*) What do you conceive to be the advantages which the microscopical examination ensures?—It is to obviate sending out blood with the lymph.

4141. Are we to understand that blood is the only noxious agency that may reside in the lymph?—I am only acting up to my instructions as to what I am to reject.

4142. (*Chairman.*) I understand that you do not merely reject it if you see blood there, but you reject it if there is anything inconsistent with the absolute clearness of the lymph?—Yes.

4143. (*Professor Michael Foster.*) I understood you to say that if there were any discrete object visible by the microscope that led to its rejection?—Yes.

4144. (*Chairman.*) You cannot go into the question whether there may be something there, although the lymph is perfectly clear, which may be noxious; but if anything shows that it is not clear, you reject it whatever it is; is that so?—That is so.

4145. (*Dr. Collins.*) Does evidence exist to show that noxious and untoward consequences from vaccination are referrable to the formed constituents of the lymph?—I do not know.

4146. What power do you employ?—A quarter of an inch.

4147. (*Professor Michael Foster.*) How many diameters is that?—It is one of Baker's microscropes. I generally use the quarter with the B eye-piece; that is 312 diameters.

4148. With that you have no difficulty in seeing red corpuscles?—None whatever.

4149. (*Mr. Picton.*) Or in seeing a white corpuscle?—No.

4150. (*Professor Michael Foster.*) They are rather bigger?—Yes.

4151. (*Dr. Collins.*) I understood you to mention that you occasionally found granular bodies, and so on, in the lymph; would you reject lymph which contained such bodies?—Yes.

4152. Do you employ a condenser for your microscope?—Yes.

4153. I suppose it is not possible, under the circumstances in which you work, to employ an immersion lens?—No.

4154. With such power as you are able to employ would you be able to recognise or distinguish any micro-organisms which might be present?—No, I should not.

4155. Have any micro-organisms been identified, or stated to have been identified, for such a disease as erysipelas and so on?—I am afraid you are going rather out of my depth as a non-medical man.

4156. I understood you to be a skilled microscopist, and I thought that might have come within your knowledge?—To a certain extent; but I should not consider myself competent to give an opinion upon these points.

4157. Could you name any bacteriological authority on such a question?—Dr. Klein.

4158. (*Chairman.*) Is there a common consensus among bacteriological authorities upon the bacteria of particular diseases?—That is, I think, beyond my province.

4159. (*Dr. Collins.*) Is there any disease within your experience whose cause you can identify with such microscopical power as you employ?—Not that I am aware of.

4160. Can you detect any difference under the microscope between lymph from a healthy child and lymph from a syphilitic child?—I have never had lymph from a syphilitic child sent me to examine that I am aware of; I have never examined it.

4161. Could you detect it if you had?—I do not know at all. I never had it to examine, so that I could not tell you.

4162. How do you know that you have never received lymph from a syphilitic child?—I say so far as I know, of course.

4163. But your knowledge, I apprehend, would only extend to your microscopical inquiries?—Quite so.

4164. Is it possible to ascertain by microscopical inquiries whether lymph contains the virus of syphilis?—No, I do not say that it is.

4165. Do you consider that the examination by blowing the contents out of the tube and covering it with a cover-glass would be more complete than an examination such as you are able to institute?—I should assume so.

4166. I apprehend that if that were done it would be difficult to re-collect the lymph?—Quite; that is the obstacle.

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4167. Are you able to recognise any microscopical differences between vaccine lymph and ordinary lymph from an inflammatory surface?—No, I do not know that I could.

4168. Have you ever made any cultivations of the vaccine lymph?—No.

4169. Are you acquainted with Dr. Pfeiffer's experiments with regard to micro-organisms in lymph?—No.

4170. It may, perhaps, have come within your knowledge as a matter of interest that some time ago a prize was offered by the Grocers' Company of 1,000*l.* for the discovery of any vaccine contagion cultivated apart from an animal body?—Yes, I heard of it.

4171. That was in the year 1883, I think?—I do not know when it was.

4172. Do you happen to know whether the awards had been made?—I do not know at all.

4173. Having regard to what you have told us, do you think it would be possible, from the microscopical examination you made, to guarantee that any lymph was pure?—No; I should not undertake to say whether it would be a guarantee that the lymph was pure. I do not know that you could do it.

4174. Do you happen to receive any lymph from the public vaccinators at Brighton?—No, none at all.

4175. Never?—Never to my knowledge.

4176. Would it come within your knowledge if you had received any?—Yes; during the time I have been appointed.

4177. How many years back would that be?—1871 was the date of my appointment.

4178. I understand you to say that you asked for reports upon the results of the calf lymph sent out, but not of the humanised lymph?—No.

4179. What is the reason for the inquiry as to the results of the calf lymph in particular?—It was to a certain extent an experiment; it was a fresh departure on the part of the Government to supply calf lymph, and they were desirous of knowing how it was acting.

4180. Should we properly apply to you with reference to the source of that stock of lymph that was employed for the establishment of the calf station?—No.

4181. Who would be able to inform us?—Dr. Cory.

4182. Could you give us any idea as to the time it takes you to examine a tube of lymph?—It varies very much as regards the light that one has; and there are a great many circumstances connected with it that cause difference in the time.

4183. But could you give us any idea as to how many tubes you are able to examine in the course of a morning?—Of course if the lymph is very opaque one puts it on one side readily enough. It varies very much.

4184. Is it generally held that the blood is more pathogenic, or capable of conveying disease, than the other contents of the body?—I am afraid that is a question which, as I am not a medical man, I cannot answer.

4185. Is not the lymph derived from the blood?—I am afraid you are going still beyond my knowledge.

4186. (*Dr. Bristowe.*) I understand that all the lymph that is sent out can be identified and referred to the source from which it came?—Certainly.

4187. So that if any occurrence of syphilis took place apparently from lymph distributed by you, you would be likely to hear of it?—Yes.

4188. Have you ever heard of such an occurrence?—Never.

4189. (*Sir Charles Dalrymple.*) Did I understand rightly that lymph is sent to you for which, if it be good, you pay, and then you distribute it with its goodness guaranteed?—We take every practical precaution we can to ensure that the lymph is good.

4190. Is it only from public vaccinators that you receive it?—That is all. The calf lymph is from a special station.

4191. (*Mr. Meadows White.*) I think you said that only certain public vaccinators would be selected?—Yes.

4192. (*Sir Charles Dalrymple.*) Do you send lymph to private practitioners?—Yes.

4193. Is it necessary that they should receive their lymph from you?—Oh, no.

4194. Then there is not the same supervision of lymph in the case of private practitioners as there is in the case of public vaccinators?—The public vaccinators, of course, are under sanction by the Local Government Board, and from time to time their work is inspected by the Board's officers.

4195. (*Chairman.*) Do they all receive lymph from you?—Only when they desire it.

4196. (*Sir Charles Dalrymple.*) Then, although the Government office, so to speak, compels vaccination, it does not in all cases take security that the lymph is good?—I do not follow.

4197. I understood you to say, in answer to the Chairman, that all public vaccinators do not get their lymph guaranteed by you?—They do not all obtain it from us.

4198. (*Professor Michael Foster.*) Do not a large number of public vaccinators vaccinate from arm-to-arm?—Yes, and keep up their own supply.

4199. (*Sir Charles Dalrymple.*) I thought that where a public vaccinator was in the case you would have to guarantee the lymph that he used in all cases?—Oh, no.

4200. (*Dr. Collins.*) Are we to understand that, as a matter of fact, you have ever guaranteed lymph?—No.

4201. (*Sir Charles Dalrymple.*) Then is this inspection that you make of the lymph not a guarantee of the goodness of the lymph?—I would not say that.

4202. (*Professor Michael Foster.*) You guarantee that it is free from such blood corpuscles and such foreign matters as can be seen with such a high power microscope as you can apply to the tube without opening it, and you cannot do more?—No. I think all practical supervision is made of the lymph to ensure, as far as possible, that it should be free from foreign bodies or from blood.

4203. As far as can be ascertained without actually opening the tubes?—Yes.

4204. (*Mr. Savory.*) Have you any reason to believe that such lymph as you pass after examination involves in its use any risk?—No, not more than is involved in the process of vaccination.

4205. But would you hesitate to employ such lymph in the case of one of your own children?—Oh, no.

4206. You would consider it practically safe?—Certainly.

4207. (*Mr. Whitbread.*) May I ask what per-centage of tubes you discard?—It varies very much indeed. From some stations it has been 2 or 3 per cent. up to 60 or 70 per cent.

4208. What would the 60 or 70 per cent. contain for the most part?—Opaque lymph.

4209. Opaque lymph which you put on one side without troubling the microscope?—Occasionally that is so.

4210. (*Professor Michael Foster.*) We are not to understand that the same individual will always send 60 or 70 per cent. of failures?—No.

4211. That might be the per-centage in one particular batch?—It might be.

4212. For instance, from the same vaccinator you might have one batch in which you accepted all the tubes, and in the next batch he sent you you might reject a great many?—Yes, that is quite possible.

4213. (*Mr. Whitbread.*) Have you any reason to believe that arm-to-arm vaccination would give a purer lymph than that which comes to you for examination in tubes?—It is all from arm-to-arm vaccination that it comes to me. If they did not come up to the standard we wished we should discard them.

4214. (*Dr. Bristowe.*) We are not to assume that it is necessarily bad or ineffective lymph because it is discarded?—No; but very often with the opaque lymph there is a great difficulty in getting it out of the tube.

4215. (*Professor Michael Foster.*) Many of the opaque tubes, I suppose, are opaque from the coagulation of the lymph without the presence of blood?—Yes, no doubt.

4216. Have you any idea how many tubes you reject for mere opacity and how many you reject for the presence of blood?—The rejections solely for blood, I should think, would be about 2 per cent.

4217. And what would the rejections for opacity amount to?—They would range in the aggregate perhaps from 20 to 25 per cent.

4218. (*Mr. Savory.*) That is in the case of human lymph?—Human lymph.

4219. (*Professor Michael Foster.*) When your public vaccinator sends you the lymph tubes he fills them at the arm, and he seals them and puts them into a paper and sends them off?—Yes.

4220. It is only in rare cases that he has occasion to observe whether they may have coagulated and become opaque before he sends them off to you?—I should think it very probable that he rarely has the opportunity. Having charged them he puts them into the slip at once, and sends them up, and there is an end of it.

4221. If it is said that there is an enormous waste of good tubes at the vaccine establishment because they are simply opaque, it has not been proved that an opaque tube is an ineffective tube?—No.

4222. You reject the opaque tubes in order to be on the safe side?—Quite; that is the sole object.

4223. And in doing so you probably waste an enormous quantity of good lymph?—That is quite possible.

4224. (*Mr. Whitbread.*) There is no reason to suppose that in vaccination from arm-to-arm by practitioners, public or private, there is less danger of the transmission of blood corpuscles than there would be if you sent out all the tubes without examination?—No, I suppose not.

4225. And you have arrived at a general conclusion that in about 2 per cent. of the cases that you have examined blood is present; is that so?—Yes, that is so.

4226. (*Professor Michael Foster.*) How many points do you distribute in the course of the year?—The quantity is always given in the Board's annual report. Of humanised lymph sent out in 1888 there were 14,074 tubes and 3,991 points. The humanised lymph on points is habitually supplied by Dr. Cory alone. That is to meet the special request of some medical men who prefer it on points. Of calf lymph sent out there were 21,485 points and 107 capillary tubes.

4227. Do you happen to know how much vaccination a single capillary tube represents in the average?—I could not tell you absolutely the average number of vaccinations performed with one tube, but our tubes contain sufficient lymph, I think, as a rule, to vaccinate about four children.

4228. (*Dr. Collins.*) Do you or do you not think that a public vaccinator would send up to Whitehall for purchase, tubes which he would not consider desirable for use in his own practice?—I should think not, because he is only paid by results, and therefore I assume that he would be careful perhaps in sending us lymph.

4229. So that if a tube sent up by a public vaccinator were not a fair sample of such as he habitually charged, it would depart from that only by way of greater excellence?—I do not know that he would make any special selection for us, but I should not think he would send us the worst lymph.

4230. Do I rightly understand that some humanised lymph is sent out from the National Vaccine Establishment upon ivory points?—Yes.

4231. In such cases, I suppose, a microscopical examination is impossible?—Quite so.

4232. And the absence of blood, red or white corpuscles, would not be ascertained?—No; it is only a limited amount of humanised lymph that is sent out on points.

4233. (*Mr. Savory.*) When the lymph is placed upon the point you let it dry?—Yes, that is I, believe, the practice.

4234. Where do you put it whilst it is drying, before it is dry?—That I do not know.

4235. (*Professor Michael Foster.*) Do you dry in a warm chamber?—We have nothing to do with the drying; the points are sent to us charged.

4236. (*Mr. Savory.*) Do you happen to know what is done with a point directly after it is charged with lymph?—That I do not know.

4237. Do you know whether it is exposed freely to the air while it dries?—I believe they are all dried in the open air; and then are put into bags bearing similar information to the slips which contain the tubes.

4238. (*Mr. Meadows White.*) They are sent to your department for distribution, from Dr. Cory?—Yes. The drying is already affected before we receive them.

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4239. All the charging takes place under Dr. Cory's superintendence?—Yes.

4240. (*Mr. Picton.*) You said in answer to Dr. Collins just now, that the public vaccinators were paid by results for the tubes that they sent up; do you mean by results the effect produced by them in vaccination?—No, by passing my examination.

4241. How long a time would usually elapse between the charging of these tubes and your examination of them?—That would vary very much indeed. Last week I could scarcely examine any on account of its being so foggy, but I should think you might take it as a fair average that I should examine them within a week.

4242. Do you find that those that have been left longest have the greatest per-centage of opacity?—Yes, that is so.

4243. How do you explain the opacity; what is the cause of it?—That I do not know.

4244. You have not studied that?— I think that is a point that we should like to know very much more about.

4245. Does there not exist already in every one of these clear tubes the cause that will produce opacity afterwards if it is left long enough?—Not of necessity.

4246. If your tubes were left for a fortnight would they all be opaque?—Oh dear no.

4247. Would a large proportion of them be opaque?—I have seen tubes that have been kept over a year, perfectly clear.

4248. But still they would have a larger proportion of opacity than fresh ones, I suppose?—There would always be a chance of that.

4249. (*Professor Michael Foster.*) The tube may often be perfectly clear for at least a year and, so far as you know, for a much longer time?—Yes.

4250. Absolutely as clear as upon the day upon which it reached you?—Yes.

4251. The changes which lead to opacity have not taken place?—No; and lymph that we have sent out has been kept two years in India and then used with perfect success.

4252. And you infer because it was used that it was perfectly clear?—Yes, that there had occurred no obvious change in it.

4253. (*Mr. Picton.*) Although the tubes are hermetically sealed, they do include some air, do they not?—Yes, a very small quantity.

4254. (*Mr. Meadows White.*) Is there more or less risk of blood finding its way into the lymph in charging a tube or in charging a lancet?—I could not tell you.

4255. (*Professor Michael Foster.*) You would be rather inclined to think that more blood would go up into the capillary tube than on to the flat surface of a lancet?—You generally find the blood distributed along one side of the tube. The tube has been held sometimes against the vesicle, and the lower part of the tube would be deeper in the vesicle, I assume.

4256. (*Mr. Whitbread.*) If the blood was found distributed upon one side of the tube, that would look as if you incurred danger in dipping the point of the lancet in, would it not?—Not of necessity, I think.

4257. If the blood appeared at the lower end of the tube I could understand that it was owing to the longer immersion of the tube and the capillary attraction, or whatever it is, would have brought up the blood from below, or from some other part; but if the blood appears distributed along one side of the tube, surely it looks as if the blood accompanied the lymph all through?—I assume that it has been from the tube being inserted too deeply.

4258. (*Mr. Savory.*) And the degree of the puncture, I suppose, into the vesicle?—Yes.

4259. (*Dr. Bristowe.*) I suppose the blood would tend to coagulate, and so carry the red corpuscles with it?—Yes, that is the process in an open vessel.

4260. (*Sir James Paget.*) Is the blood seen to flow into the tube?—No, I mean individual red corpuscles like beads.

4261. But you see them some little time after the tube has been charged?—Yes.

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4262. Would not it be that the red corpuscles gravitate just as they do in an ordinary clotting?—No, not of necessity. I am disposed to think they enter something along the lower side of the tube, and cling, as it were, to that wall.

4263. (*Professor Michael Foster.*) It might be deferred so long that blood corpuscles had time to settle, and in that case if the tube had been placed too horizontally the corpuscles would all be on the bottom side?—It is possible; but sometimes you will find the individual blood corpuscles floating in the lymph.

4264. (*Mr. Savory.*) But, as a matter of fact, the blood cell is heavier than the lymph?—I imagine that it is so.

4265. (*Chairman.*) That means that, if the tube containing the lymph were put down horizontally, the tendency would be for the blood to be found in that part of the tube which had been the lowest?—It may be so.

4266. (*Mr. Meadows White.*) I understood you to say that it came up one side of the tube, but not all the way up the tube?—Up the lower side for some distance.

The witness withdrew.

Mr. Robert Cory, M.D.

Mr. ROBERT CORY, M.D., examined.

4267. (*Chairman.*) You are the director of the Animal Vaccine Station?—Yes.

4268. And you are one of the instructors in vaccination for the Local Government Board?—Yes.

4269. You hold the first appointment on the Institution of the Animal Vaccine Establishment?—Yes.

4270. What date was that?—The 9th of March 1881.

4271. That institution was established with a view of supplying calf lymph, was it not?—It was.

4272. Will you be good enough to describe to the Commission the arrangements of the Animal Vaccine Establishment with regard to the calf lymph?—With respect to the calves coming to the station, there are five calves vaccinated every week, two calves on the Thursday, two calves on the Saturday, and one calf on the Tuesday.

4273. By whom are they vaccinated?—By myself, or by the assistant director. The lymph is generally taken from the calves five days after the vaccination. Human lymph is fully matured on the eighth day; but in the calf the course is more rapid, and we take the lymph on the fifth, or even the fourth day, and in that way we get an odd number of days instead of an exact week, between inoculation and lymph-taking. That makes it necessary to vaccinate three days in the week in order to get the lymph for the Tuesdays' and the Thursdays' calf to arm vaccination of children.

4274. What is done with the lymph taken from them?—The lymph is partly used for calf to arm vaccination at the station, partly sent up to the Local Government Board.

4275. On points we are told?—Yes, on points. Sometimes it is sent in tubes, but that is when people want it for the vaccination of calves.

4276. And the points are distributed by the Local Government Board?—They are sent out to practitioners requiring them.

4277. And the records of the success or failure of the operation, and the circumstances connected with it, are sent to the Local Government Board?—They are, by the practitioners using the lymph.

4278. What is the origin of the lymph that is used for the vaccination of the calves?—It was some lymph that was sent over to England by Dr. Dubreuilh, who obtained it from a village called Laforêt near Bordeaux. Dr. Dubreuilh obtained that lymph and sent it on to us after the seventeenth calf had been vaccinated from the original source. That lymph has been used at Lamb's Conduit Street, and continues to be used at the present time.

4279. Do you know whether that was from the natural cowpox?—That was from what is generally termed spontaneous cowpox, that is as it occurs first in the cow.

4280. (*Professor Michael Foster.*) And has passed through the cow only?—That is so. The lymph that we are using has never been humanised.

4281. (*Chairman.*) Has that lymph been used during the whole time?—No; before March, 1882, the lymph stock was that established by Dr. Carsten of the Hague, and at that date the stock was exchanged for the Laforêt lymph. This has been continuously used to the present time. Then for a limited time, another stock of lymph was set up alongside the other for the sake of comparison. We used it, I think, on 89 calves.

4282. Where did that come from?—Dr. Simpson supplied it to us from Aberdeen.

4283. (*Sir James Paget.*) From the calf?—From the calf, I think.

4284. (*Professor Michael Foster.*) What was the origin of that lymph?—I am not able to speak definitely as to its earlier origin. Dr. Simpson, who afterwards became the medical officer of Calcutta, sent it to us, and it was upon his guarantee that we used it.

4285. His guarantee, of what?—That the lymph was vaccine lymph.

4286. That it was calf lymph, and had not passed through any human being?—I understood that.

4287. (*Dr. Collins.*) Was that lymph used for the vaccination of children or only for calves?—Children were vaccinated with it after it had passed through the calf.

4288. (*Dr. Bristowe.*) Is that lymph still employed?—No, it is given up entirely now.

4289. Why?—The effect of the one was better than of the other. The vesicles produced by the lymph that we obtained from Dr. Dubreuilh were better vesicles than those produced by Dr. Simpson's lymph.

4290. (*Chairman.*) The latter was only used to a limited extent, as I understand?—Only to a limited extent.

4291. (*Dr. Bristowe.*) Still it was efficacious?—It produced characteristic vaccine.

4292. (*Chairman.*) Besides your duties in reference to the calf lymph have you had to do also with arm-to-arm vaccination with humanised lymph?—Yes, I do that at Surrey Chapel at the present time.

4293. Is that a vaccination station?—Yes.

4294. Are you there acting as a public vaccinator?—I am there also under the Local Government Board. Certificates are at that station given to students after six weeks' instruction, and to medical practitioners on passing an examination in their knowledge of vaccination.

4295. That is where the instruction and examination in vaccination goes on?—Yes.

4296. It is a vaccine station kept up for educational purposes?—It is.

4297. Is that the only one, or are there other educational stations?—There are other educational stations in England. I have dotted them down in red on a Bradshaw's map, which will show them at once.

4298. About how many of them are there?—There are 13 stations in the United Kingdom.

4299. Is evidence of having attended at one of those stations required of those who seek to hold the office of public vaccinators?—Yes; and at the present time all the examining boards have made it compulsory that their students shall have a certificate of having been taught the practice of vaccination before they are admitted to pass the final examination; so that the men requiring the particular form of certificate on examination are becoming fewer and fewer.

4300. We have been told that besides the lymph that is distributed in tubes by the Local Government Board some lymph is distributed on points which are received from you; how is that lymph obtained?—That lymph is obtained from children at the station where we use human lymph.

4301. That is the station at Surrey Chapel which you have referred to?—Yes.

4302. Will you tell the Commission how that lymph is put upon the points?—The child's arm is pricked, and then unless blood flows (we are always very careful not to take any blood upon the points), the points are

dipped into the lymph that wells up in little globules and the points are allowed to dry for 10 or 20 minutes.

4303. (*Professor Michael Foster.*) In the ordinary air?—Yes.

4304. (*Chairman.*) Then all the lymph that is supplied on points comes from what I may call the education station of the Local Government Board?—Yes, quite so, except the lymph that comes from the calf lymph station.

4305. All the humanised lymph comes from that particular station?—Yes, all that I furnish on points. I believe that is the only station from which they habitually receive dried lymph upon points.

4306. Who takes that?—I take that personally.

4307. Or your assistant?—No, there is no assistant in the matter. I always take every point at Surrey Chapel.

4308. (*Sir James Paget.*) Do you take it from selected children?—I select the children myself.

4309. From those you have vaccinated you select those as to whom you are most sure of good health?—Quite so; and before taking any lymph I always examine their buttocks and other parts of the body where eczema or other skin disease is likely to be found.

4310. Do you often find those parts alone affected in a child that looks generally healthy?—Yes; I should think almost every day I reject one that I might have taken lymph from if I had not seen its lower parts.

4311. You spoke of the lymph being more or less good; is there any test of the goodness of the lymph except the kind of vesicle and scar which it produces?—Of course I am only giving now my own individual opinion. I believe that is the only test you can get. There are also the microscopical tests which are used, and their tendency is no doubt to cause the rejection of a great deal of good lymph.

4312. Has it ever been observed that small-pox has prevailed in a district where one kind of lymph has been used and not in another where another kind of lymph has been used?—Not that I know of.

4313. In reference to the comparison between lymph from the calf and that from the child, what observations are there as to one being better than the other?—So far as I am able to judge I think you could not tell the difference between them. If you have a dozen children vaccinated with calf lymph, and a dozen children vaccinated with humanised lymph, you would not be able to tell the difference between the two.

4314. Is the calf lymph that you have now at Lamb's Conduit Street entirely derived from that one source that you speak of in France?—Yes.

4315. You have never had it from any other natural cow-pox?—With the exception I spoke of.

4316. You are not sure about that?—No; I should except a source got last year from Gloucestershire, carried on for a short while side by side with the ordinary stock, and used in the vaccination of one or two children.

4317. Nor have you ever had it, I suppose, from a cow that had been variolated?—No; some attempts of my own at direct variolation of the cow and calf were made elsewhere than at the station.

4318. Have you used lymph from a cow that had been inoculated with small-pox?—I believe that was the origin of Dr. Simpson's lymph.

4319. Was that inoculation done in India?—No; it was obtained in Aberdeen.

4320. From a cow which had been inoculated with small-pox?—Yes.

4321. And then carried on through several children?—No, at first through the calf.

4322. From the cow to the calf and then by successive removes from calf to calf?—Yes; I should say that the lymph we afterwards used upon children never produced anything but vaccine. There must have been a great many children vaccinated from the lymph, and it never produced any other effect but vaccine.

4323. You mean by that, the eruption?—Yes, the places on the arm, and they were not small-pox. And there is no instance of contagion having taken place from one child to another at that time, after the manner in which small-pox is propagated.

4324. May we suppose that if this were a case in which a cow was inoculated with small-pox and the lymph then transferred to the calf and onwards from one calf to another, that produced nothing in children finally but the ordinary vaccinia?—Quite so.

4325. You never saw any suspicion of other pustules about?—No, none whatever.

4326. Have you any knowledge of how many removes through the calves had taken place before the lymph was used upon the children?—Two removes I know of, but I do not remember how many had taken place before we got the lymph.

4327. Have you known of any other case of what is called the variolation of the cow?—Only by reading.

4328. You have never had it experimented upon within your own knowledge?—No, I have tried it myself, but I have never succeeded in producing any vesicle on the bovine animal.

4329. But you think there is good reason to believe that Dr. Simpson's lymph was derived from a cow which had been inoculated with small-pox?—I believe that it was.

4330. And you never saw any mischief following?—No, and the first cases especially were very carefully observed.

4331. (*Mr. Savory.*) May I ask you upon what evidence you say that in Dr. Simpson's case the lymph was due to the inoculation of the cow by small-pox?—I got it from notes that were taken by Mr. Murphy at the time, and I had forgotten the circumstance, until I looked the matter up and saw his notes.

4332. Did he witness the actual facts?—No, I do not think he witnessed the earlier procedures of Dr. Simpson, but the notes in his handwriting are of the information we obtained from Dr. Simpson at the time.

4333. Do you know of any other case in which a similar experiment has been performed successfully in which the cow has been inoculated with small-pox?—Only from general literature.

4334. But you know of no other experiment of this sort?—No, only from my reading.

4335. I understand you to say that whether a child were vaccinated with lymph obtained directly from the calf or with lymph obtained from another child, you would be unable to distinguish the difference?—Yes.

4336. Practically the result is the same?—Practically it is the same.

4337. And you, of course, have had considerable experience in the matter?—I have vaccinated a little under 50,000 children.

4338. And I gather, therefore, that your opinion would be that it was a matter of comparative indifference which lymph was used?—Yes.

4339. Have you any choice yourself?—No.

4340. You think that it is a matter of absolute indifference?—I think it is.

4341. (*Sir James Paget.*) Do you use only calf lymph at one station, and only child lymph at another?—Quite so; but I should tell you that the lymph has been changed at Surrey Chapel, the place where we use the humanised lymph, and we are now using there what is a descent from the calf lymph.

4342. (*Mr. Savory.*) You know that there is an impression amongst some that when a child is vaccinated directly from the calf the results are rather more severe than when it is vaccinated from another child?—Yes, I have often heard that. The reason I think is that the calf lymph has generally been got in England from Dr. Warlomont, and that he takes his lymph on the eighth day, the same day as we take lymph from the child. But that is unduly late. The lymph when you take it late from the calf produces inflamed vesicles.

4343. That would be your explanation of the difference?—It would.

4344. What do you consider to be the best time for taking lymph for vaccinating from a child or from a calf?—On the eighth day from a child and on the fifth day from a calf.

4345. Supposing that the operation is delayed, as it very often is perhaps to the ninth day, do you think that the lymph deteriorates materially in the 24 hours? I am desirous of protecting lymph from organisms that may get access to it. I am now speaking of calf lymph. When a cow is vaccinated there is a lot of straw about, and from that foreign organisms may get upon the lymph, and give rise to abnormal results. So I would not risk the rupture of a vesicle.

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4346. So far as the lymph is concerned that would not make a material difference?—No.

4347. Is it because the changes are more rapid in the vesicle in the calf than in the human subject that you prefer to take the lymph from the former on the fifth day and from the latter on the eighth day?—Yes; and I think one reason of it is this: that the temperature of the calf is one degree and a fraction higher than the temperature of a human infant, so that I believe it is the higher temperature that hastens the vesicle.

4348. The changes which the vesicle on the calf undergoes are more rapid?—Yes, you see that in the vesicle.

4349. That is not a matter of inference but of observation?—Quite so.

4350. (*Professor Michael Foster.*) The whole thing goes on more rapidly in the calf?—It does.

4351. Of course there are several other differences to be considered in the calf besides the mere difference of temperature, which may also have to do with this matter?—Quite so.

4352. I understood you to say, in answer to Sir James Paget, that you believe the reason why the symptoms were supposed to be more serious with calf lymph than with humanised lymph was because in so many cases Warlomont's calf lymph was used, and Warlomont's calf lymph was taken on the eighth day?—Yes.

4353. Your lymph is a different strain from Warlomont's lymph?—Yes.

4354. Warlomont's lymph, I believe, came from Italy originally?—I believe it did.

4355. It was brought by Lanoix from Naples?—Yes, I have heard so.

4356. That is a different strain altogether?—Yes, I believe it is.

4357. Do you know that your strain will, as you say Warlomont's does, produce more inflammation if the lymph is taken on the eighth day?—I do not insist upon that. I have used Warlomont's lymph, and I know that that does produce inflamed arms.

4358. Have you tried Warlomont's lymph taken on the fifth day?—No, I have had none. I do not believe he generally distributes it.

4359. So that it is a matter of opinion on your part with regard to that being the cause of the greater inflammation?—Yes, so far as his lymph is concerned.

4360. In your case you do not find that amongst the infants vaccinated with your calf lymph there is greater inflammation or greater tendency towards untoward results, such as ulceration, than with humanised lymph?—I do not believe you would at the date of inspection tell the difference between the effects of the humanised lymph and those of the calf lymph.

4361. And that has been the case from the beginning?—Yes.

4362. That was the case with the first calf which you vaccinated from?—Yes, I should say so as regards the Laforét stock.

4363. (*Chairman.*) Could you give us any idea of the comparative number of cases of vaccination performed with calf lymph and with humanised lymph?—I think that of my own vaccinations over 15,000 have been performed with the humanised lymph, and about 32,000 with calf lymph.

4364. (*Professor Michael Foster.*) You said, did you not, that your calf lymph has been going on since 1881?—Yes.

4365. And when you began it was the seventeenth remove from the so-called spontaneous case?—Yes, that was in 1882.

4366. Has that case been published?—Yes, I think it has.

4367. Do you know where?—Dr. Hervieux, I fancy, gave a description of the lymph in the "Weekly Gazette of Medicine and Surgery of Paris."

4368. Was that about the year 1880?—It was, I believe, on January the 26th, 1882.

4369. You know it has been asserted that lymph taken from the cow does lead to greater inflammation and has a greater tendency to produce ulceration than lymph which has been, so to speak, humanised?—Yes, as regards the cow.

4370. Your experience leads you to reject that view?—Yes, it does. I have here the number of the cases that have been vaccinated at the calf-lymph station during different years. From 1882 to 1883 there were 614 cases; from 1883 to 1884 there were 1,294 cases; from 1884 to 1885 there were 2,901 cases; from 1885 to 1886 there were 4,054 cases; from 1886 to 1887 there were 5,591 cases; from 1887 to 1888 there were 6,151 cases; from 1888 to 1889 there were 7,067 cases; and from April 1889 to the end of September this year there were 4,330 cases; making altogether 32,002. We hear of almost every bad case, I believe. We give each parent these cards, specimens of which I have here. The red card is given on the day the vaccination is performed, and the black card is given on the day week, and in that black card there is this direction:—"If, as sometimes happens, owing to the child's state of health, the arm does not heal up readily, the child shall be brought back to the station." Every parent has this direction; and it is my belief that we get, comparatively speaking, a larger number back with sore arms at the calf station to what we get at Surrey Chapel, where humanised lymph is used.

4371. (*Mr. Meadows White.*) Is that card only delivered to those vaccinated with calf lymph?—To both.

4372. (*Professor Michael Foster.*) What proportion of cases were brought back with various complaints?—I do not find that any cases were brought back till 1884 to 1885.

4373. (*Sir James Paget.*) Are these cases in which calf lymph was used?—Yes. Between 1884 and 1885 there were 2,901 cases, and 22 cases were brought back; that is ·75 per cent. From 1885 to 1886 out of 4,054 cases there were 37 brought back with complaints; that was ·91 per cent. From 1886 to 1887 there were 5,591 cases, and 64 were brought back, being 1·1 per cent. Between 1887 and 1888 out of 6,151 cases 80 were brought back, being 1·3 per cent. From 1888 to 1889 there were 7,067 cases, and 60 were brought back, or ·98 per cent. From April 1889 to the end of September this year there were 4,330 cases; 60 were brought back with complaints, making 1·4 per cent. So out of 32,000 the number brought back for complaints was 1·009 per cent.

4374. (*Mr. Meadows White.*) Have you a similar table for human lymph?—No.

4375. (*Professor Michael Foster.*) You have not the corresponding result in the use of human lymph?—No.

4376. Were any of those cases serious ones?—I classify them thus: sore arms, eruptions, erysipelas, and axillary abscess. Out of the 323 cases brought back 260 of them were for sore arms, unhealed arms.

4377. That means an unwillingness on the part of the sore to heal?—Yes, or so supposed by the parent.

4378. (*Sir Edwin Galsworthy.*) Not any extension of inflammation?—No; very often it was from the parent not knowing what a vaccination sore looked like in the second week.

4379. (*Sir James Paget.*) It was not what you yourself would call a serious ulcer?—No.

4380. (*Professor Michael Foster.*) Would there be any large amount of induration with that apparent unwillingness to heal round the edge of the sore?—I should say there was some induration in that class of cases.

4381. (*Chairman.*) Could any of those cases have arisen from the way they had been treated, from rubbing off or want of care?—The majority of them are occasioned by the mothers putting on applications which they had better not put on; there is "lions' plaster," for instance. I do not know what it consists of; that is a favourite method of treating vaccine vesicles. You would be astonished to see the hideous stuff some people will make up in a pot and put on to the places; they cannot let the vesicles alone.

4382. (*Professor Michael Foster.*) To the best of your belief if those arms had been properly treated they would have healed up in due time?—Yes, in the great majority of such cases they would have healed up in due time if they had been left alone.

4383. (*Sir James Paget.*) You ascribe the sore arms to the treatment rather than to the vaccination?—Yes. Then 38 are returned for eruptions of various kinds.

4384. (*Professor Michael Foster.*) Is there anything special about those eruptions? — No; eczema and lichen.

4385. Nothing that you could say was an eruption peculiar to previous vaccination with calf lymph?—No; I may say as regards these eruptions after vaccination, that there is one which is, I think, almost peculiar to it, that is something between an urticaria and an eczema. Little blisters are formed on the surface of the skin, and I have three times seen children have that very severely.

4386. That is not special to calf lymph?—No.

4387. (*Chairman.*) Does that eruption come and go in the same case, or come and then disappear?—The child may have a return of the eruption during dentition.

4388. (*Sir James Paget.*) It would recur quite independently of vaccination in the same child?—Yes; during dentition three months after it was vaccinated this form of eruption might come again.

4389. (*Dr. Bristowe.*) How long would the eruption last?—About a fortnight.

4390. (*Chairman.*) Will you proceed with your next figures?—Out of the 32,000 cases, as I have said, there were 260 with sore arms and 38 with eruptions. Then there were 16 cases of erysipelas, and nine of axillary abscess.

4391. Does that complete the total?—Yes.

4392. (*Mr. Savory.*) Those were attacks; were there any deaths?—Eight deaths were reported to the station of children who had been vaccinated. The first one was vaccinated on the 3rd of March 1885, and the date of death was the 9th of March 1885, the death being certified as convulsions. In the case of the second death, the child was vaccinated on the 28th of April 1885 and died on the 12th of May from confluent small-pox; it was vaccinated late in the incubation period of the small-pox, the small-pox appeared about the fifth day after vaccination.

4393. That could not be ascribed to vaccination?—No. These are the eight cases of deaths reported to the station, and vaccination was accused of the death in each of the cases.

4394. (*Mr. Picton.*) Did vaccine vesicles appear in that case where the child died from confluent small-pox?—No.

4395. There was no result from vaccination?—No, it was only accused of the small-pox death. Then as to the next death the child was vaccinated on the 13th of August 1885 and died on the 10th of October. I heard from Dr. Webb that it had died, and that death was attributed to vaccination, but I did not ascertain what it had really died of.

4396. (*Sir James Paget.*) It died two months after being vaccinated?—Yes.

4397. (*Professor Michael Foster.*) The cause of death is not stated?—No. Then in the next case the child was vaccinated on the 2nd of February 1886 and died on the 8th of February 1886, that was from inflammation of the bowels. Of course the mother very often, when a child dies, blames vaccination for doing that which vaccination has no business to be blamed for. I am giving you all the cases of death I have heard of where vaccination has been blamed for it. Then in the next death the child was vaccinated on the 23rd of November 1886 and died on the 7th of January 1887, from cellulitis that may have been from vaccination.

4398. (*Sir James Paget.*) Do you know anything of what occurred intermediately between vaccination and the occurrence of cellulitis?—No; I made inquiries about the child, and I believe the arm had become inflamed, I could not acquit vaccination entirely of the death in that case. Then in the next death the child was vaccinated on the 5th of April 1887 and died on the 12th of April 1887 from convulsions. Then in the next death the child was vaccinated on the 8th of October 1889 and died on the 1st of November 1889, that was from erysipelas; and in the last death the child was vaccinated on the 22nd of October 1889 and died on the 10th of November 1889, that was from convulsions. I investigated those two last cases myself; I did not see the child that died of erysipelas; it was buried before I had the opportunity of seeing the body; the erysipelas began in the second week and seems to have proceeded from the vaccination wounds. The other case was merely a case of convulsions, which might have occurred from bowel complaint, not from vaccination at all.

4399. (*Mr. Savory.*) There is only one death from erysipelas?—Only one death from erysipelas and one from cellulitis.

4400. Cellulitis might go with erysipelas?—Yes.

4401. So you might say from that form of mischief there were two deaths in 32,000 cases?—Yes.

4402. What do you consider should be the average diameter of the areola that ought to indicate a successful case of vaccination?—It varies a good deal. I should say a breadth of two inches when at its greatest.

4403. We often hear the term erysipelas applied to that areola?—Yes.

4404. (*Sir James Paget.*) The boundary of the areola would be well defined; it would not be like erysipelas?—No.

4405. (*Dr. Bristowe.*) That areola would include a group of four or five vesicles?—Yes; when the vesicles nearly approach you get the redness of about two inches broad formed round the group.

4406. (*Professor Michael Foster.*) Do the facts show that your calf lymph which has never been humanised and has descended, to the best of your knowledge, from a case of spontaneous cow-pox, does not, supposing the lymph to be taken on the fifth day, give rise to any unusual amount of inflammation, or any unusual bad results?—Yes; as compared with standard arm to arm lymph, this is what the facts do show.

4407. You say a successful case of vaccination by calf lymph cannot be distinguished from a successful case of vaccination by human lymph?—Yes.

4408. What is your ratio of success in the one case as compared with the other?—Their insertion success is almost exactly identical; there is a little in favour, I believe, of human lymph, but they both run within a decimal point per cent. With calf to arm vaccination the insertion success is 96·7, and with human arm to arm vaccination it is perhaps 96·8.

4409. So as regards the probability of success, you can trust calf lymph almost as well as you can human lymph?—You can when vaccinating "calf to arm."

4410. You have no evidence, I suppose, to show the comparative immunity from small-pox in the cases where calf lymph is used and in the cases where human lymph is used?—We sent up some lymph to the small-pox hospital at Highgate, and Dr. Gould vaccinated the attendants at the hospital with the lymph, and there has been no case of small-pox among the attendants vaccinated with that lymph.

4411. You have no facts on a large scale to show the relative mortality from small-pox in the case of persons vaccinated with calf lymph and in the case of persons vaccinated with human lymph?—I mentioned one case of death from confluent small-pox where the child was vaccinated with calf lymph; that is the only case of the disease stated to be after calf vaccination that I have come across.

4412. You vaccinate on the abdomen of the calf?—Yes.

4413. You do not vaccinate either on the teat or the udder?—No, not on the teat; it is a painful part to get lymph from; if on the udder, as near up to the teat as we please. Where we vaccinate male calves we like the scrotum.

4414. Do you use both male and female calves?—Yes.

4415. Indiscriminately, or one in preference to the other?—Male calves are easier to get.

4416. Less valuable?—Yes.

4417. There is a difficulty, is there not, in extracting the lymph from the vesicle of a calf as compared with a human vesicle?—Yes, we have to use clamps.

4418. When you puncture the vesicle the lymph does not come away in the same easy way as in the case of a human subject?—No.

4419. That is the reason, I suppose, why you distribute your calf lymph in points rather than in tubes?—That is the reason.

4420. You do so, do you not; we have been told that calf lymph is distributed on points, whereas the most common practice with human lymph is to distribute it in capillary tubes?—Yes.

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4421. Why do you choose points with calf lymph?—Because we thought when we first began the station that the lymph was better kept on the points than in the tubes.

4422. There is practically no difficulty in collecting calf lymph in capillary tubes?—No, you can do it with the aid of clamps, but the lymph thus collected is difficult to get out of the tubes.

4423. Do you get clear lymph in that way, free from blood?—No, it is always mixed with blood, more or less.

4424. Which would you prefer to use yourself?—I would rather use the points.

4425. You think on the whole they are the best?—Yes.

4426. How much lymph can you obtain from a single calf—how many cases could you vaccinate from a single calf?—400 or 500.

4427. You have no experience in calf lymph other than your own, except some casual experiments with Dr. Warlomont's?—Only of those I have mentioned.

4428. With no other have you any experience?—No.

4429. Your knowledge of this case of Dr. Simpson is confined to some notes taken by Mr. Murphy?—Yes, I have refreshed my memory from notes taken by him at the time.

4430. You did not see anything of it yourself?—I believe I did, but my remembrance of the matter does not extend to details.

4431. That has not been published?—No.

4432. (*Dr. Bristowe.*) Who was this Dr. Simpson?—He was Medical Officer of Health of Aberdeen, and afterwards Medical Officer of Health at Calcutta.

4433. Is he there now?—I believe he is.

4434. He could give us the information?—Yes.

4435. (*Professor Michael Foster.*) You yourself have tried to inoculate cows with small-pox virus?—I have attempted bovine inoculation several times.

4336. You failed absolutely in getting any result?—I got papules.

4437. Similar to those which Dr. Chauveau got?—Yes, so I believe.

4438. (*Sir James Paget.*) How many times did you try?—Five times.

4439. (*Professor Michael Foster.*) Were those experiments on calves or on cows?—Only once on a cow, the other four times on calves.

4440. Had those calves been vaccinated previously?—No.

4441. Or had cow-pox previously?—I do not know.

4442. Did you attempt to vaccinate them afterwards?—No, they were not our calves. I had not the opportunity.

4443. (*Chairman.*) Have you any means of telling from your records whether children vaccinated from the lymph, from what we will call Dr. Simpson's source, exhibited any different results as regards proportion of complaints as compared with those vaccinated from other lymph?—We always register in the book the size of the vesicle, and the size of the areola, by means of a symbol mark; every case has this mark against it; this line (*pointing to book*) represents the diameter of a vesicle, and this other line would be the areola round, so you can form some judgment from the register.

4444. I was asking as to the proportion of complaints in the one case and in the other?—I could easily get that.

4445. It might be worth while to see if there was a greater or a less proportion, or the same proportion, of cases complained of where what we call Dr. Simpson's lymph was used, that you found to be the case where the lymph which you are using at present was used?—I will give that. The facts prove to be thus:—

Lymph used in Vaccination.	Cases of success, and Rate.	Cases returned, and Rate.
Dubreuilh, 685 -	678 or 98·4 %	8 or 1·17 %
Simpson, 1,247 -	1,174 or 98·3 %	15 or 1·20 %

4446. (*Professor Michael Foster.*) The numbers you have given to us included cases of vaccination from both kinds of lymph; you gave us 260 cases of sore arms and 38 cases of eruptions, and so on. Those were partly from Dr. Simpson's lymph and partly from the Bordeaux lymph?—Yes. There is one thing I should like to refer to, and that is the question of insusceptibility to vaccination; that is a thing I do not myself believe in. I have now vaccinated close upon 50,000 children, and I have never seen a case of insusceptibility.

4447. I thought there was one case?—Yes, I was going to mention that; I mean I have not known a case of insusceptibility among children that were not more than nine years of age. The only case of an approach to insusceptibility I have ever had was a case of a child 10 years of age. It has frequently fallen to me to vaccinate a reputed insusceptible child.

4448. And have you always succeeded?—Yes.

4449. (*Sir James Paget.*) How many times did vaccination fail in the case of that one child?—Twice.

4450. Did you try a third time?—I told the mother to bring it back in six months' time, but she did not.

4451. (*Chairman.*) Can you give us the number of cases in which you failed the first time and afterwards succeeded?—There were 22 cases in 5,005 in 1888, that would give you an idea, it would be nearly the same for the whole.

4452. (*Sir Charles Dalrymple.*) Up to what age would those cases be?—They were all young children. I do not know exactly the limit of age, but the majority of them would be under four months.

4453. (*Sir James Paget.*) In all of those you succeeded the second time?—Yes.

4454. (*Professor Michael Foster.*) You make a statement to the Local Government Board of the total number of failures the first time?—Yes.

4455. (*Mr. Hutchinson.*) There is a private establishment for the supply of calf lymph?—Yes, Dr. Renner's.

4456. Do you know on what day he takes his calf lymph?—I believe on the fifth day.

4457. Have you met with any cases of very slow healing sores after vaccination?—Yes.

4458. For how long in some cases?—Three weeks.

4459. Not longer?—No.

4460. Would you expect to find enlargement of the axillary glands as a common consequence of vaccination?—Yes.

4461. A considerable enlargement in some cases?—Yes, I have on nine occasions seen axillary abscesses.

4462. Respecting the eruption which you describe as occurring sometimes after vaccination, is it your opinion that it always keeps to the type you describe?—No.

4463. Does it vary?—Yes, there are very considerable varieties in eruptions following on vaccination. I should say there is no peculiar eruption after vaccination except the one I have described.

4464. You quite recognise that eruption as occasionally attending on vaccination and a part of the vaccinia disease?—Yes.

4465. You know Dr. Gregory's description of it?—No, I do not remember it.

4466. It is usually a vesicular eruption?—Yes; such an eruption is sometimes seen on the backs of the hands and feet.

4467. When what you call a lichen eruption comes out without a vesicle, do you consider that vaccinia eruption?—It is provoked by the vaccination. Or to take another instance, you may get a syphilitic eruption in a child after vaccination, seen on the tenth day. You never ascribe a secondary rash of syphilis, appearing after only ten days, to an inoculation. If a man goes into a football field and gets a kick on the shin, as very likely he will, and he gets a syphilitic node:—if that man has had syphilis, no doubt he would be glad to say he got syphilis from the kick. If he did say so nobody would believe him, but people do believe parents when they say that their child got its syphilis from vaccination. Vaccination being a cutaneous irritant, it has produced an eruption in an already diseased child; that, no doubt, is the reason of syphilis appearing so early after vaccination in the case of the child; just in the same way as a person

playing foot-ball gets his kick and the node. I look upon a perfectly normal skin as not being affected by vaccination, it is only the tender skin that get a lichenous or other rash after vaccination.

4468. A true vaccinia eruption has nothing to do with the health of the child?—No; not as injuring the child.

4469. What precautions do you recommend to be taken as regards the protection of vaccination sores?—We would rather not do anything to them.

4470. Are no instructions given to the parents of the child as to what should or should not be done?—We tell them not to use shields, and recommend them to put upon the sores a little clean piece of linen rag.

4471. You do not recommend the use of vaseline or anything of that sort?—No; special directions would be given if a case was brought back with the child's arm weeping.

4472. Would not it be well after the vaccination is complete and the scab thoroughly dry to direct the parents to protect it?—We do not like keeping the primary scab damp by any such appliance as vaseline or the like.

4473. Let it thoroughly dry, but the risk of erysipelas is about the tenth day, is it not?—Yes, but that is before the scab is dry.

4474. You stated, I think, that only two cases out of the eight deaths had followed directly from vaccination, that is to say, one from cellulitis, and one from erysipelas, those were the only two out of the eight which were fairly attributable to vaccination?—Yes.

4475. In those cases the child had been vaccinated with calf lymph?—Yes; all the cases were cases in which calf lymph had been used.

4476. I take it that there were only eight deaths that you know of in the 32,000?—Yes.

4477. How long a period after vaccination does the child remain under your supervision? A fortnight or three weeks?—We seldom see the child after it is brought back for inspection unless anything is amiss or is supposed to be amiss with it.

4478. (*Dr. Collins.*) What is the date of inspection?—The eighth day of vaccination.

4479. (*Sir Edwin Galsworthy.*) What proportion would be brought back for inspection?—Nearly all of them; there are, I should think, 2 per cent. of neglect to bring children back for inspection. The reason they are so generally brought back is that the parents do not get the certificate filled up if the children are not brought back; they require a certificate to relieve them from the pressure of the law, and unless the child is brought back the certificate is not given. I could give you the exact figures if I had a little time.

4480. (*Mr. Hutchinson.*) It is the practice to examine the buttocks of a child for congenital syphilis before vaccination?—Before vaccination, no.

4481. If you find obvious indications of congenital syphilis in a child brought to you for vaccination do you vaccinate it?—No, we generally postpone the vaccination.

4482. In any of those cases in which the arms have been sore, and in which abscesses in the axilla have followed, have you had reason to think that the existence of taint of syphilis was the cause?—No, I do not think so.

4483. (*Mr. Whitbread.*) You told us that you were obliged to use the clamps to get lymph from the calf?—Yes.

4484. And that very frequently blood comes with it?—Yes.

4485. In what proportion of cases, roughly speaking, does blood come with the lymph?—I think in the majority.

4486. Do you use that?—Yes, we must use lymph with a certain mixture of blood.

4487. You have no hesitation in using lymph from the calf, though it may contain blood?—No, none whatever.

4488. The rule as to examination for blood before it is issued does not apply to calf lymph?—No.

4489. You told us also, that although you can depend on the success of vaccination as confidently from calf lymph as from humanised lymph, yet that the number of sore arms brought back to you is greater in those vaccinated from calf lymph than from humanised lymph?—Of course it is rather difficult to speak accurately upon the point, but that is my impression.

4490. Have you found that there is any difference in the proportion of sore arms brought back to you as between those vaccinated with calf lymph and those vaccinated with human lymph?—I could not say, because I have not taken the same pains to ascertain the number brought back after use of human lymph.

4491. (*Mr. Meadows White.*) The same directions are not issued in the case of humanised lymph?—Yes, the same directions are issued, but there has not been the same care in registering the cases; but my impression is that you get more sore arms after using calf lymph than after using humanised lymph.

4492. (*Mr. Whitbread.*) Then, with regard to taking lymph from the calf at one period, as compared with another, you state that in your opinion the lymph is deteriorated, and that organisms are produced in it if it is taken on the eighth day?—I intended to convey that these organisms got into the lymph after the vesicles had been broken. But I may add that I regard the eighth day as too late to take lymph from the calf.

4493. Have you ever subjected calf lymph taken on the eighth day to microscopical examination with a view to ascertaining what difference there was between such lymph and calf lymph taken on the fifth day?—No.

4494. Then your opinion is based upon what?—One knows there are a lot of organisms in hay and straw, and one comes to the conclusion that as time goes on these elements which we wish to avoid have increased opportunity of access to the lymph.

4495. There is the fact that the calf is of a higher temperature?—Yes; that is one condition.

4496. If there was a considerable difference in calf lymph on the eighth day as compared with the fifth, would it probably show itself under the microscope?—I do not know.

4497. Would it not be interesting to try?—Yes.

4498. (*Chairman.*) Did I understand you to say that it was a matter of observation that the vesicle had on the eighth day progressed further in the case of the calf than it had in the case of the human subject?—Yes.

4499. You can observe the fact that it does progress more rapidly in the calf than in the human subject?—Yes.

4500. I understood you to say that on the fourth or fifth day the same stage has been reached in the calf which in the child is not reached till the eighth?—The same stage is reached on the fifth day in the calf that is reached on the eighth day in the child.

4501. (*Professor Michael Foster.*) Has the calf on the eighth day reached the same stage as that reached on the twelfth day in the child?—Yes, approximately so.

4502. (*Sir James Paget.*) May I take it that the more irritating effects of vaccination are produced by later takings of the lymph, as, for example, more irritation would be produced from lymph that you got on the twelfth day from a child's arm?—Yes.

4503. And as a rule, the more quickly the cycle which reaches to a perfect vaccine vesicle is finished, the more mild is the lymph produced. You find the calf lymph taken at the fifth day is as effective and less irritating than calf lymph taken on the eighth day?—Yes; calf for calf.

4504. (*Professor Michael Foster.*) You do not know that from your own observation?—Yes, I do.

4505. I thought you had no experience with your own strain?—I have experience upon that subject.

4506. You have tried your own strain on the fifth and eighth days, have you?—Yes.

4507. You find that from calf lymph taken on the eighth you get greater inflammation?—Yes.

4508. (*Dr. Collins.*) The earlier in the stage of the cycle of the vaccine vesicle that you take the lymph the less intense would be the local result?—As a rule. I would say there is a stage when you cannot get any lymph at all.

4509. (*Mr. Whitbread.*) I see this statement at the foot of the red card: "Nurses of small-pox hospitals "are always re-vaccinated before commencing their "work. This has been the rule for over 50 years.

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"None of them have taken small-pox since this rule "has been observed." Does that mean that no nurse at a small-pox hospital has taken small-pox for the last 50 years?—That card gives the Highgate Hospital experience, and was issued without reference to the Asylums Board Hospitals. I do not know how the final "s" came to be inserted.

4510. This is a general notice to parents, and it says: "Nurses of small-pox hospitals," not confining it to Highgate?—Yes, the card has been reprinted with the old experience, and if *too late* vaccination be included, the card is incorrect.

4511. "Nurses of small-pox hospitals are always re-"vaccinated before commencing their work. This has "been the rule for over 50 years. None of them have "taken small-pox since this rule has been observed." That would convey to my mind that no nurse for the last 50 years in one of the small-pox hospitals has taken small-pox?—If they have been re-vaccinated, and the revaccination has been completed before a nurse goes on duty, I believe your impression expresses the fact.

4512. (*Mr. Meadows White.*) I think you gave the number of vaccinations and the number of vaccinated children brought back to you from a table?—Yes, I have it in a tabular form.

4513. Perhaps you will be good enough to read it?—Certainly.

Experience of Calf-vaccine Station.	No. of Primary Vaccinations in Year.	No. of Cases that returned for complaint.	Per-centage.
April 1882 to 1883 -	614	—	—
„ 1883 to 1884 -	1,294	—	—
„ 1884 to 1885 -	2,901	22	·75
„ 1885 to 1886 -	4,054	37	·91
„ 1886 to 1887 -	5,591	64	1·1
„ 1887 to 1888 -	6,151	80	1·3
„ 1888 to 1889 -	7,067	60	·98
„ 1889 to end of September.	4,330	60	1·4
	32,002	323	1·009

Sore Arms.	Eruptions.	Erysipelas.	Axillary Abscess.	Total.
17	3	2	—	22
31	4	1	1	37
53	8	2	1*	64
63	9	5	3	80
48	5	5	2	60
48	9	1	2	60
260	38	16	9	323

* The abscess in this case was over the sternum.

Deaths, attributable to vaccination, among the above total cases.

No.	Date of Vaccination.	Date of Death.	Cause of Death.
4,524	3 March 1885	9 March 1885	Convulsion.
5,093	28 April 1885	12 May 1885	Confluent small-pox.
6,304	13 Aug. 1885	10 Oct. 1885	(?) Heard from Dr. Webb.
8,190	2 Feb. 1886	8 Feb. 1886	Inflammation of bowels.
12,526	23 Nov. 1886	7 Jan. 1887	Cellulitis. Born September 5.
14,521	5 April 1887	12 April 1887	Convulsion.
31,764	8 Oct. 1889	1 Nov. 1889	Erysipelas.
32,091	22 Oct. 1889	10 Nov. 1889	Convulsion.

4514. I understand that to an observer of the symptoms and progress of the vesicle precisely the same appearances would be presented in cases where calf lymph had been used as where human lymph had been used?—Yes, I think so, where both had been taken on their respective best days.

4515. And the symptoms are the symptoms of a special disease; that is, the symptoms which appear are specific symptoms?—Yes. Vaccination is a specific disease, and the symptoms are specific symptoms, and they are precisely the same in the two cases.

4516. (*Mr. Picton.*) You have used the phrase spontaneous cow-pox; will you kindly explain what you mean by spontaneous cow-pox?—The first case occurring in a herd that you cannot say has been communicated by man.

4517. But do you believe it ever has been communicated by man?—I believe it has; that is only an opinion.

4518. There is a difference of opinion, is there not, amongst medical men as to whether cow-pox originates in the cow or not?—Yes.

4519. (*Sir James Paget.*) You say communicated by man; what is the man suffering from?—I am referring to small-pox; though cowpox can be communicated from human subjects having vaccine.

4520. In the case you had your own lymph derived from, you think it probable that someone with small-pox had milked the cow?—There was small-pox very much about Laforêt at the time.

4521. (*Dr. Collins.*) Is that stated in the Gazette Hebdomadaire de Médécine et Chirurgie?—Yes, I believe so.

4522. (*Mr. Picton.*) Were you at all acquainted with the case of cow-pox in Wiltshire in 1887?—No, I know there was a case spoken of by that name, but I do not know much about it.

4523. Your Board made inquiry into it, did it not?—Yes.

4524. Did you take no interest in it?—I took a general interest in it.

4525. Did you receive any lymph from that case of cow-pox?—No, but some calves were vaccinated by Dr. Klein at Lamb's Conduit Street after passing through the Wiltshire disease.

4526. Was any lymph from that case brought to the National Vaccination Establishment at all?—I really forget.

4527. You showed us some cards sent out in the case, as I understand, of vaccination from calf lymph, are similar cards sent out in the case of vaccination by human lymph?—Yes.

4528. You told us you found no case of insusceptibility to vaccination, is there such a thing as insusceptibility to small-pox apart from vaccination?—That would only be an opinion. No, I do not think there is; of course I am supposing the small-pox virus to be used under the same conditions that vaccine is used.

4529. Is that the opinion of medical men generally?—I think so.

4530. That there is no insusceptibility?—Yes.

4531. Does vaccination create insusceptibility to re-vaccination?—It does for a certain time afterwards.

4532. For how long?—It varies immensely.

4533. You speak now of your own experience, have you tried to re-vaccinate cases that had been vaccinated?—Yes.

4534. What is the shortest limit of time within which you find it possible to re-vaccinate after vaccination?—That depends on what you mean by "re-vaccinating," different people have different meanings attaching to the word. You do not mean only the operation, and the same result might be accepted by one person and denied by another.

4535. What I mean by re-vaccination is what is ordinariiy meant by re-vaccination, the practical appearance of a vesicle after a certain number of days?—Yes; but are you taking the eighth day? Because many re-vaccinations run the whole course before the eighth day.

4536. Cases of re-vaccination are more rapid than cases of primary vaccination?—Yes.

4537. What I meant by my question was, what is the longest time after a primary vaccination that you have found re-vaccination impossible?—You are looking at the thing from an entirely different point of view to

what I am; any answer I should give you would be a misleading one from your point of view.

4538. I am afraid you do not know my point of view. I am only asking you for the fact. I only want to know for how long a period of time primary vaccination prevents susceptibility to re-vaccination; you say the time varies?—It would be a very short time if you looked to results immediately afterwards, but a very considerable time if you took the ordinary day for inspection, the eighth day.

4539. I do not quite understand you?—If you would kindly read this pamphlet I have here, "Some Aspects "of the Vaccination Question," you would perhaps get from it the information you require.

4540. (*Sir James Paget.*) Would you expect that a person vaccinated last month could be effectually re-vaccinated 12 months hence?—Yes; a certain result would be produced.

4541. Would you expect the same result six months hence?—Yes, I should expect a little result six months hence.

4542. Three months hence?—Between three months and six months.

4543. (*Mr. Picton.*) For from three months to six months the human subject would be insusceptible to re-vaccination?—Yes.

4544. (*Professor Michael Foster.*) Might we say this, that by examination in the case of a vaccinated person, you would be able to tell from the character of the vesicle, if you watched its progress throughout, whether that person had been previously vaccinated or not?—Yes, in a great majority of cases.

4545. (*Mr. Picton.*) Does small-pox create insusceptibility to small-pox?—To attacks of small-pox undoubtedly it does, in most people and for a long time; but as regards fatality of that minority of cases that become attacked by small-pox a second time, my answer must be, No. If you read that paper at your leisure, you will see some facts that throw light upon the point.

4546. I want to have an answer on the Minutes. Your answer is no?—My answer is no, small-pox confers no certain immunity from death by small-pox; a second attack of small-pox when it does occur is sometimes almost as bad as the first attack.

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4547. Does small-pox give insusceptibility to itself for any period of time?—Yes, for a great many years.

4548. For more than three months?—Yes.

4549. Then there is a difference in that respect between vaccination and small-pox?—I was previously speaking of insusceptibility conferred by vaccination against vaccination. You ask me now to compare vaccination with small-pox. As regards the protection conferred by small-pox against subsequent small-pox, I would point out that I am now speaking of the natural disease. For, if you inoculate small-pox, you get precisely the same results as if you vaccinate; you are comparing two separate things altogether.

4550. They are quite separate, are they?—Yes; inoculation for small-pox and natural small-pox are two separate things.

4551. You do not regard vaccination as modified small-pox?—I do regard it as modified small-pox.

4552. In the one case you tell us that insusceptibility is created for three months only. In the other case small-pox insusceptibility is created for several years?—Not insusceptibility to inoculated small-pox: I hold there is evidence of a difference between natural small-pox and inoculated small-pox; and that after an inoculation of small-pox, the system would become as early susceptible to inoculated small-pox, as to re-vaccination after vaccination; and further that you would have the same kind of complications as you would have with vaccination.

4553. You are not speaking now from experiment?—No, I have not inoculated small-pox into the human subject.

Adjourned till Wednesday next at 1 o'clock.

Twentieth Day.

Wednesday, 4th December 1889.

PRESENT:

THE RIGHT HON. THE LORD HERSCHELL IN THE CHAIR.

Sir JAMES PAGET, Bart.
Sir EDWIN HENRY GALSWORTHY.
Mr. WILLIAM SCOVELL SAVORY.
Dr. JOHN SYER BRISTOWE.
Dr. WILLIAM JOB COLLINS.
Professor MICHAEL FOSTER.
Mr. JONATHAN HUTCHINSON.
Mr. SAMUEL WHITBREAD, M.P.
Mr. F. MEADOWS WHITE, Q.C.

Mr. BRET INCE, *Secretary.*

Mr. ROBERT CORY, M.D., further examined.

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4554. (*Chairman.*) We understand that you desire to make some explanation or correction of your former evidence?—Perhaps I might be allowed to say one or two things in the way of correction with regard to the evidence that I gave last Wednesday. I should like first of all to hand in these four cards. I may explain how the word "hospitals" was introduced into the card instead of "hospital." It was originally printed "hospital," but through my oversight in looking over the proof of a reprint of the card I quite inadvertently let the "s" stand. This is the last printed card and the only one of the whole series that contains the plural "hospitals."

4555. In the earlier cards the reference was exclusively to what is known as the Small-pox Hospital at Highgate, which is the only small-pox hospital that has existed for any great length of time?—Yes, quite so.

4556. (*Mr. Whitbread.*) The statement on the card would be true of the Small-pox Hospital at Highgate?—Yes, it would be quite true of that. It is also true of all the London Small-pox hospitals, if you deduct all the cases that were re-vaccinated too late.

4557. (*Chairman.*) We need hardly go into that, because the reference was to a hospital that had existed for 50 years, as to which the statement was accurate?—Yes. Also I have found the notes of Mr. Murphy that were referred to last Wednesday. I have too seen him since and he says he can tell nothing more; that the notes were under my direction taken by him for me,

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and that he knows no more about the facts than I do. If I may be allowed to read notes I will do so.

4558. This is with regard to the lymph that was obtained from Dr. Simpson?—Yes. The first note is dated the 21st of November 1885, and is as follows:—

"Calf 938 inoculated to-day at 12 noon in five "incisions on the scrotum with lymph on five points "supplied by Dr. Simpson, of Aberdeen. Lymph used "had been taken from a vesicle which formed on a "cow's teat after inoculation with small-pox lymph "from an unvaccinated patient. The lymph was taken "from the small-pox patient on the fifth day of the "eruption. The vesicle of the cow was opened, and the "points touched with the lymph 150 hours from the "time of inoculation. It was very like a cow-pox "vesicle."

The next note is dated 26th November, Thursday:—"Of the five places of insertion three have some appear- "ance of vesiculation to-day. From one of these, child "No. 7,489, was to-day vaccinated; and four inoculations "by incision were made on left side of front of scrotum "of calf 941. From the other (vesiculations), two "insertions on right side of front of scrotum, four on "back of scrotum, and seven on abdomen were made "in same calf—the forceps and knife being first cleansed, "as also lancet, in flame by exposure to heat."

Then on 1st December:—"Insertions on calf 941 taken "in six places; insertions distinctly vesicular and "somewhat scabby. Calf 944 inoculated from these in "33 places, and children Nos. 7,507, 7,508, 7,509 also "vaccinated therefrom."

A note on 3rd December, says:—"Child No. 7,489 "returned to-day with five perfectly normal and well- "formed pearly vesicles."

Another note, 5th December, states:—"Visited this "child, and found it well; no eruption and vesicles "normal. Calf 944, vesicles normal in appearance, but "not very well developed. Calves 947 and 948 vacci- "nated therefrom."

A final note, 8th December, says,—"Children 7,507, "7,508, 7,509 all returned with five vesicles normal in "appearance and average amount of areola."

4559. (*Professor Michael Foster.*) Those notes do not give the details of the original inoculation?—No. Then I was asked for the number of vaccinations performed with Dr. Simpson's lymph from the calves. There were 89 calves, if you remember, vaccinated with that lymph in succession. There were in addition 1,247 children vaccinated therewith.

4560. (*Dr. Collins.*) In what year or years was this?—In 1885 and 1886. Of the 1,247 children vaccinated with Dr. Simpson's lymph, 1,174 cases, or 98·3 per cent., were successful; 15 of the cases, or 1·20 per cent., were brought back on account of some departure of their vaccination from the normal. This considered to be only sore or unhealed arm. At the same time Dr. Dubreuilh's lymph was being used, in 685 cases, of which 678, or 98·4 per cent., were successful. 8 of these cases, or 1·17 per cent., returned after inspection. There was therefore only a difference of ·03 per cent. between the two as regards irregular results.

4561. (*Chairman.*) There was no substantial difference?—There was no substantial difference at all. I might, if I were a chemist, say it was within the limits of experimental error.

4562. (*Professor Michael Foster.*) That success means from calf to arm?—Yes, in both series vaccination was from calf to arm.

4562*a*. And the success which you mentioned the other day was from calf to arm?—Yes; and that was insertion success.

4563. And not with stored lymph?—No, not with stored lymph; that is a very different thing.

4564. (*Dr. Collins.*) In the notes of Dr. Murphy which you have read there is no statement as to the actual experiment of inoculating the cow with the small-pox; could you tell us who performed that experiment and where?—It was performed by Dr. Simpson in Aberdeen.

4565. By himself?—Yes.

4566. Is that stated in these notes?—No, it is not.

4567. That has been separately ascertained?—Yes, I believe so.

4568. Has any publication of the experiments which led to the raising of this stock of lymph been made?—No, I do not believe it has been published at all.

4569. I think you were the author of a report which appeared in the 11th Annual Report of the Local Government Board on the earlier operations of the Animal Vaccine Establishment in the year 1882?—Yes, I believe I was.

4570. In that you refer to the original source of the Dubreuilh lymph which has since been employed at the Animal Vaccine Establishment?—Yes.

4571. I suppose I may take it that a thorough investigation as to the nature of that lymph was made before it was introduced?—I am quite ignorant of that. I had the lymph sent to me and the vaccinations were performed with it.

4572. I understood you to refer to a paper in the "Gazette Hebdomadaire," which contained an account of that lymph?—Yes.

4573. Are you familiar with the report in the "Gazette Hebdomadaire"?—No; I have seen it, but I can not say that I am familiar with it.

4574. You stated, in answer to Question 4519 and the two following questions, that you were under the impression that so-called spontaneous cow-pox was really due to the inoculation of the cow by a milker suffering from small-pox?—Yes; it was in answer to a question of Sir James Paget's.

4575–6. You were asked, "In the case you had your "own lymph derived from, you think it probable that "someone with small-pox had milked the cow?" and you replied, "There was small-pox very much about "Laforêt at the time." Then I asked, "Is that stated "in the 'Gazette Hebdomadaire de Médecine et Chirurgie'? (*A.*) Yes, I believe so." "I believe so," has been added there?—Yes, I have since added that qualification.

4577. On what grounds did you found the belief that the original source of that so-called spontaneous cow-pox was due to the inoculation from a milker suffering from small-pox?—I only believed so at the time. It is my general belief that vaccinia is modified small-pox.

4578. Do you find a specific reference in that number of the Gazette, to which you refer, stating that small-pox was about at Laforêt at the time?—No, I do not know that I do.

4579. So that beyond a general belief that cow-pox is referable in all cases to the inoculation of human small-pox, you are not aware of evidence which exists to connect the two in that particular outbreak?—No, I am not.

4580. Was not another source of lymph at one time employed in the early operations of the calf lymph establishment besides the Bordeaux lymph?—Yes; lymph obtained from Dr. Carsten of the Hague.

4581. Can you tell the Commission why that stock was discontinued?—The Laforêt stock produced better results on the children, and in the calf also. The vesicles were not so ulcerated at the time the lymph was taken from them.

4582. Did the Hague lymph produce ulceration around the vesicles?—I meant to say "accelerated;" they were more apt to be accelerated.

4583. In the child or in the calf?—In the calf

4584. Not in the child?—Not in the child.

4585. (*Professor Michael Foster.*) When taken on the fifth day?—Yes.

4586. (*Dr. Collins.*) Are you aware that the use of the Bordeaux lymph has since been discontinued in France?—No, I was not aware of it.

4587. Are you aware of suggestions which appeared in print at the time that that outbreak was one of spurious cow-pox?—No, I am not.

4588. You are not familiar with Dr. Leyet's criticisms upon it?—No. If it had been a spurious case we should have found it out ourselves.

4589. In what way?—By the appearance of the vesicle. If you have a cabbage in your garden you know that it is a cabbage, and you do not expect to be poisoned by it.

4590. (*Sir James Paget.*) Have you had experience of inoculation with what is called spurious cow-pox carried on from calf to calf or from arm to arm?—Never.

4591. Have you seen the result of spurious cow-pox by inoculation?—No, I have not.

4592. You feel sure that you could detect the difference?—Yes, certainly, in the human lymph.

4593. (*Dr. Collins.*) Is M. Bousquet an authority on vaccination in France?—Yes.

4594. Are you aware that he states that there is no constant feature in the form, the colour, or the areola to indicate the true cow-pox?—I am afraid that I am rather ignorant of French literature.

4595. Are you familiar with the appearances of true cow-pox in the cow?—Certainly.

4596. What outbreaks in this country have you investigated?—We have only had the lymph that we have been using at the station.

4597. I mean what investigations have you made in natural cow-pox in the cow?—Not any.

4598. You have never seen the natural cow-pox in the cow?—Not that I am aware of; I was referring just now to cow-pox in the calf.

4599. Was the Bordeaux lymph ever submitted to what was known as the variolous test?—No, I think not.

4600. Are you aware that one of the first cases that was inoculated with the Bordeaux lymph in Paris terminated fatally?—No.

4601. Are you aware that it was stated that it was not until the fourth remove that the vesicles derived from the Bordeaux lymph were fully formed?—No.

4602. I think in a reprint of the thesis which you were so good as to send to the members of the Commission last week "On the relation of Cow-pox and Horse-"pox to Small-pox" you contend for the view that cow-pox is invariably the result of the inoculation of human small-pox upon the cow?—I merely state that as a thesis. This paper was written as a thesis for my degree, and I was contending that as a thesis.

4603. It would not misrepresent your contention to say that you hold that cow-pox never occurs in the cow except as the result of the inoculation of the small-pox of man?—That is my opinion. You may have communication through another animal, through an intermediate host, more easy of accidental inoculation; but, so far I do not see any reason to alter my opinion to that effect.

4604. I see you say that "A right understanding of "this matter is one of great practical importance, for "if it be true that cow-pox is but modified small-pox, "then no longer must we regard the human body as a "soil foreign to the vaccine virus, but rather the cow's, "and thus a weighty argument now used in favour of "animal vaccination would have to be transferred to "the opposite balance." Would that represent your present views?—Yes.

4605. Apparently you consider that the difficulties of explaining the facts would be greater if it were held that cow-pox and small-pox were independent diseases?—Yes.

4606. I think you refer to Dr. Ballard as one who contends for the latter view?—Yes, I do.

4607. And I believe Dr. Ballard attributes the disposition of vaccine lymph to deteriorate to the fact of its being cultivated on a foreign soil?—Yes.

4608. Have you had any experience of horse-pox?—No, I have not.

4609. Or of equination?—No.

4610. I see you state that "if cows were not milked, "and horses were not shod, their respective varioloid "diseases would cease, as far as we can see, to exist"?—Quite so.

4611–2. That would be a corollary to your main contention?—Yes. Of course I was arguing a good deal from general literature then; and my contention was a "thesis contention."

4613. I see you say that "mares suffer quite as much "as horses do from the disease, whereas in cow-pox "the females alone are infected"?—That is so.

4614. Can you tell us in what way the disease is communicated to mares?—My contention was that the pox from the human small-pox was conveyed to the heels of the horses while they were being shod, the fact being that the eruption comes out in the horses' hoofs, where they are chiefly handled by men, and on the cows' teats, where they are chiefly handled by men and women.

4615. Do you know of any other parts that are affected besides the heels of the horse or the mare?—Yes, the mouth; but the vesicles, I believe, are always later in the mouth than in the heel; and we know that a vaccinated child which scratches its arm and then its buttocks will have sores upon its buttocks, so that I look upon those sores in the mouths of the horses as a secondary inoculation from their heels. Horses have a habit of biting themselves on any part that itches, and the eruption on the heels being very irritating, a horse would be likely to bite its heel.

4616. I suppose you do not happen to be aware that at Bordeaux it was found that the success obtained by inoculation with horse-pox was superior to that which was obtained from the use of the Bordeaux lymph?—I fancy I remember to have heard something to that effect.

4617. I believe equination is more extensively practised in France than it is here, is it not?—Yes, it is.

4618. You consider that the rarity of cow-pox in this country is largely due to the diminution of small-pox?—Yes, I believe the rarity of cow-pox is due to the diminution of small-pox.

4619. Are you acquainted with the report on the eruptive diseases of the teats and udders of cows which appeared in a publication by the Agricultural Department of the Privy Council for the year 1888?—I have only just glanced through the paper.

4620. Are you aware that as a result of an investigation that was made a large number of cases of cow-pox were discovered in various parts of the country?—Of what they said was cow-pox, I believe.

4621. Does any evidence exist to show that those cases were not cow-pox?—Not that I know of.

4622. Was small-pox largely prevalent in this country last year?—No.

4623. The experiments of the Lyons Commission, conducted by M. Chauveau, were to a large extent contrary to the contention which you uphold, were they not?—They were.

4624. Do you happen to be acquainted with the writings of Mr. Fleming of the War Office upon the subject?—Yes, I think I have read Mr. Fleming's papers.

4625. Is Mr. Fleming an authority upon diseases of cattle and horses?—He is, as a veterinary surgeon.

4626. Are you aware that he makes this statement, "I "will now venture to dispute every one of the arguments "brought forward to prove that human variola and cow-"pox are due to the same virus or are the same "disease"?—Yes.

4627. Are you aware that a communication was addressed in the year 1879 by the Irish Local Government Board to the Galway Guardians intimating that lymph obtained by inoculating the cow with small-pox if used would render the operator liable to prosecution?—I heard of it at the time.

4628. Is Dr. Warlomont an authority upon animal vaccination?—He is.

4629. Are you aware that he contends that it is impossible to convert small-pox into cow-pox by the inoculation of the cow with small-pox?—I was not aware of it, but I daresay it is so.

4630. I think I understood you to say in your previous examination in answer to Questions 4522 and the following, that some investigation was made by your Board into what was commonly known as the Wiltshire outbreak of cow-pox?—Yes.*

4631. Have you been able to ascertain since the Commission last met any results of the experiments that were conducted?—Dr. Klein made some experiments at Lamb's Conduit Street at that time, as well as some experiments later, and I believe there are notes of those experiments.

4632. Were any children inoculated with lymph derived directly or indirectly from that source?—I took some of Dr. Klein's lymph down to St. Thomas' Hospital, and some children there were vaccinated with it.

4633. With what result?—With a perfectly normal result. A drawing was taken of the arm, and it went through a perfectly normal course. In fact, the lymph

* In revising this proof I observe repeated reference (Questions 4630 to 4647, and Questions 4783 to 4789) to lymph *from Wiltshire* used by Dr. Klein at Lamb's Conduit Street. I have written to the Chairman of the Commission stating, in reference to these questions and their answers, that the lymph to which I was here referring came, not from Wiltshire, but from Alderley, in Gloucestershire.—R. C.

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used at St. Thomas' for three or four months was lymph derived from that source.

4634. (*Sir James Paget.*) Was that lymph which Dr. Klein took from some of the Wiltshire cows?—Yes, I understood Dr. Klein that he obtained that lymph from cows in Wiltshire.

4635. What was the result of inoculating with it?—It produced perfectly normal vaccine vesicles.

4636. (*Dr. Collins.*) Did I correctly understand you to say that that lymph was, in the opinion of Dr. Klein, the true and not spurious cow-pox?—I do not know what Dr. Klein's opinion was respecting the cows from which he took it.

4637. (*Dr. Bristowe.*) You do not know what Dr. Klein's views about that are?—No.

4638. (*Dr. Collins.*) Will you give us your own view from having watched the progress of vaccination as to whether the results would be such as to enable you to class it as true and not spurious cow-pox?—I should certainly class it as true and not as spurious cow-pox.

4639. Do you happen to know anything of the origin of that lymph?—No, except that it was found in some eruptions on the udders of cows in Wiltshire, I believe.

4640. Did any evidence exist to connect the origin of that outbreak either directly or indirectly with small-pox?—Not that I know of.

4641. Can you tell the Commission whether a stock has been raised from that lymph and is still being used?—No; we have given it up at St. Thomas' Hospital now, but it was used for three or four months there.

4642. (*Professor Michael Foster.*) Why did you give it up?—Because the recognised stock is better to use, I think.

4643. (*Dr. Collins.*) Do you think that the lymph derived from the French source was superior to that which was obtained in Wiltshire?—No, the results, so far as I observed them, were very much the same.

4644. (*Chairman.*) What was the date of the use of this Wiltshire lymph?—1888, I think; it was during Dr. Klein's later series of experiments.

4645. You had had a long experience of the Bordeaux lymph at that time?—Yes.

4646. (*Dr. Bristowe.*) May I ask whether you re-vaccinated any of those children afterwards with other lymph?—Not when they had the normal vesicles.

4647. (*Dr. Collins.*) So that the only protection which those children would have would be that which would be given by the Wiltshire cow-pox?—Yes; what I have spoken of as the cow-pox from Wiltshire.

4648. At Question 4311 you were asked, "Is there "any test of the goodness of the lymph except the kind "of vesicle and scar which it produces?" and your answer was, "Of course I am only giving now my own "individual opinion. I believe that is the only test "you can get. There are also the microscopical tests "which are used, and their tendency is no doubt to "cause the rejection of a great deal of good lymph"?—The tendency, no doubt, is to cause the rejection of a good deal of good lymph.

4649. I do not refer so much to the latter part of your answer. Should I be right in interpreting that answer to mean that the test and the only test except a microscopical one of the goodness of the lymph would be practically a retrospective one, having watched the stages that the vesicle had passed through?—Yes, I think so up to a certain time—the time when the lymph is usually taken. You can then tell very well the character of the vesicle.

4650. What additional test would the microscope provide?—It would enable you to be quite sure that there was no blood with the lymph. If a vesicle bleeds at all you reject the lymph at once.

4651. The same precaution in excluding blood, I think, is not adopted in the case of animal vaccine as in the case of human vaccine?—No.

4652. What is the explanation of the difference of procedure?—The lymph from the animal is taken by means of clamps which are put on the vesicle of the calf. The calf vesicle is so small that you cannot get the lymph out unless it is squeezed out. This pressure also squeezes out the blood, and you cannot obtain the calf lymph without taking also a certain amount of blood which is at the same time pressed out of the vesicles by these clamps.

4653. You do not think it a matter of moment to exclude blood in the case of the animal?—No.

4654. But I understand that you do consider it a matter of moment to exclude blood in the case of the human subject?—It is generally considered advisable.

4655. Why?—Because syphilis may be conveyed by it; at least that is the contention.

4656. What evidence exists to show that syphilis is conveyed by the blood, and not by inflammatory lymph?—I do not know that much exists.

4657. Are you aware whether any evidence exists pointing in that direction?—I do not remember any at the moment.

4658. Are you aware that Dr. Ballard states in his essay on Vaccination that the perfect character of a vaccine vesicle is no guarantee that it will not furnish both vaccine and syphilitic virus?—I am not aware of it, but no doubt it is so. I had overlooked that statement.

4659. But it does not conflict, that I am aware of, with anything that you have said?—No.

4660. Would you approve of that statement that the perfect character of the vesicle is no guarantee that it will not furnish both vaccine and syphilitic virus?—I do not disapprove of it.

4661. He also stated in the year 1868 that "numerous "cases are on record to prove that the vaccine virus "and the syphilitic virus may both be introduced at "the same spot, and even by the same puncture of the "vaccinating lancet, and that in such instances both "viruses may take effect, the vaccine vesicle running "naturally through its various stages, and being suc-"ceeded by a chancre on the fall of the crust." Do you agree with that statement?—Yes.*

4662. In your answer to Question 4467 you drew an analogy between a node following a kick on the shin and syphilitic eruptions following on vaccination; would that explanation apply to all syphilitic eruptions that followed vaccination?—Unless the syphilis was conveyed by the vaccination; but then you would not get the syphilitic eruption appearing on the 10th day after the vaccination.

4663. So that that explanation only applies to those recent cases in which the eruption follows within a week or two after the vaccination?—Quite so, to cases of inherited syphilis.

4664. Do I correctly understand you to suggest that there are other cases in which the syphilis is actually communicated by vaccination and the rash makes its appearance in the ordinary sequence?—There have been a few cases where there has been undoubted conveyance of syphilis by vaccination; but they are very few indeed. In all the authenticated cases there had been a definite interval between the vaccination and formation of chancre, and another interval between the formation of the chancre and the appearance of the secondary symptoms.

4665. I understand that you have had a large measure of success in vaccinating children who have been alleged to be insusceptible by other vaccinators?—Yes; there have been half a dozen or more such cases.

4666. In fact, insusceptibility to primary vaccination in children under 10 years of age, I think you say, is an almost unknown experience?—Yes, that is my experience.

4667. The only case in which you were foiled at your second attempt was in a child over 10 years of age?—Yes; I believe that was the case.

4668. Do you consider that the age element probably was to some extent responsible for the failure?—No; I ascertained before the child came to me that it had been vaccinated by Dr. Pearce; I also vaccinated it once, and having failed told the mother to bring the child back in six months' time.

4669. Do you, or do you not think that the insusceptibility to primary vaccination is greater in the adult than in the infant?—I have had very little opportunity of testing it.

4670. From such experience as you have had have you been able to form any opinion upon that subject?—I have formed an opinion that the vesicle on the adult

* In answering "Yes" to this question, I intended only to admit the possibility of such an occurrence as that referred to in the quotation.—R.C.

at primary vaccination is exactly the same as on the infant.

4671. Upon what number of instances do you base that opinion?—I should think a dozen or two or more.

4672. Have you any notes on such a question?—I have not, except the ordinary record in the vaccination register.

4673. In answer to Question 4345 you say, "I do "not know that the lymph does deteriorate; it might "(I am speaking now only the opinion that I have "formed myself) from the falling into it of organisms. "When a cow is vaccinated there is a lot of straw "about, and from that foreign organisms get upon the "lymph and give rise to abnormal results"?—Perhaps I might read what I would rather say, "I am desirous "of protecting lymph from organisms that may get "access to it. I am now speaking of calf lymph."

4674. What results do you apprehend are referable to the organisms which are derived from the straw?—When the vesicle is rubbed and the organisms get entrance into it you might get suppuration of the part.

4675. Are we to understand you as offering that explanation of the inflammation of the vesicles occurring in the use of lymph taken later than the fifth day?—When the vesicles are older than the fifth day they have a greater tendency to be broken by the animal lying down, and when the head of the vesicle is rubbed off the organisms have opportunity of entrance; but the vesicle is always washed with a disinfectant lotion before we take the lymph, and the organisms are not in the vesicles then. It is only when they get rubbed at later stages by the animal lying down in the straw, that in my opinion those organisms can get entrance.

4676. Do you think that the inflammation in such cases is referable to organisms derived from the straw?—I think it very often may be.

4677. And not to any property residing in the lymph?—No, I think the source of the mischief has been obtained in the straw, when the vesicles suppurate.

4678. Have you discovered micro-organisms which you think might be responsible for such result in the straw or in cultivations from it?—Yes, I think I have.

4679. What micro-organisms have you found?—I do not know that I could tell you all, but I have found the ordinary organisms that grow on the hay.

4680. Do you allude to the hay bacillus?—Yes, the hay bacillus is one of them; that is one of the commoner ones.

4681. Do you think that is responsible for causing inflammatory symptoms around a vaccine vesicle?—I think that might possibly cause inflammation.

4682. In answer to Question 4370, you gave a statistical account of cases which were brought back subsequent to the day of inspection, and you said: "We "hear of almost of every bad case, I believe." What makes you think that?—The notice to bring back irregular cases is on the card, and as the calf lymph was something new, parents were anxious, of course, to know that their children were not injured in any way.

4683. The compliance with the law terminates on the child being brought back for inspection at the eighth day if the results are satisfactory, does it not?—Yes.

4684. Did you happen to hear of a case which was stated to have been vaccinated at the calf lymph establishment which was brought before the Commission some two or three weeks ago?—I heard that there was a case that had been vaccinated at Lamb's Conduit Street brought up before the Commission.

4685. Had it been brought back to the calf lymph establishment?—No, not that I know of.

4686. In answer to Question 4390, speaking of the cases of erysipelas which followed vaccination at the calf lymph station, you stated that there was probably some want of correspondence between them and the Registrar-General's figures; I did not quite understand what you meant?—That I should wish to strike out.

4687. The Registrar-General, I apprehend, takes notice only of deaths?—Quite so.

4688. In those cases in which convulsions caused a fatal termination shortly after vaccination, do you trace any causal connexion between the two or not?—Children often die of convulsions owing to something that irritates the bowels, or to mere indigestion, which is quite sufficient to occasion convulsions; and when a child dies of convulsions after vaccination I do not know that you can attribute the death to the vaccination at all.

4689. You do not think that amongst the variety of things that might cause convulsions, the inflammatory fever following vaccination, is one?—I think it may, perhaps now and again, have something to do with it, but it would always be doubtful whether the death was not from other causes.

4690. I think, as a matter of practice, you usually make five insertions?—Always; in every child that I have vaccinated I have made five insertions.

4691. Do you attach great importance to that number?—Great importance from a directorial point of view. If you give leave to one person to have it done in four places, you will have every person asking for four places, and if you believe that five is the best number you must make five insertions without exception.

4692. Do statistical results show much difference between five insertions and four insertions?—Not very much, but they do show a considerable difference between four insertions and three. We wish to get the full result, and, of course, occasionally a place fails.

4693. Would you agree with Curschmann, who advocates six places on each arm?—No; I think a sufficient amount is reached when you have five places.

4694. You would not agree with what is stated by some persons, who appear to be authorities, that one mark is as good as a number?—No, certainly not.

4695. (*Mr. Savory.*) May I ask whether after vaccination you have observed the temperature in any cases?—In, I think, four cases.

4696. In only four cases?—In only four. I have taken the temperature in the rectum every day with the thermometer, for the purpose of getting the temperature tabulated. It rises slowly from the first. On the second day you get a rise in temperature and it slowly goes up.

4697. (*Chairman.*) Were the results, in the four cases in which you observed the temperature, uniform?—Almost uniform.

4698. (*Sir Edwin Galsworthy.*) On what day is the maximum temperature reached?—I forget for the moment.

4699. (*Mr. Savory.*) According to this chart the temperature gradually rises from between 37·1 and 37·2 centigrade, until on the seventh day on the average of those four cases it is just a shade above 37·6?—Yes.

4700. (*Dr. Collins.*) Can you tell us what that would be Fahrenheit?—About 99·7 I think.

4701. Have you taken similar charts for the calf in the process of vaccination?—No, I do not think one has ever been taken by me.

4702. Do you know whether the temperature of the calf is elevated concurrently with the appearance of the vesicles?—I believe it is.

4703. Is that statement derived from observation?—Not my own.

4704. In Question 4383 you were asked whether you ascribed the sore arms to the treatment rather than to the vaccination and you said yes; do you think that the treatment would explain all the cases?—No, I do not; I did not mean to imply that I did.

4705. In answer to Question 4491 you state, "My "impression is that you get more sore arms after using "calf lymph than after using humanised lymph"; would not that suggest that at any rate some of the sore arms are referable to the lymph rather than to the treatment?—Yes, partly to the lymph.

4706. Do you think it is possible as a practical vaccinator to secure similar or almost identical cicatrices upon every person?—No; the cicatrices vary immensely.

4707. As the result of inoculation with the same lymph?—Yes, in different persons.

4708. Could you give us any further information upon that subject; in what way do they vary?—Some of them are foveated, some of them are plain, some of them are puckered. Where the inflammation has been great you get a puckered cicatrix; where the inflammation has not been so extensive you get a foveated scar.

4709. Do you think that the absence of fovcation is indicative of the lymph being of less good quality?—Yes, I should think it was an indication that the lymph is not of such good quality when in many cases it leaves a plain cicatrix.

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4710. In your ordinary practice (and I apprehend that you employ only the best lymph) do you not find great variation in the results of the cicatrices?—Quite so they vary; but lymph that always produces a plain scar is generally weak lymph.

4711. But are there plain scars which result from vaccination in your practice?—Yes.

4712. Would you consider that in cases in which the cicatrisation was devoid of foveation the protection afforded would be less perfect?—Yes, and less lasting.

4713. Although such cicatrices might have resulted from the use of the best possible lymph?—Quite so.

4714. (*Mr. Savory.*) Have you any facts as to that?—I have observed a good many of the scars produced with calf lymph, and I find that they are foveated, I should say the majority of them.

4715. But have you any facts to show that when they are not foveated the protection is less than when they are foveated?—No, my vaccinations have not yet been tested by any great lapse of time.

4716. I thought that was the answer you intended to give?—I infer that in these cases the ordinary course of vaccination has been interfered with.

4717. (*Dr. Collins.*) So far as your own evidence goes you have no evidence to show that plain cicatrices afford less protection than foveated cicatrices?—Only by the results of re-vaccinating such cases.

4718. In what way does re-vaccination differ when it is performed upon a person with plain cicatrices and when it is performed upon a person with foveated cicatrices?—The results are so uncertain that I should be very sorry to give a prediction of how the re-vaccination would take, whether in a foveated cicatrix or in a plain cicatrix of previous vaccination; but I think that taking a large number of cases you may say that you generally get less results from re-vaccination in persons with well-foveated cicatrices than in persons with plain cicatrices.

4719. When you speak of the results being uncertain are you speaking of your own results?—Yes.

4720. (*Dr. Bristowe.*) It is only your impression; you are not sure that it is so?—No, I am not so sure that is so; my numbers are not so large as I could wish.

4721. (*Dr. Collins.*) I think I understood you to say, in answer to Sir James Paget at Questions 4540 and 4541, that you would expect that a person vaccinated last month could be effectually re-vaccinated 12 months hence?—Yes; but I meant to guard myself there about the definition of a re-vaccination.

4722. I want to understand clearly what it is that you wish to say?—You get a result from re-vaccination which is only a papule and not a vesicle. The papule varies immensely, from hardly anything at all to a papule of some size, and from that to a vesicle.

4723. Would you call that papule an effectual re-vaccination?—Yes, I should certainly. It is as much as you can produce in that individual.

4724. (*Sir James Paget.*) It is a mere matter of words. What would you call a re-vaccination which produced a complete vaccine vesicle? Would you call that merely effectual and not distinguish it from that which produced a papule?—When you produce a papule, that is all the result that you can produce in that individual. If you vaccinate him half-a-dozen times you get nothing else.

4725. Then by what term would you distinguish between the cases in which you produced papules and the cases in which you produced complete vaccine vesicles?—At Lamb's Conduit Street and also at Surrey Chapel we have a form of certificate for the Post Office boys that are re-vaccinated, and in it we have "vesicle" marked above the line and "papule" below the line. If it is a papule that is produced we scratch out the word "vesicle," and if it is a vesicle produced we scratch out the word "papule."

4726. You do make a distinction between the two groups of cases?—Quite so.

4727. (*Dr. Bristowe.*) You mean that these different papules and vesicles are the specific results of vaccination?—That is what I mean.

4727*a*. And though the specific result which you get in a case where there is only a papule is the only specific result you can possibly get, still it is specific?—That is what I mean.

4728. (*Professor Michael Foster.*) But that papule is the maximum effect which can possibly be produced in that subject at that time by any quantity of the virus?—Yes.

4729. When the condition of the subject is changed, then you may get a complete vesicle, owing to the diminution of the immunity?—Yes.

4730. And that complete vesicle bears the same relation to the subject as your papule does at the earlier stage, where there is a certain larger quantity of immunity still left in the organisation?—Yes.

4731. It would be desirable to have two different names for those two different kinds of vaccination, would it not?—It is in either case a successful revaccination, and that is all that you can certify.

4732. (*Mr. Meadows White.*) You mean that being successful it is evidence of immunity, and that it is as much as you can get; and therefore it shows to you a satisfactory state of things, the patient being, according to your judgment, protected?—Yes, fully protected by the re-vaccination.

4733. (*Professor Michael Foster.*) Are you aware that in the minds of a great many people successful vaccination would mean that the immunity had been lost?—Yes, no doubt; but the loss of the immunity is a gradual loss.

4734. But really successful vaccination would mean that that immunity had been so far lost that at all events there was great fear of the subject catching small-pox?—You might define successful re-vaccination as that amount of result that you would produce if a person would have caught small-pox on being exposed to it. But I do not thus define it.

4735. (*Sir James Paget.*) The question has often been asked here whether if a person can be successfully re-vaccinated, that is to say, can be vaccinated so as to produce a complete vaccine vesicle, that indicates that he was as susceptible of small-pox as if he had never been vaccinated; do you think he is?—Where a complete vesicle, running the course of a primary vesicle is produced, I believe that the individual, if he had been exposed to small-pox, would have taken it.

4736. Would you think the same of a man in whom a papule was produced?—No, he would not necessarily have been liable to attack by small-pox.

4737 (*Professor Michael Foster.*) In the minds of most people successful vaccination means a vesicle, which in your mind means the liability to take small-pox?—Yes, very likely.

4738. Those people would not apply your phrase, "successful vaccination," to the papule, which you still regard as indicating protection to the person to a certain extent against small-pox?—No, perhaps not.

4739. (*Mr. Meadows White.*) In one case the success means the success in producing the perfect vesicle?—Yes.

4740. (*Mr. Savory.*) In the majority of cases would the vesicle of successful re-vaccination differ from the vesicle of primary vaccination?—It would be entirely a matter of degree.

4741. But, apart from degree, in the majority of cases would there be a difference at all?—Not if you acquire your perfect susceptibility to small-pox again.

4742. I am not talking of susceptibility, but of the appearance of the vesicle itself. After successful re-vaccination could you tell the vesicle which follows from the vesicle of a primary vaccination?—I believe, in the majority of cases, you could.

4743. In the great majority of cases you could tell the difference?—Yes, certainly.

4744. (*Professor Michael Foster.*) There is still some effect left?—Yes, of the primary vaccination.

4745. (*Mr. Savory.*) The difference would be due to the fact that after re-vaccination a vesicle would not be so perfect and complete as after primary vaccination?—Yes.

4746. (*Chairman.*) What are the features which would distinguish re-vaccination, successful to the extent of producing a vesicle, from a primary vaccination?—The vesicle of re-vaccination always runs its course more rapidly than that of primary vaccination.

4746*a*. (*Mr. Savory.*) Almost invariably?—Almost invariably.

4747. Would not that fact imply that there was some effect of the primary vaccination still left?—I believe that is what it does imply.

4748. (*Professor Michael Foster.*) So that practically, absolutely successful re-vaccinations, as indicating that no trace has been left of the original vaccination, are extremely rare?—Extremely rare. There are few individuals that are liable to a second attack of small-pox, and there are about the same number I should think that are liable to fully successful re-vaccination.

4749. (*Sir Edwin Galsworthy.*) But is not a second attack of small-pox frequently as severe as the first?—I believe it is.

4750. (*Dr. Collins.*) Have you had any experience of vaccinating persons who have had small-pox?—Yes, I have vaccinated several. A good many of the Post Office boys who come up for re-vaccination are boys who have never been vaccinated before, but who have had small-pox.

4751. What is the result?—Exactly like an ordinary re-vaccination.

4752. Which re-vaccination?—Supposing that they had been vaccinated instead of having small-pox before, you would produce the same results by your re-vaccination.

4753. But I understand you to include in your way of using the term "successful re-vaccination," everything from a papule on the one hand to a nearly perfect vesicle on the other?—Yes, any re-vaccination that reduces susceptibility to zero.

4754. Which of the many stages which would intervene between those two limits would be the kind of result which you would find in those boys who had had small-pox but had not been previously vaccinated?—I do not know the minute differences, but what I am about to say will give you an idea; let us take two adults of like age one of whom had small-pox at a certain date while the other was vaccinated at the same date:—if you were to re-vaccinate the latter and to vaccinate the former the results would be the same. The person who was re-vaccinated would have a modified vesicle, and the one who had had small-pox would have a modified vesicle in the same form.

4755. (*Chairman.*) In the vesicles of those who have had small-pox, do you find the same kind of differences of degree of susceptibility to the vaccine virus that you find in the cases of re-vaccination?—Yes.

4756. All those who have had small-pox and who are afterwards vaccinated do not present exactly the same characteristics?—No; it will depend on the interval between their small-pox and their subsequent vaccination.

4757. You will find in some slight results and in others you will find the vesicle of re-vaccination?—Yes; in some papules in some vesicles.

4758. (*Mr. Meadows White.*) Have you ever found a perfect vesicle of re-vaccination in a case where there had been small-pox?—My opportunities of vaccinating people who have had small-pox have been very limited.

4759. (*Professor Michael Foster.*) How many cases have you vaccinated after small-pox?—I should think 20.

4760. In how many of those cases did the re-vaccination give you papules?—In nearly all of them, I should think; but they were mostly Post Office boys, and the interval since their small-pox was not great.

4761. You have not as yet got a vesicle?—No.

4762. (*Dr. Collins.*) Did none of them give you vesicles?—No, I believe not one.

4763. You are sure of that?—Yes, I think so.

4764. Do you find much difference amongst calves in their susceptibility to vaccination?—No, I think we have only had one insusceptible calf, and we have vaccinated some 1,500 calves.

4765. Have you ever tried re-vaccinating calves at intervals of time?—Yes, but only after a short interval.

4766. With what result?—With no result at all if it has been a successful primary vaccination.

4767. What has been the longest time after the primary vaccination at which you have re-vaccinated a calf?—A month, I think. Of course the time is limited to us experimentally by the expense of keeping the calves at the station.

4768. In this paper on cow-pox, horse-pox, and small-pox you refer to some experiences in India in which stocks of vaccine lymph are stated to have been raised from animals suffering from Cattle Plague; were the results of such vaccinations stated to be perfectly normal and successful?—I am afraid I must confess that my memory is rather defective, and I forget what I have said in that thesis.

4769. For instance, taking Dr. Macpherson's experiments, it is stated that the vaccination of children from the crusts obtained from the cattle "had all the characters of true vaccine; the child suffered much from "fever for four days. Two children were vaccinated "from this vesicle with complete success, the symptomatic fever being very severe; from these two children five others were successfully vaccinated, and the "stock thus established was afterwards regularly continued. Some of the children vaccinated with this "lymph were tested by variolous inoculation and exposure to variolous infection and found secure." Have you formed any opinion as to those experiments of Cattle Plague inoculation?—I know Dr. Murchison advocated the vaccination of animals to save them from the cattle plague, and there were a large number of experiments performed upon the animals at that time, but they did not save them at all from cattle plague.

4770. But I was referring rather to the inoculation of children with lymph obtained from that source?—This is quite beyond my personal experience. This is only what I got from literature.

4771. You would not venture further than the facts as stated in your pamphlet?—Quite so.

4772. Do you happen to be familiar with the pamphlet headed "Facts concerning vaccination for the heads of families" which is stated to have been revised by the Local Government Board and issued with their sanction?—No, I do not know it.

4773. Can you tell us who is likely to have been connected with the revision of that pamphlet?—The Medical Department, I suppose.

4774. (*Dr. Bristowe.*) Can you give us any information at all with regard to the views of those who have investigated the cow-pox; on what grounds were you induced to use the lymph from it?—Dr. Klein brought up some of the lymph and we vaccinated calves with it, producing quite characteristic-looking vesicles; and then I brought some of the lymph from these calves down and used it on some of the children at St. Thomas's.

4775. In your opinion does vaccine virus deteriorate by going from human being to human being?—My opinion is that it does not at all deteriorate if properly managed.

4776. (*Sir Edwin Galsworthy.*) In the case of candidates for the office of public vaccinator, what is the exact evidence required of their qualification; are they examined, and, if so, where?—I examine them on the subject matter of my lectures on vaccination to the student class I am instructing week by week at the Station; inquiring as to their knowledge of the history of vaccination, of the vaccination laws, of the Orders and Instructions of the Local Government Board, and of the significance of the different "arrangements" made for Public Vaccination. Also I examine them as to their manual dexterity in vaccinating, taking lymph, and the like.

4777. Then they have to keep certain times and make certain attendances at your stations?—The students have, but not practitioners coming for mere examination. They only come once.

4778. Do you grant the certificate?—Yes, I do. The certificate on a single examination is only for medical men who have already passed their examinations but who have not obtained a certificate before. When such practitioners are appointed public vaccinators they are required by the Local Government Board to obtain a certificate of competence in vaccination, and I am allowed to give certificates on a single examination to these persons.

4779. They are appointed by the guardians, are they not?—Yes; but their appointment has to get the sanction of the Local Government Board.

4780. Do the guardians always require these certificates?—I believe the certificates are invariably required before the appointment is confirmed by the Local Government Board.

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4781. You told us that at the Surrey Chapel Station you formerly used the humanised lymph, and now you use the calf lymph; why was the change made?—I think we renewed our stock there from the Calf Station more as a matter of convenience at the time than anything else.

4782. In what year was that?—It was about the year 1887, I think.

4783. (*Dr. Collins.*) Are you aware that in a communication by Dr. Klein to the Local Government Board in 1887–88 he makes this statement:—"In the study of "the Wiltshire disease proper I have already made "some progress, but hardly sufficient to warrant an "attempt to diagnose it as seen during life from other "teat diseases"?—I do not remember that.*

4784. He also states on page 214: "In view of this "second differentiation of a definite disease from among "the mass of cow diseases that show sores on the "teats, the old division into true and spurious cow-pox "has become manifestly insufficient. It is seen that "the name 'spurious cow-pock' has in all probability "been used to cover a variety of sores having essential "differences in nature, just as until the time of Jenner "the name 'cow-pock' had covered along with various "other things the disease which we now know as vac-"cinia. But it is one thing to have learnt the essential "nature of these sores in the cow that are concerned "with vaccinia or scarlatina in the human subject, and "another thing to affirm the distinguishing characters "by which those sores may be recognised from other "sores that once on a time laid claim to being equally "with them cow-pox or spurious cow-pox. Our new "discontent with the name spurious cow-pox does not "at once give us a knowledge of the nature of those "sores which remain on the list, and we are now learn-"ing that there are many different kinds of such sores." So that apparently the pathology of cow-pox is rather obscure even at the present time?—That is Dr. Klein's opinion.

4785. (*Sir James Paget.*) Was it after that that he sent you the lymph from the Wiltshire disease?—He brought up the lymph I have referred to the Lamb's Conduit Street Station, and we tried the lymph on a calf.

4786. When did he do that; was it at the same time that he made that report or afterwards?—He must have made that report before, I think.

4787. He made the report before you tried the lymph?—Yes.

4788. (*Chairman.*) It was in the year 1887, as I understand, that you tried this lymph?—So far as I can remember, it was 1888.

4789. (*Sir James Paget.*) And the effects produced by that virus led you to the complete belief that the Wiltshire disease is true cow-pox—vaccinia?—Yes, that is to say, I believe that the disease of the cow from whom that lymph was taken was true cow-pox.

4790. (*Professor Michael Foster.*) Do I correctly understand that from your own observation with your own strain of calf lymph you find that inflammation and other untoward consequences are more likely to occur when the lymph is taken on eighth day than when it is taken on the fifth day? If you remember, we discussed that point at the last meeting, and I understood that you compared your own five-day lymph with Warlomont's eight-day lymph. I subsequently understood you to say that besides that you had used your own lymph on the eighth day as well as on the fifth day?—Yes.

4791. And with your lymph on the eighth day you find a greater tendency to inflammation and other things than with your own lymph on the fifth day?—Yes, I think so.

4792. You said, I think, that you thought there was less inflammation, and so on, with human lymph than with calf lymph?—Yes.

4793. Is that simply an impression, or is it an opinion which you have worked out on carefully collected data?—I think that is more of an impression.

4794. A general impression?—Yes.

4794*a*. You have not worked the question out carefully?—No.

4795. Is the re-vaccination which we were talking about just now a re-vaccination of calf lymph on calf lymph?—No, the lymph that we use alike for primary vaccinations and for re-vaccinations would be human lymph.

4796. So that all your re-vaccinations are with human lymph after human lymph?—Yes, at Surrey Chapel.

4797. You have not any data of human lymph after calf lymph, or calf lymph after human lymph?—None as to human lymph after calf lymph. At Lamb's Conduit Street, however, all our re-vaccinations are performed with calf lymph. But so far as I have observed it is a matter of indifference whether re-vaccination be performed with human lymph or with calf lymph; the result is practically the same.

4798. (*Mr. Hutchinson.*) I understand you to say that you have no reason for the preference of calf lymph to human lymph, or human lymph to calf lymph?—No.

4799. Is one followed by irritation more frequently than the other?—I think not; I do not think that there is any real difference.

4800. You do not think that there is any difference in the ulterior consequences?—No.

4801. (*Mr. Meadows White.*) You did say, did you not, that there were differences between the effect of calf lymph taken on the eighth day and calf lymph taken on the fifth day?—Yes.

4802. (*Professor Michael Foster.*) When you said in answer to Question 4338 that it was a matter of comparative indifference which lymph was used, were you taking into consideration the probability of inflammation and other untoward consequences, or was your attention in answering that question directed only to the efficiency of the vesicle?—I was speaking then with regard to the vesicle, I think; at least that was my impression at the time.

4803. But you are not prepared to change that statement?—No, I think not.

4804. Such differences as there may be between calf lymph and human lymph with regard to the development of untoward results are so small that you still regard them as a matter of indifference?—I think so.

4805. (*Dr. Collins.*) Then would your answer to Question 4491 be correct where you say: "My impression "is that you get more sore arms after using calf lymph "than after using humanised lymph"?—I am afraid that I have contradicted myself there as in many other places.

4806. But will you now give us your general impression?—My impression is that there is very little difference between the two.

4807. (*Chairman.*) But so far as there is a difference, the difference would be in the direction of the calf vaccine tending more to inflammation than the human vaccine?—Yes, that is so.

4808. (*Mr. Whitbread.*) Quite accepting your explanation of the way in which the plural "hospitals" got into the card, do you think it prudent now to issue that card with a statement on it confined to the one hospital when, as a matter of fact, it has been proved that re-vaccination does not give such absolute immunity?—I do not know that it would really make very much difference if you left the "s" in. There would be very few, if any, cases where a nurse who has had small-pox has been previously successfully re-vaccinated.

4809. (*Dr. Collins.*) Are you aware that it is stated in a pamphlet, which has been issued with the sanction of the Local Government Board, that soldiers who have been re-vaccinated can live in cities intensely affected by small-pox without themselves suffering to any appreciable degree from that disease?—Yes, I know that statement.

4810. It is important to ask you that question, because evidence has come before the Commission that the reason for the excess of small-pox in the army in India, which is re-vaccinated, is their greater exposure to contagion?—I know nothing of the Army in India.

The witness withdrew.

* In revising this proof I observe repeated reference (Questions 4783 to 4789, and as well Questions 4630 to 4637) to lymph *from Wiltshire* used by Dr. Klein at Lamb's Conduit Street. I have written to the Chairman of the Commission stating, in reference to these Questions and Answers, that the lymph to which I was here referring came not from Wiltshire but from Alderley, in Gloucestershire.—R. C.

Mr. CHARLES CREIGHTON, M.D., examined.

4811. (*Chairman.*) You are a Doctor of Medicine?—I am.

4812. And you have been occupied since 1872 with original laboratory work on pathology and the allied sciences?—That is so.

4813. And with teaching anatomy?—Yes.

4814. And since 1882 also with epidemiology?—Yes.

4815. You have translated a treatise of Professor Hirsch on Geographical and Historical Pathology?—I have.

4816. And you have also written some papers of your own on pathological subjects?—Yes.

4817. Since 1886 have you directed your attention specially to the subjection of vaccination and small-pox?—That is so.

4818. From what point of view have you directed your attention to it?—I began, first of all, to inquire into the nature of cow-pox and the historical sources of vaccine lymph; that led me into a considerable course of reading among the earlier writers.

4819. And have you also investigated the subject of the statistical experience in relation to vaccination?—Subsequently I went over all the statistics, but I have not written upon that part of the question, as I have upon the other part of the question.

4820. Dealing first with the historical sources of British vaccine, what have you to say with regard to that part of the subject?—The first vaccine put into circulation was obtained by Woodville, and it so happened that it was of a much milder type than the vaccine which had been tried experimentally by Jenner; and, perhaps, I could best explain the difference between the two by stating what Jenner found in his experience.

4821. But what are the two sources from which lymph has been obtained? Am I right in understanding that you desire to deal with two sources; one being directly from diseased teats of cows, and the other from disease contracted by milkers through handling the diseased teats?—That is so; vaccine lymph practically has been obtained on the one hand from sores on the milkers' fingers, and on the other hand directly from the cows' paps.

4822. You were proceeding to speak of some distinction between the lymph that had been obtained from different sources in early times; do I rightly understand that the lymph in both cases was obtained directly from the cow?—Woodville used both sources concurrently. Jenner also used both sources.

4823. What have you to say with reference to the difference between the two sources?—I make out no great difference between the milkers' cow-pox and the cows' disease; but the difference that I was going to point out was the difference between Woodville's lymph, which became successful and was circulated all over the world, and Jenner's lymph, which merely had an experimental interest.

4824. When you say Woodville's lymph became successful, in what sense do you use the word "successful"?—It became the source of a continuous series of vaccinations, Jenner's attempts having never gone beyond the fifth remove from the cow, and in two or three of them not beyond the first remove.

4825. What is the point which is illustrated by that distinction between the lymph obtained by Jenner and that obtained by Woodville?—The point is the original characteristics of cow-pox as Jenner experienced them, and as they have been subsequently found by other observers.

4826. I do not quite understand how that is illustrated by the distinction between the lymph obtained by Woodville and that obtained by Jenner?—It so happened that Woodville's lymph became practicable, and was circulated all over the world as an innocuous substance because the cow-pox from which he took it was of a milder type than that of Jenner; the mildness of the type was more or less an accident which Woodville availed himself of.

4827. You do not draw any distinction between the disease of the cow, in the case of the cows from which Jenner took it and the disease in the case of the cows from which Woodville took it?—No. Jenner gave a guarantee of genuineness to Woodville's lymph, and he himself used it.

4828. With reference to the Jennerian lymph obtained from the cow, what are the points to which you wish to direct the attention of the Commission?—The characteristics of the disease, as it occurs in the cow, as they were described by Jenner in general terms, and as they were more particularly described by one of his veterinary neighbours and contemporaries, who practised at Gloucester, were that the disease was an ulcerous disease on the teats, and for the most part confined to them; it occurred only in a cow in milk, and it was supposed to begin in one particular animal, and then to be carried by the hand of the milker to the other animals. No one saw it exactly at the origin, no scientific person capable of describing the initial steps of the process ever saw those steps so far as is known; the milkers were the sole authorities as to the first appearances of the disease. Whenever the affected teats of a cow were seen by medical men or veterinary men, they were in a state of ulceration covered by crusts; so that the first appearance of cow-pox in a cow, though a matter of profound interest, rests upon the testimony of the milkers themselves, or the dairy farmers. The disease, whenever it has been seen by any one capable of describing it, has been described as an ulcerous affection of the paps for the most part covered by large crusts; sometimes the crusts have been less adherent than at other times, in which case one sees the ulcerous nature of the process quite distinctly: large ulcers described by Ceely 40 years after as having hard, round, sloping edges, and sometimes with granulations rising from the floor of the ulcer.

4829. Do you mean that the appearances were never seen by medical men in the early stages of the disease?—I think not. Ceely himself says he never could get lymph from unbroken vesicles; that was remarked as early as 1802 in an outbreak in Norfolk; so that what one might call an ideal cow-pox vesicle was never to be seen on the cow. They were always broken by the action of the milker's hands in milking the animal, so that cow-pox, so far as anyone has seen it who can describe it, is an ulcerous affection of the paps. Perhaps I might add that a veterinary neighbour and contemporary of Jenner, Mr. Clayton, who practised in Gloucestershire, within a radius of 10 miles of the city of Gloucester, a man of very large experience, communicated his experience to Dr. Beddoes, of Bristol, in 1799, the year after Jenner's Inquiry was published. He made a great many statements rather more precise than those of Jenner himself, and amongst other things he said:—"This disease may arise from any cause "irritating or excoriating the teats, but the teats are "often chapped without the cow-pox succeeding. In "chaps of the teats they generally swell, but in the "cow-pox the teats seldom swell at all, but are gra-"dually destroyed by ulceration." So in that sentence which I have read he indicates his own opinion as to the origin of this disease, namely, that it arises on the top of casual cracks or other common ailments of the cow's paps.

4830. Do you gather that from the passage which you have just read?—Yes. He says:—"This disease may "arise from any cause, irritating, or excoriating the "the teats." That was his opinion, and Ceely has practically accepted that view, that it arose spontaneously. "Spontaneously" is not an accurate term, but it is the term they all used, and it was used by Jenner himself in his evidence before the Parliamentary Committee of 1802; he speaks of cow-pox as spontaneous cow-pox; that was the way in which it was commonly explained, as something superinduced upon a trifling ailment, very often in a heifer in her first milk, owing to the tenderness of the heifer's paps from the fact of never having been milked before.

4831. By "spontaneous" they meant that it was not derived by contact with any other animal or with a human being?—Yes; just so, that it had not been introduced from outside.

4832. As regards milkers' cow-pox, what were the symptoms shown by the milkers who were affected with cow-pox?—They are described by Jenner, and Jenner's description has been confirmed by, I may say, all subsequent observers. After describing the beginning of them Jenner says: "These symptoms varying in their "degrees of violence, generally continue from one day "to three or four days, leaving ulcerated sores about "the hands which, from the sensibility of the parts, are "very troublesome and commonly heal slowly, fre-

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"quently becoming phagedenic, like those from whence "they sprung. The lips, nostrils, eyelids, and other "parts of the body are sometimes affected with sores; "but these evidently arise from their being heedlessly "rubbed or scratched with the patient's infected "fingers." And then Jenner himself gives no fewer than 16 references to milkers—dairymaids, or men milkers—or others, who had been infected; and, though he does not describe each of those 16 in detail, he mentions now and then the nature of the sores they had; for instance, he speaks of corroding ulcers in one case; in another case he speaks of "a poor girl who "produced an ulceration on her lip by frequently "holding her finger to her mouth to cool the raging of a "cow-pox sore by blowing upon it." That occurs at the 50th page of his Inquiry.

4833. That you say has been confirmed by other observers?—That has been confirmed by Jenner's contemporaries, though their language is not very precise, but more particularly by Ceely, who went into the question far more thoroughly than any one had ever done before, and published his researches in the eighth and tenth volumes of the Transactions of the Provincial Medical and Surgical Association. Ceely gives coloured plates of the sores upon the milkers' hands, and also in one remarkable case upon the temple, in which the sore was three-quarters of an inch long.

4834. In the earlier cases of vaccination what was the character of the effect produced by the original vaccine?—Ulceration was a common sequel of the original vaccinations; it was so common in Jenner's own practice that I believe it was the real barrier to his success in establishing a stock of lymph for general use. The instances of ulceration following the early vaccinations in the first removes from the cow are so numerous and so uniformly recorded by observers in all countries that I think it is not necessary to mention particular cases; but I have here an extract from a pamphlet written by Mr. Hicks, of Eastington, who was one of Jenner's intimates and was in his confidence from the first, and who was a strong supporter of his practice——

4835. Was he a medical man?—No, a manufacturer, but he was the first gentleman to have his children vaccinated, and he seems to have had a sufficient knowledge of the nature of the process. Mr. Hicks says at the 43rd page of his pamphlet, published at Stroud in 1803:—"Large ulcers are often the consequence of such "casual infection" (that is, accidentally in the case of milkers), "and the virus may probably be rendered "more mild after having passed several times through "the human constitution. This, I think, is the only "satisfactory way in which we can account for the fact "of sore arms being so prevalent in the first stages of "vaccine inoculation, and for their having almost "entirely disappeared since." Mr. Hicks's statement has no special value except as expressing the general experience. The same frequency of ulcerations in the early practice was noticed at Rotterdam, at Brandenburg, at Milan, and at other places abroad which I cannot now enumerate, as well as frequently in England.

4836. (*Sir James Paget.*) Not in Woodville's cases?—Not in Woodville's cases. Woodville does mention one case in which an ulcer followed, but in his general statement he says that he had no ulceration.

4837. (*Chairman.*) I gather that his use of lymph began very nearly at the same time as Jenner's?—Jenner had practically failed to circulate lymph. At the end of 1798 Jenner had no lymph to supply to those who wrote to him for it. In the month of January 1799 Woodville heard of cow-pox at a cow-house in Gray's Inn Lane, and by a remarkable piece of luck he managed to start a stock of lymph which went on continuously for 30 or 40 years, and may be going on still.

4838. (*Sir James Paget.*) You admit the element of luck?—A large element of luck. Perhaps I might explain wherein I think the luck consisted. Woodville had got the dairy people in London to look out for cow-pox and to promise to let him know as soon as any case occurred; and as soon as he heard of this outbreak at Gray's Inn Lane, within the first days of the symptoms being seen on any one of the cows, he obtained matter from those cows; and at the time when he got matter from that source, he says that only two or three of the cows were affected, whereas nearly 200 were ultimately affected by the disease. So that he got a stock of lymph for the inoculation of the human subject from a stage and phase of the disease when it was comparatively new or young, and had not become cultivated, as I believe it can be cultivated, into a more inveterate and virulent type.

4839. (*Chairman.*) Do you mean that he took it from the particular cow from which he obtained it at an early stage of the disease in that cow, or merely that he took it when a small number of the cows had been attacked?—I mean both; both a small number had been attacked, and I believe it was taken at an early stage.

4840. (*Professor Michael Foster.*) He speaks of a pustule, but he gives no description of it; was it a vesicle or an ulcer?—It must have been an ulcer, I think; it must have been an ulcer under a crust.

4841. (*Chairman.*) Why do you think so?—Because no one sees it in the cow in any other form.

4842. (*Mr. Meadows White.*) Was Woodville a surgeon?—He was physician to the small-pox hospital.

4843. He speaks of a pustule?—Yes; Jenner having constantly spoken of pustules when he meant ulcers.

4844. (*Sir James Paget.*) You would admit, I suppose, that it is not in the nature of vaccine disease to produce an ulcer; that if the lymph be taken early enough and from a case which has not been disturbed it produces a vesicle without ulceration?—That, as a matter of fact, happened in Woodville's cases.

4845. (*Chairman.*) You have told us that Woodville mentions only one case in which the vaccine inoculation produced ulceration, but what did it produce in the cases where it did not produce ulceration?—It produced a whitish vesicle, which is like the vaccine vesicle as we now see it on the arms of children or others. In one case, in Woodville's own notes, he speaks of an ulcer having followed, and no doubt ulceration frequently followed the use of Woodville's lymph when he circulated it. In his own hands, in a series of about 400 cases, there was only one case described in which the vesicle ulcerated.

4846. (*Professor Michael Foster.*) Did Jenner remark that ulceration did not follow the use of Woodville's lymph?—Yes.

4847. So that not only in Woodville's hands but in other hands it was free from the production of ulcers?—For the most part, but there were other cases in which ulcers followed. Addington, of West Bromwich, got lymph from Woodville, and in his first 11 cases he had five cases of ulceration. After that, he says, all the vesicles ended in a dry scab down to the 60th case.

4848. (*Chairman.*) The next point to which you wish to direct the attention of the Commission is the empirical connexion between cow-pox disease and small-pox?—Yes.

4849. What have you to remark upon that head?—The connexion was attempted to be proved by Jenner before he published his inquiry, and by his contemporaries within the first few months of the introduction of the practice, first by experiment and secondly by observing what followed in the vaccinated in the ordinary way of experience.

4850. What were the experiments?—The experiments consisted in inoculating a person affected by cow-pox with the small-pox. The point I wish to bring forward is that the practice of inoculation with small-pox had come at that time to be exceedingly mild, for it was the Suttonian method that was adopted. The Suttonian method was introduced into England in 1765 or thereabouts, and by the end of the century it had become the universal mode of practising small-pox inoculation, so much so that in the preamble of a Bill introduced into the House of Commons in 1808, inoculation is spoken of as the Suttonian inoculation, and is so contrasted with cow-pox inoculation. Suttonian inoculation produced a local pustule—a single variolous pustule—at the spot where the matter had been inserted, but according to Sutton's desire it should not have produced anything more than that; and in a great many cases it did not produce anything more than that; a certain number of cases happened in Sutton's practice in which there was a general eruption, but that was not his wish, and it was not the usual sequel.

4851. Do you mean that was the character of the inoculation with which Jenner made his experiments?—Yes, he tells us so implicitly.

4852. In the case of those who had been vaccinated did the results follow which followed in the ordinary cases of Suttonian inoculation?—It appears to me that the margin of difference was an imperceptible one; that practically the same results followed.

4853. You mean there was the same small-pox pustule?—A local pustule, I believe, followed in almost every case.

4854. You say you believe; what is the source of that belief?—I could give my grounds for that belief, first of all, by going over all the cases individually; but if Jenner's words are examined it is clear that he uses a phrase which means that a local pustule was produced.

4855. Do you mean that the result of Jenner's experiments was to show that the prior vaccination had produced no effect in changing the character of the result when you inoculated the small-pox?—That was not Jenner's conclusion by any means.

4856. But you say Jenner states the facts to be so, and draws the opposite conclusion. I do not quite follow you?—I do not say that he states them explicitly, but he states them.

4857. Could Jenner have been mistaken? If he saw that the result produced was that which was always produced in cases of inoculation, how was he led to the conclusion that prior vaccination had produced any effect?—It is incredible to me; I have so stated in one of the books I have written on the subject. I find in all these cases, when looked into, that something followed, and that that something seems to have been a local pustule. In a number of cases it is clearly stated. One of Jenner's correspondents, Forbes of Camberwell, says though he tried the test in a good many cases he produced a local pustule in them, and he had no doubt that from that pustule small-pox could have been produced; but he said that the constitution remained unaffected, there was no general eruption.

4858. (*Mr. Whitbread.*) And no fever?—Sometimes there was fever, and in Paris that was the distinction made by Salmade, who was inoculator for the *Comité Central*. He says, if you have a local pustule and fever that is enough.

4859. (*Chairman.*) Enough for what?—Enough for protection, according to the old method; and that was what the Suttonians all aimed at.

4860. In those cases of inoculation after vaccination, Jenner drew a certain conclusion, which you say was erroneous, but did he point out what he at all events considered to be the differences between the results produced in the individuals vaccinated and those produced in individuals who had not been vaccinated?—The contrast between the results upon vaccinated persons and the results produced in the ordinary course of pre-Jennerian practice, I believe was never explicitly stated by anyone in the whole course of the controversy.

4861. But what did Jenner say was the effect produced? He was making experiments to see if vaccination was of any use; he professed to find it was of use; he must have suggested something showing that it was of use——

(*Dr. Collins.*) Can you give us the number of cases upon which the original inquiry was based? You draw a distinction between those who had had a casual cow-pock at some prior date, and those who had been actually vaccinated by Jenner himself?—Yes, but I do not think it is of material moment. The first case illustrates what I say; James Phipps, who was vaccinated on the 14th of May 1796, was inoculated on the 2nd of July with small-pox matter, the source not being stated, I think, and the same effects followed——

4862. (*Mr. Savory.*) I have the case of Phipps. Jenner describes the inoculation, and then he says:—"But "now listen to the most delightful part of my story. "The boy has since been inoculated for small-pox, "which, as I ventured to predict, produced no effect"?—That is what one may call a colloquial account of it; the formal account of it occurs in the Inquiry, and the words he uses there are that the same effect was produced as commonly follows the application of variolous matter in anyone who has had small-pox or cow-pox.

4863. (*Chairman.*) Does he define what that is?—He defines it casually in a letter to Shorter, of Bloxham, some time after. If reference be made to that letter it will be seen that he uses the same formula that he used in other cases where he applied the variolous test, which means that a local pustule was produced.

4864. That seems to differ from his statement with regard to the case of Phipps, because that is not "no effect"?—I would attach no importance to slight differences in Jenner's language, because he was notoriously unprecise in his statements.

4865. (*Professor Michael Foster.*) Would he make no difference between no effect at all and a variolous pustule?—I believe he was capable of it.

4866. (*Dr. Bristowe.*) Does he?—He makes discrepant statements on different occasions.

4867–8. (*Chairman.*) Does he sum up at all the result of his experiments?—No; he never summarises the results of his variolous tests; he made only some two or three on vaccinated children, and in one of the cases in which he applied the variolous test, the case of a child, whose name was Mary James, after he returned from publishing his Inquiry in London in the summer of 1798, he distinctly says that a local pustule was produced, and also that there was fever, and a transient eruption upon the wrists; that occurs in the Further Observations.

4869. That was in one particular case?—Yes, that is one of the two or three cases of children that Jenner is known to have tested.

4870. In the case of Phipps you think when he says that he has a delightful fact to narrate, namely, that he saw no result, he must have seen some result, and that the result which he would have observed if there had been no vaccination; that is what strikes me as strange?—It strikes me as incredible also.

4871. (*Sir James Paget.*) Many inoculators made a large number of experiments by inoculating those who had been vaccinated?—Yes.

4872. Woodville among them?—Yes.

4873. Woodville says he inoculated nearly 400 who had been vaccinated?—Yes.

4874. Do you think Woodville, who was the inoculator to the small-pox hospital, would have confused 400 or 500 cases and thought the same result was produced after vaccination as when the person had not been vaccinated?—Woodville's variolous tests seem to me to be rather vitiated throughout. He had in his experience quite a large number of cases in which small-pox attacked the vaccinated accidentally from their being in the atmosphere of the small-pox hospital. It was the peculiarity of Woodville's practice, that there were concurrent small-pox and cow-pox going on, and in his 400 variolous tests he includes all those who had had small-pox before by accident; all those who had gone through small-pox accidentally before were always tested by inoculation some weeks after.

4875. I speak of those whom he vaccinated?—They had all been vaccinated.

4876. Whether they had had small-pox or not?—They had the small-pox after they had been vaccinated.

4877. He vaccinated none that had already had small-pox?—No.

4878. (*Professor Michael Foster.*) A certain number of those cases had variola concurrent with vaccination, and the immunity which afterwards followed in those cases was due to the variola they had and not to the vaccination?—Yes.

4879. (*Chairman.*) That would not cover the whole 400?—No.

4880. In a certain number of cases he inoculated small-pox virus after vaccination; did he profess at all events to find some different result to that which he would have found if they had been inoculated without vaccination?—The contrast was never drawn formally by anyone. They said, in a very slip-shod sort of way, there was evidence of protection, that what followed was so trifling that it did not amount to anything, forgetting that the Suttonian practice led to nothing in ordinary except a trifling amount of small-pox.

4881. Was Woodville accustomed to adopt the Suttonian practice?—I cannot say as to that; the only account I can find of it is in the preface to his History of Small-pox Inoculation in Great Britain, in which he says new experiments are needed, because the "established process" (meaning Sutton's) will sometimes fail of its effect, and at other times produce the disease in an aggravated form.

4882. (*Dr. Bristowe.*) Can you quote Woodville's own words?—I have quoted them.

4883. I mean with regard to the results of inoculation after vaccination; you have not quoted his words, you have given your interpretation of what he says?—I do not remember the words.

4884. (*Dr. Collins.*) Did not Jenner, as a matter of fact, complain that the lymph he received from Woodville

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gave rise to eruptions while it did not give rise to ulcers?—Not in the first cases certainly.

4885. (*Chairman.*) You cannot tell us what Woodville recorded as the result of his experiments which satisfied him that the vaccination had a protective effect?—He never discusses the point at length, and never draws any contrast between what the Suttonian practice would have produced in ordinary, and what it produced in those particular cases. He states his conclusion and his satisfaction with it in general terms. Woodville's 400 cases are part of a large number of so-called variolous tests, to which I attach comparatively little importance beside those of which we have the particular detail.

4886. Whether he used Sutton's method, or any other method, must he not at all events have thought he saw some difference between the effects after vaccination of the method he used and the effects produced without vaccination?—They seem to have set up a standard for the variolous test as if it included an eruption and fever.

4887. Have you any reason to suppose that Woodville used in those test cases any other method of inoculation than that which he was in the habit of using for inoculation for small-pox?—No, I think not.

4888. Then, if he continued to use the same method in these experimental cases, must not it have appeared to him that there was some difference in the result to lead him to make the assertion that vaccination was a protection?—I have no doubt there were differences, but, as I say, the margin of difference was imperceptible, it cannot have amounted to much.

4889. I do not quite gather your reason for saying that in Woodville's case?—Because Sutton's method in ordinary was calculated to produce a local pustule, although in a certain number of cases it produced also variolous fever, and eruption after the eighth or ninth day.

4890. What is your ground for saying that in those test cases of Woodville's the inoculation, whether it was the Suttonian or any other, after vaccination produced those same results?—As regards Woodville's own cases there is no ground for saying that, because we have no particulars; we can only infer what the Sutton method would have produced in ordinary circumstances, and what it did produce on the average.

4891. Surely Woodville's experience, and the conclusion he founded upon that experience, would be more important, would not it, than a theory which assumes the question which is under discussion?—If he had given any discussion of the problem it would have been of value as testing the correctness of his conclusion, but there is no such discussion.

4892. (*Mr. Savory.*) There are specific statements of the want of effect produced by inoculation with small-pox after vaccination?—There are many such statements.

4893. (*Professor Michael Foster.*) And in some cases it is stated that there was actual variola after vaccination?—Even where variola did follow it was thought of no account. I have quoted in this book the results of the variolous test as used by Mr. Ward, surgeon to the Manchester Infirmary.

4894. (*Chairman.*) When was that?—In 1799.

4895. (*Professor Michael Foster.*) Might we have a little clearer statement of your notion as to what the Suttonian method was?—The Suttonian method consisted of several parts. It consisted in preparing the patient, and in a certain kind of what I may call hygienic treatment; but so far as regarded the inoculation itself, it consisted in taking the matter, not from a natural case of small-pox, but from a previous case of inoculation, and so passing it through a succession of subjects from arm to arm. That was an innovation on the old practice which began long before Sutton. It is mentioned by Kilpatrick in his account of inoculation in South Carolina a good many years before Sutton, but it was carried to its greatest length in Paris by Gatti in the years before Sutton began his practice. In 1766 it is stated that Alexander Reid, the surgeon of Chelsea Hospital, had carried the small-pox matter through 30 removes from its original source from arm to arm. Bromfeild also mentions that 20 children had been inoculated with small-pox matter at the 14th remove from a natural case of small-pox; so that what was afterwards supposed to be the discovery of Jenner, namely, passing matter from arm to arm, was an old Suttonian practice, and the effects of that were to reduce the inoculation of small-pox to the mere formality of small-pox; that is to say, to a local pustule and little else.

4896. (*Sir James Paget.*) Was that protective against small-pox?—I should not like to say whether it was protective against small-pox.

4897. (*Professor Michael Foster.*) Was not it the case that one large part of Sutton's method was a cooling regimen?—That was part of it, doubtless.

4898. Was there not a great difference of opinion among those who followed Sutton's practice as to what was the essential part of the treatment, whether preparatory medicine or cooling regimen, or this practice of taking from an inoculated spot itself?—I believe such differences of opinion did exist. Sutton kept his treatment more or less secret.

4899. Ruston, for instance, who wrote on inoculation, in discussing the value of those different parts of the treatment, says: "If I were to give the preference to "one thing more than another it would certainly be the "diet and the medicine." Then was not it the case that in the majority of instances the appearance of what is spoken of as a local pustule was followed by an eruption; and was not there an effort on the part of Sutton to minimise the reports of eruption?—No doubt.

4900. And does not Chandler, who was a Suttonian, write to this effect, "It is all very well to say the eruptions were few. I have seen hundreds of pustules"?—Chandler did say eruptions followed, and I quite admit that Sutton tried to minimise, to use your expression, the effects of his own method; he could not guarantee a local pustule only.

4901. Was not it the case in Jenner's time that the inoculation, however carried on, very frequently at least produced eruption? You said that the common result was to have one vesicle only?—No, I said, or meant to say, that was what they aimed at.

4902. What was the result?—The result was, as I said already, that they did not always succeed.

4903. In such records of inoculation as we have of that time, do not the words "burden of vesicles" occur again and again in describing the results?—No doubt the words "full burden" are used, but I do not know that they apply to the majority of cases or to how large a proportion.

4904. (*Chairman.*) Is there any authority for the statement that the normal result of inoculation by Sutton's method was only a single local pustule?—All I can say is that that was the object the Suttonians aimed at; that was what satisfied them.

4905. That is very different from the result produced. What I want to know is the normal result produced?—I believe it is impossible to gather what the average result might have been, but no doubt the inoculation produced in the majority of cases no more than a local pustule.

4906. (*Professor Michael Foster.*) Are there many cases on record in which in reference to inoculation the result is stated as being limited to a local pustule?—I doubt if there is a single case published with full details, such as are now published.

4907. Are there not at the same time many cases of inoculation in which reference is made to a greater or less number of pustules coming out, and eruptive fever?—With no more particularity than in the other case.

4908. (*Dr. Collins.*) Professor Crookshank says that Sutton advertised that "if any patient had 20 or 30 "pustules he was said to have the small-pox very "heavy"?—That was Sutton's advertisement, to which I think comparatively little importance need be attached.

4909 (*Mr. Meadows White.*) That is the language of a clergyman employed by Sutton who preached sermons and wrote exaggerated accounts of the result of the Suttonian practice.

(*Professor Michael Foster.*) After inoculation an inflammation appeared at the spot inoculated; about the fifth day that became a vesicle, and with that an eruptive fever came on, and that was speedily followed by a greater or less number of pustules over the body generally?—Yes.

4910-11. The lymph taken on the fifth day from the local pustule did frequently, at all events, appear to the observers if the pustule was in their opinion a proper one, to produce the ordinary symptoms of small-pox, produce an eruption, and so on?—It produced much less eruption than was produced by the older method.

4912. It is admitted that that system produced fewer pustules. Ruston argues that the fewer pustules from that method were due to diet and regimen quite as much as to the actual mode of inoculation?—Salmade, who wrote a treatise on inoculation about the same time as Jenner's Inquiry appeared, objects to the inoculation part of the Sutton practice, the taking of matter from arm to arm and in what they call a crude state, for the reason that after it had passed through a certain number of arms the effect would go off altogether. That is distinctly stated by Salmade.

4913. (*Sir James Paget.*) Without reference to Sutton's method or any other, merely looking to the fact that a large number of persons besides Woodville took to the practice of vaccinating, having all been in previous years inoculating, is not it highly improbable that they should all have been deceived and believed that the same result followed in the vaccinated as followed in the unvaccinated?—As I say, it is incredible.

4914. Do you think that they did overlook it, incredible as it is?—Yes; I think the sequence of events was this, that when they inoculated a cow-poxed subject and found only very little effect, they said it does not signify; forgetting that very shortly before they had been content with that same effect as a due result of small-pox inoculation.

4915. (*Chairman.*) What is your ground for forming that belief?—I formed that belief gradually from a study of the whole history of small-pox inoculation itself, and from a study of the manner in which the variolous tests were reported.

4916. You have not given us anything from what Woodville says, as you have in the case of Jenner, to cast doubt on the result?—The reason I have given nothing from Woodville either in this examination or in what I have published is that there are no details given by Woodville which one can lay hold of, but there are results given by others, and those I have quoted and I am prepared to repeat.

4917. (*Sir James Paget.*) Given by English observers?—Yes.

4918. Who are they?—I have here before me a report of 14 cases by Mr. Ward, the surgeon to the Manchester Infirmary, page 130 of "Jenner and Vaccination." I may say I searched through a whole library of literature to get definite statements as to what followed when the variolous test was used, and I do not think I have overlooked any that were worth re-producing on the ground of their precision or definiteness.

4919. I see you say, at page 130, "Evans, of Ketley, "near Shifnal, had vaccinated successfully 68 persons, "of whom 39 had vaccinal eruptions and several had "troublesome ulcers; of these he tested 12 with small-"pox and found that they resisted it"?—That is his statement, but he gives no particulars.

4920. (*Professor Michael Foster.*) Suppose the inoculation totally failed, what particulars would you expect?—He does not say it totally failed; he says "they resisted it."

4921. (*Sir James Paget.*) What more particulars do you want? Supposing a person is inoculated, say, with a lancet, and there is no effect whatever beyond the healing of the wound, that he puts down as "no effect" or "no result" or "resisted"?—When one has to take a man's *ipse dixit* about a matter of that sort I set it aside altogether as not counting one way or the other. I go to those cases where there are particulars, and then I can follow the actual sequence.

4922. (*Chairman.*) That is from an inherent doubt on your part of all observers?—By no means. From the probabilities as they have arisen in the course of my inquiries.

4923. (*Dr. Collins.*) Do you know the experiments of Brown, of Musselburgh?—I know them only at second-hand; I understand they were adverse to the variolous test.

4924. (*Mr. Hutchinson.*) Is there any proof that Woodville used Sutton's process?—The only proof that I know is in the preface to his History of Small-pox Inoculation (1796); he speaks of it as a recognised process. He says that new researches are needed because the established process in certain cases not only failed of success, that is, failed to protect, but evidently produced the disease in an aggravated state; and my inference from that would be that Woodville really wanted a milder process than Sutton's, or more uniformly mild at least.

4925. (*Professor Michael Foster.*) You were calling our attention to Mr. Ward's cases?—This is the most complete set of variolous tests I have found.

4926. (*Chairman.*) In what sense most complete?—Drawn out in the greatest detail.

4927. (*Professor Michael Foster.*) Is the description of Case 1 an accurate description?—That is all I could find in the original papers.

4928. I thought that in the original papers, what appears to have been confluent small-pox, followed after vaccination?—Yes, I understand so.

4929. And the inoculation afterwards was ineffectual?—I did not read it so, but I may have made a mistake. Case 1 is that of a girl aged seven; successful vaccination produced oblong vesicle on the 13th day full of limpid fluid and surrounded by an areola; she was thereafter inoculated with small-pox and had the disease in the confluent form (1,600 to 1,800 pustules). That was all I could make out of Ward's own statement, and in the commentary I could find nothing by which he explained that rather singular result.

4930. (*Chairman.*) Are those cases quotations from the Medical and Physical Journal, or are they your summary of them?—Those 14 cases of Ward's are my summary.

4931. In your view of those 14 cases were they different from the cases which you referred to immediately before, the cases that Evans of Ketley refers to; you place them in a different category altogether?—On the ground that I am unable to follow the particulars; that I am unable to check the author's inference from his facts.

4932. You give a summary of Evans' account of his cases as given in the "Medical and Physical Journal"?—I cannot recall his own words; my method was to transcribe the author's own words into my note-book, and when I was writing this book, with a view to brevity and other considerations, I stated what I thought was the equivalent.

4933. (*Sir James Paget.*) I observe in Case 10 you put in, "Inoculated from Case 1, evidently with the co-"existent small-pox matter mistaken for cow-pox;" what was the evidence of that?—That was an inference from the fact that cow-pox did not follow, but only small-pox.

4934. This is an inference, not evidence?—Ward himself did not know the difference between cow-pox and small-pox. It is necessary to draw an inference, and that is the inference I draw in that case, which is rather to the credit of vaccination than against it.

4935. It is a further inference from the first inference that he did not know the difference between cow-pox and small-pox?—One's first impression from reading his paper is that he had confused cow-pox and small-pox; that probably he was under the impression that cow-pox was small-pox of the cow. That confusion comes out in several of the earlier writers.

4936. Do you think he was under the impression that vaccination produced the same effects as inoculation?—No; for one thing he would not look for an eruption after vaccination.

4937. You do not mean the same in the effect of communicating the virus, but only the same in what you may call the ultimate nature of the disease?—Yes.

4938. (*Dr. Bristowe.*) How do you account for the statement with regard to Cases 10 and 11?—I cannot explain how it happened, but it seems to me that 10 and 11 were inoculated with small-pox by mistake; they do not affect the average; you may strike them out as being cases of misadventure.

4939. (*Professor Michael Foster.*) Small-pox taken from Case 1; that is according to your account from pustules due to inoculation which followed after a vaccination?—Yes.

4940. Is not it rather strange that he should vaccinate from the pustules of the subsequent inoculation with small-pox?—I should like anyone who criticises these statements to go over the original documents.

4941. (*Chairman.*) Is there any record where Ward got his vaccine lymph from?—I have not noted it; it is not in my memory whether it is recorded or not.

Adjourned till Wednesday next at 1 o'clock.

Twenty-first Day.

Wednesday, 11th December 1889.

PRESENT :

THE RIGHT HON. THE LORD HERSCHELL IN THE CHAIR.

SIR JAMES PAGET, Bart.
SIR EDWARD HENRY GALSWORTHY.
MR. WILLIAM SCOVELL SAVORY.
DR. JOHN SYER BRISTOWE.
DR. WILLIAM JOB COLLINS.
PROFESSOR MICHAEL FOSTER.
MR. JONATHAN HUTCHINSON.
MR. J. ALLANSON PICTON, M.P.
MR. F. MEADOWS WHITE, Q.C.

MR. BRET INCE, *Secretary.*

Mr. Charles Creighton, M.D.

11 Dec. 1889.

MR. CHARLES CREIGHTON, M.D., further examined.

4942. (*Chairman.*) The last question put to you was : "Is there any record where Ward got his vaccine lymph from?" Your answer was, that you had not noted it; I understand you wish now to make a statement upon that point?—I have in the interval referred to the report of Ward's cases, and I find that he does not say where he got the the vaccine matter from, but that the same vaccine matter was made use of in the first nine cases, and that for the other five cases he used matter from the first vaccinated case. I have also looked up the point which Professor Foster called my attention to, with reference to the first of Ward's cases. I find that the small-pox which the child sickened for on the 11th day after vaccination is not ascribed by him to the inoculation of small-pox matter. On the other hand, he ascribes it to the inoculation with the cow-pox matter, which seems to me of course to be erroneous; and I conclude therefore that the child caught small-pox accidentally, concurrently with her vaccination. But so that I may not seem to be inferring anything that the evidence does not bear out, I have made a verbatim transcript of the whole of Ward's 14 cases, and I shall put this in, not with any desire that it should be printed, unless it should seem necessary, but rather to authenticate the condensed statement of these cases given by me in my book. (*The paper was handed in. See Appendix X., page* 288.)

4943. As to Case 1, the first of these cases, you state : "16th April, girl aged seven, successful vaccination "(oblong vesicle on 13th day full of limpid fluid and "surrounded by areola); was thereafter inoculated "with small-pox and had the disease in the confluent "form." Does not Ward state that the disease which the child had was due to the first inoculation which he states was with cow-pox, and that she was well on the 21st of May; that his next inoculation, which was with variolous matter, was on July the 4th; and that that produced no effect?—That is so.

4944. So that it is not accurate to say, "Was thereafter inoculated with small-pox and had the disease in "the confluent form;" the disease which she had in the confluent form was after the first inoculation which was believed to be with cow-pox?—I was misled by the confusion in Ward's own mind, which runs through the whole of his narrative, that the small-pox which actually occurred was the result of his inoculation with cow-pox.

4945. (*Professor Michael Foster.*) But on July the 4th she was inoculated with variolous matter, and on July the 11th she had not taken the infection?—That is quite correct. I am quite willing to amend the statement. The words "thereafter inoculated" printed in this book are erroneous. My reading of the case is that the child caught small-pox accidentally about the same time as she was vaccinated.

4946. (*Chairman.*) In the second case you put "Infant "aged nine months, brother of No. 1, successful vac-"cination," and so on; caught the small-pox from his sister, and had about 50 pustules, mostly on his face, which began to show about the 35th day from his vaccination. Where did you get that from?—In Ward's own record. He does not say that the child caught it from his sister, but that this child was the brother of the other child, and that small-pox appeared about the 35th day after its vaccination, the first vaccinated case being then in small-pox, and in the same house.

4947. Your conclusion is that because about 50 pustules appeared on the 33rd, 34th, and 35th days from vaccination, they were not the effect of his inoculation with cow-pox matter, but with variolous matter?—That was my conclusion, and that it was caught from the other child in the house. If it had been the vaccinal exanthem the difference would probably have been noted; it would have come out sooner.

4948. But Mr. Ward evidently did not think it was a case of small-pox at all, because he thought it was the secondary effects of the original virus?—But he thought the same of the confluent small-pox in Case 1.

4949. But he does not say that it was confluent small-pox?—Indeed, he does.

4950. Not confluent small-pox?—He calls it confluent, at all events.

4951. He says that some of the sores became confluent, but his view was, whether it was right or wrong, that it was cow-pox and not small-pox; he says it was like confluent small-pox, although milder?—I do not wish to read any interpretation of my own into these cases; but I have copied them verbatim, and in order to settle all these points I have put in the transcript.

4952. (*Dr. Collins.*) It was the impression of Ward then that the cow-pox could be taken in the confluent way, I understand?—That seems a probable inference.

4953. (*Sir James Paget.*) Is it only an inference, or is it a statement of his?—I am not aware that he makes a statement.

4954. (*Chairman.*) But he gives a distinct account day by day of her condition, and all that he observed?—I am aware of it.

4955. I thought you said that he did not make a statement?—It was in reply to Sir James Paget's question that I spoke.

4956. What he said was, that she had a confluent eruption, not that it was a case of confluent small-pox?—I, for my part, can attach no other meaning to it; and I should think that no other meaning can be attached to it.

4957. (*Professor Michael Foster.*) In the case of Evans, to which you alluded, you stated, as I understood, that he did not describe at all what he found, but he merely said that he found they resisted it. The language he uses, I think, is this :—"I inoculated 12 of them with "variolous matter *without* effect." The "*without*" being emphasised by being in italics?—That is so; but he adds to that: "their arms appeared inflamed for three "or four days, and then gradually got well."

4958. Therefore he does describe distinctly what he saw?—I should not call it a description.

4959. (*Sir James Paget.*) If he saw no more than that is it not a fair description?—He saw something, and he did not quite describe what it was. I do not want to question his good faith for a moment, but, having examined a great many of these reports of the variolous

test, and found that that "something" in certainly many of the cases meant the local pustule, I am suspicious about the others.

4960. (*Chairman.*) But is not "an appearance of inflammation" an expression in use by medical men?—Yes; and that same appearance of inflammation we find may mean the local pustule; and in evidence of that I refer to the letter of Forbes of Camberwell to Jenner, which I have given an extract from at page 133 of my book. Forbes is describing the variolous test, and his words are: "Although the variolous inflammation per-"fectly succeeded, and, I have no doubt, would have "infected others inoculated with the fluid secreted, "yet the constitutional progress was as completely "arrested as if the patient had gone through the small-"pox before."

4961. (*Sir James Paget.*) He does speak there of some fluid which might be collected, of which Evans says nothing?—No doubt.

4962. (*Chairman.*) However, your assumption is that, because Forbes used that expression, "variolous inflammation," although he also speaks of the "fluid secreted," all other medical men who spoke of seeing inflammation meant that there was something more than inflammation?—I am not prepared to assent to that in general terms. My sole object is to point out that when this vague something was described as following the variolous test in certain cases, in the absence of details one must either set those cases aside altogether, as not contributing to the evidence one way or another, or take it to mean the local pustule.

4963. There is one fact mentioned by Evans—I do not know whether you observed it—that several of the patients slept with others who had full crops of small-pox pustules without being in the least degree affected?—I believe I noticed that; but I have here the notes that I made, some two years ago or more, of all that seemed to me the relevant points. I was dealing only with the variolous test at the time, and therefore I did not mention anything else.

4964. (*Professor Michael Foster.*) But Evans says: "After they were all recovered I inoculated 12 of them "with variolous matter without effect; their arms "appeared inflamed for three or four days, and then "gradually got well." Are those details sufficient to satisfy you?—That is the passage which I have just read.

4965. Simple inflammation following the puncture, passing off after the third or fourth day, instead of being exaggerated on those days, and passing on to a pustule as in the ordinary variolous inoculation?—It appears to me that that is a construction of the author's words which goes further than anything that I have ventured to put upon them.

4966. "Their arms appeared inflamed for three or "four days, and then gradually got well." That means that the inflammation passed off after a short time?—"Gradually," he says, which may mean several days. One does not know. The statement is a vague one, and I should think it is irrelevant to the discussion altogether. It is one of those cases which I have set aside as not throwing light upon the subject.

4967. (*Mr. Savory.*) Assuming it to be as he describes, and the common inference to be drawn from it, how would you have described it? What detail would you have given which is not given there?—Not having seen it, I am quite unable to say.

4968. (*Chairman.*) But, supposing you had seen nothing except a little inflammation of the arms, which gradually passed away, what other description would you have given beyond what Evans has given?—If there had been anything like a pustule, if something for three or four days had followed the puncture, that is to say, an elevation of the skin first, or a papule, then filling with fluid and becoming a pustle, I should have so described it.

4969. But the question which Mr. Savory put to you was, supposing that had not been the case, but that all that had been visible was an inflammation which passed away, how would you have described it otherwise than as Evans has described it?—With every wish to answer Mr. Savory's question, I can hardly enter into the position which is assumed.

4970. (*Mr. Savory.*) Assuming a puncture made which produces a slight degree of irritation and a transient flush, which is called inflammation, and then subsides, what would you add to that to make it clearer?—If the facts were so, I should have stated them so.

4971. How can you say that it is not so?—I do not say it is not so. I say that these slight sequelæ of the variolous test are by a number of the observers reported so loosely that they make no impression upon me; and I can best illustrate the whole of that point, if I may pass to another point, by referring to the correspondence between Mr. Shorter and Dr. Jenner on the subject of the variolous test to which I referred on Wednesday last. It is not given at length in my book, but I can give you the reference; it is on page 131. But I have here something more than that. This correspondence is printed in the third volume of the Medical and Physical Journal, at page 348. It consists of three parts; first, a letter of Mr. Shorter to the editors of the Journal; secondly, the letter which Mr. Shorter sent to Dr. Jenner, dated the 25th December 1799; and, thirdly, Dr. Jenner's reply to Mr. Shorter, dated the 29th of December. The whole correspondence arose out of the variolous test. In the first letter to the editors, Mr. Shorter says: "From a perusal of them" (meaning the two other letters) "you will perceive I had strong "doubts of the efficacy of cow-pox inoculation as a "substitute for small-pox till I received Dr. Jenner's "answer to the cases I sent him. His gentleman-like "letter removed all my doubts, and I have again re-"sumed the practice." Mr. Shorter's letter to Jenner contains a detailed account of the variolous test upon two cases, a brother and a sister, both adults, vaccinated successfully about the middle of June 1799 with matter on a thread.

4972. (*Sir James Paget.*) When was it used?—On the 7th of December. They were vaccinated about the middle of June 1799.

4973. (*Dr. Bristowe.*) Is there any account of the vaccination and of the results, or is there a mere statement that they were vaccinated?—It is the statement of the man who did it.

4974. But there is no account of it, and its results?—I have got "successfully" here within square brackets: that seems to have been the impression made upon my mind in reading, but I think there are no particular details.

4975. (*Professor Michael Foster.*) I think there is a statement of Shorter, that the vaccination was successful, but, so far as I remember, nothing more?—It is my impression that it was "successful."

4976. (*Dr. Bristowe.*) Are there any facts stated here which are more authentic or more detailed than those which are just now objected to by you, and with regard to inflammation following inoculation?—It appears to me that the cases are not comparable. Everyone knows the correct vaccine vesicle.

4977. (*Chairman.*) At that time was a correct vaccine vesicle as well known to them as a small-pox vesicle?—They had Jenner's plates to look at. At all events, Mr. Shorter himself had no doubt about the success of his vaccinations.

4978. Will you proceed with your statement?—I will now read the account of the variolous test verbatim:—"On the 7th of December, I inoculated them both "(their names being William Barrett and Ann Barrett) "with matter on a thread taken only the day before. "They soon were sensible of some effect from it. The "first 24 hours they felt smarting and itching in the "incisions. On removing the threads, they observed "them moist. There was little further to be perceived "until the fourth day, when inflammation was evident "on William's arm, sufficient for me to have assured "him that if he had not had the cow-pox I should have "been positive that he had received the infection. "Ann's arm appeared very doubtful. From this day "to the seventh the inflammation was progressive, and "on examining the arms a pustule presented itself on "Ann's, with matter in it on the inoculated part. She "also informed me that this day she was very unwell, "was feverish and had a tendency to sickness. Wil-"liam's arm was also more inflamed than on the fourth "day. The incision had a rising appearance, and felt "hard, and towards the lower part there was a pustule "just appearing; but he had not the least indisposition "this day or any succeeding one. On the ninth William "called on me and informed me that on the eighth he "had observed matter in the pustule on his arm; but "when I inspected it this day it had the usual aspect "of small-pox just declining. He also told me that

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"the pustule on Ann's had discharged matter on the "eighth day, but that on this day it appeared to be "dying, and all indisposition gone. On the twelfth day "I saw them both again. Ann's arm had inflammation "which extended almost from the shoulder to the "elbow, and so painful and sore that she applied an "emollient poultice to it. The incision now had a "large scab on it, and there was on the bend of the "arm a sort of blighted pustule. Ruminating on these "appearances for a moment, I could not but persuade "myself that she had certainly received the variolous "infection, and I frankly told her so. William's arm "also retained considerable inflammation and hardness "about it, nearly as much as I have observed when "small-pox pustules have appeared." That ends the extract from Mr. Shorter's letter, which contains all the matters of fact.

4979. (*Dr. Bristowe.*) Neither of them was taken ill about the time when small-pox should have become general, should have generalised itself?—No more than I have read with reference to the female case.

4980. (*Professor Michael Foster.*) Nothing is said about the health of the male, I think?—He seems to have had no constitutional disturbance in particular.

4981. (*Dr. Bristowe.*) And there was no rash?—No.

4982. (*Chairman.*) Is that an extract from a letter written by Shorter to Dr. Jenner?—Yes, and the extract contains all the matters of fact.

4983. (*Sir James Paget.*) What do you deduce from that?—If you will allow me, I will read Dr. Jenner's reply, which is dated the 29th of December 1799. I omit the first sentence or two which are of a complimentary kind. "However, I must at once observe "that the cases you adduce, in my opinion do not in "the least militate against the safety of cow-pox as a "preventive of the small-pox. Pray recollect how "seldom we find the skin insensible to the action of "variolous matter in those who have previously gone "through the small-pox. The cow-pox leaves it in the "same state. The patients you mention were not insen-"sible to the local action of the variolous virus." That explains, it seems to me, the periphrasis with which Jenner describes the result of the variolous test upon his first case, the case of James Phipps.

4984. (*Professor Michael Foster.*) There is a great deal more, is there not, in that answer of Dr. Jenner's to Mr. Shorter?—Nothing that seemed to me to be relevant.

4985. I have not the letter with me, but I think a great deal follows in that letter from Jenner to Shorter?—But how can it affect the matter?

4986. He discusses the question with Mr. Shorter?—Yes.

4987. (*Sir James Paget.*) What is your deduction from this?—I referred last Wednesday to the case of James Phipps, and to the periphrasis by means of which Jenner described what actually followed in James Phipps when he applied the variolous test. Jenner's words are: "The same appearances were observable "on the arms as we commonly see when a patient "has had variolous matter applied after having either "the cow-pox or the small-pox."

4988. (*Mr. Savory.*) Will you read the two words that precede that sentence?—I have not got them here.

4989. It is rather important. Jenner states, I think, that no disease followed, which, I think, should have been put in?—That I stated before.

4990. (*Dr. Collins.*) In his letter to Gardiner on the same case, I think Jenner stated that "no effect" was produced?—That I have quoted in another part of my book.

4991. (*Mr. Savory.*) This is from the Inquiry, page 20, in the second volume: "Several slight punctures and "incisions were made on both his arms, and the mat-"ter was carefully inserted, but no disease followed." Then, "The same appearances were observable on the "arms as we commonly see when a patient has had "variolous matter applied after having either the cow-"pox or the small-pox." Would you not distinguish between a local irritation produced by the insertion of variolous matter which was followed by no further effect and the effect of it acting upon the system as a poison?—Certainly.

4992. Is not that what Jenner means: that in these cases the usual effect followed, the effect of a local irritation, transient disturbance, which is manifestly a totally different thing from the natural constitutional and local effects which would be the result of a poison?—Different from the constitutional effects I admit; but here is his comment upon the very detailed account by Shorter; he uses the same language about that which he used about James Phipps—the language which I have just read.

4993-4. (*Sir James Paget.*) Is he not probably contrasting what occurred in those cases with what would have happened after inoculation in these two persons if they had not been previously vaccinated or had had small-pox?

(*Professor Michael Foster.*) In the conclusion of that letter, which you have not read, does he not call attention to the fact that when variolous matter is inserted in subjects who have previously had small-pox a local pustule often occurs, but that local pustule is followed neither by an eruptive fever nor by secondary pustules? Does he not point out that in the case of the woman referred to by Shorter such constitutional disturbance as she showed was not a specific constitutional disturbance due to the variolous matter, but to the local mischief of the incision; and does he not further call the attention of Shorter to his having made a large incision, or asked him if he did make large incisions?—I do not recollect as to the last point, but I believe the statement is correct as to the bulk of the letter, and have not the smallest objection to it.

4995. And does not Jenner speak of it as being acknowledged and accepted by all the profession that, though a person has had small-pox, the direct insertion of variolous matter into his skin may give rise to a local pustule?—That seems to be stated.

4996. And does he not draw a distinction between such a local pustule and the proper pustule which follows inoculation in a person who has not had small-pox or cow-pox, and which is accompanied by eruptive fever, and in the majority of cases followed by a secondary crop of pustules?—I can confidently say that there is no distinction drawn by anyone between the local pustule and the proper pustule.

4997. (*Mr. Savory.*) But a distinction is drawn between the abortive effects and a proper pustule. Would it not be common knowledge that a person who has had small-pox once if inoculated with variolous matter, will still get local irritation of some sort?—That is the statement of Jenner.

4998. Is not that familiar knowledge?—I am willing to accept it.

4999. Does Jenner anywhere state that vaccination has greater efficacy than a previous attack of small-pox?—With deference to you, it appears to me that that is leading me off the point of the variolous test.

5000. (*Sir James Paget.*) The variolous test produces the same effect after vaccination, in Jenner's cases, as after small-pox?—Yes.

5001. (*Professor Michael Foster.*) Jenner's argument was that you gain no more effect on the arm after vaccination than you do after previous small-pox?—I feel myself not equal to interpreting all these facts, still less to arguing upon them. My sole object has been to quote, as correctly as I can, after taking a great deal of trouble about it, what the matters of fact were, leaving the inference to be drawn without any co-operation from me.

5002. (*Chairman.*) But do you not rather draw inferences? You have drawn the inference that where people said that they saw no effect, they did see the effect of a local pustule, because you have drawn the inference that the local pustule must always be there, and that when they speak of inflammation they must have meant the local pustule?—I would not go further than to express a suspicion that in those cases the local pustule had probably occurred; but I do not want these cases in evidence, because I have more particular cases where the local pustule is described in so many words.

5003. According to your view, does a previous attack of small-pox produce any effect upon the system, so as to be calculated to alter the character of the variolous test when afterwards used, or to protect from infection?—I adopt the current view that one attack of small-pox gives immunity in general from another.

5004. Then you do not suggest any question of the view that the appearances which would be seen after the insertion of variolous matter in the case of a patient

who had had small-pox would differ from those which would be seen in general in the case of a patient who had not had small-pox before?—It seemed to depend very much upon how the inoculation was done.

5005. (*Dr. Collins.*) Did not the Suttonian inoculators, by the careful management of their lymph, aim at and frequently secure merely the local pustule without any secondary eruption?—They professed to do so in the majority of their cases.

5006. (*Mr. Savory.*) But they did not always succeed?—They did not always succeed, as I have said twice.

5007. (*Professor Michael Foster.*) Did they often succeed?—I believe they did often.

5008. In the work of Desoteux and Valentin, a Treatise Theoretical and Practical on Inoculation, published in 1799, obviously of considerable authority in France, the authors, describing inoculation according to the Suttonian method, and speaking of the local eruption, say:—"Their number is often very little, "generally 40, 60, 100, sometimes 10, 15, 25; it "often happens that one only sees one or two 'boutons,' "sometimes none at all. In the latter case, which it is "true is extremely rare, there exists nevertheless a real "variola." The point to which I wished to call attention was that they speak of no pustule at all as being exceedingly rare in the year 1799.——

(*Dr. Bristowe.*) It is mainly on the authority of the clerical advocate of the Sutton's procedure, is it not, and not on medical evidence, that small-pox inoculated according to their method very frequently produced small-pox without development of any general eruption?—On other authority as well. I take the general statements more especially of Dr. Giles Watts on the one side, and of Mr. Bromfeild and Dr. Langton on the other side, that is to say, both of the Suttonians and of their opponents. They are general statements. I admit I should prefer particular statements under all circumstances, if they were to be had, but they are seldom to be had, and I must leave the matter there.

5009. (*Chairman.*) Have you covered now the points suggested down to the evidence derived from the investigations of Ceely, 1838-40, or is there any point prior to that date that you wish to dwell upon?—I have still a good deal to say about the experimental tests.

5010. What is the next state of facts to which you wish to call attention?—The best kind of experimental test is one in which a control-experiment is tried, according to the current phrase of the physiology and pathology of modern times. I have looked through the whole literature of the subject for these control-experiments, and I have found only two in which details are given.

5011. Will you inform the lay mind what a control-experiment is?—It is an experiment where a case is taken alongside of another wanting the particular circumstances—the logical method of difference. The two control-experiments which I have found, and which I have transcribed, one of them verbatim and the other in notes, are both foreign, but they were both done by men of position,—the first one by Ballhorn and Stromeyer, who were the pioneers of vaccination in Germany, and the second one by Sacco, in the most formal circumstances, in the presence of a large number; Sacco having been the pioneer of vaccination in Italy. The first control-experiment is a very long one. The results are described from day to day, and I could not trust myself to summarise them; I shall, therefore, put it in. But I may express my opinion that the result of the inoculation of small-pox upon the vaccinated brother and upon the unvaccinated sister was as nearly as possible the same.

5012. Was that the conclusion at which the observers arrived?—On the contrary, the conclusion at which the observers arrived was: "The whole of this history "proves that the inoculation of small-pox had no effect "upon the brother, and that the small-pox of the "sister was extremely benign and mild"; they conclude by saying that the sister had the small-pox, whereas the brother had not. It illustrates that small margin to which I referred in my evidence last Wednesday.

5013. The brother had nothing, as I understand?—They both had very much the same.

5014. (*Dr. Bristowe.*) They say not?—They say not, but here are the facts. I am going to hand them in.

5015. (*Chairman.*) Who were the observers in this case?—Drs. Ballhorn and Stromeyer.

5016. Were they medical men of any repute?—They were, indeed; they were the leaders of the vaccination movement in Germany.

5017. But apart from their being leaders of the vaccination movement, were they medical men of any repute?—Yes, undoubtedly, one was a Court surgeon and the other was, I think, a Court physician at Hanover.

5018. (*Mr. Picton.*) Could you give us, for our information, some extracts on which you found your opinion?—I have referred to this case in my book on page 210.

5019. (*Chairman.*) The translation of the notes is as follows:—

"On the 26th of June were inoculated, with vaccine "matter by incision, two children of Mr. Kirchner, "teacher of the English language. On the 2nd of July "we perceived on the incision in the boy *un petit bouton* "*ou une petite pustule d'inoculation*. On the 3rd of July "his pustule of inoculation appeared very red and elevated, whilst not the least redness was observed "on the incision of the sister, which gave ground for "the presumption that the vaccine virus had not "operated upon her. On the 4th there occurred some "serosity of the pustule of inoculation of the boy. On "the 5th there was a little peripheric redness. On "the 6th the peripheric inflammation was hard and "was a demi-pouce in size. The pustule of inoculation was raised, and had a white head or point, which "appeared to contain some serosity. The patient was "pale. On the 7th the inflammation was nearly two "pouces in size, and perfectly resembled the description which Jenner has given. The night had been "very restless and with abundant perspiration. On "the 9th the inflammation was much diminished. "There appeared on the shoulder a large red spot. "There was a dry crust upon the pustule of inoculation. "The patient had passed the night more quietly, and "had less perspiration. On the 10th the peripheric "inflammation and the red spot had disappeared, "and the patient was no longer pale. On the 16th the "crust had fallen off. On the 17th the incision was "quite closed." That is the vaccination.

Then follows the test of the inoculation of small-pox after the vaccination made by incision. It was not given by inoculation to the boy then, but he caught it?—No, he did not catch it.

5020. What does this mean: "During the time that "the eldest son of M. Kirchner had the small-pox." Was that some other son?—Yes, I think that is what is meant.

5021. "During the time that the eldest son of M. "Kirchner had the small-pox they left with him his "sister, of whom we have just spoken, in order that "she might be attacked by it. Down to that time "neither the vaccine nor the small-pox had taken in "her. On the 24th of April 1800, in the morning, on "the left arm of both the brother and the sister there "was put a vesicatoire, and on the evening of the same "day an incision was made on the right arm, where "a thread was put dipped in fresh matter from the "small-pox taken from the child of the baker Kleinrath. "On the 25th the little blister opened, and there "was put in three threads soaked in fresh matter from "small-pox from the same child. On the 27th the "incision of the girl was tolerably inflamed; that of "the boy very little. On the 28th the place where the "blister had been placed upon the two children had "suppurated. The incision of the girl was red, hard, "and a little raised; that of the boy appeared to be "about to close. On the 29th the blistered place in "the boy was still red, but almost hard. The incision "of the girl, on the contrary, was as on the preceding "day; it appeared to be about to form two boutons "but there was no more than a little crust on the incision of the boy. On the 30th the incision of the "girl was as it was the day before. The place of the "blister was moist, inflamed in its periphery, and a "little hard. On the 1st of May the incision of the "girl was still hard and red; the place of the blister "was hard and inflamed in its periphery, and covered "with a crust. That of the boy was still moist and a "little red, and the incision was entirely closed. On "the 2nd the incision of the girl was less red, but on "the places of the blisters of the two children there "was a crust. On the 3rd the place of the blister in "the girl was inflamed afresh, and at a little distance "from it there was formed a small-pox pustule. The "boy was as on the preceding day. On the 4th the "place of the blister in the girl was less moist; that "of the boy had a dry crust; the inflammation had

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"almost disappeared. On the 5th the small-pox pus-"tule on the girl had disappeared, and was almost dry. "The place of the blister on the boy was altogether "dry. The whole of this history proves that the inocu-"lation of small-pox had no effect upon the boy, and "that the small-pox of his sister was extremely benign "and mild; which might be a beneficent result of the "trial of the vaccine inoculation, even when its success "had been nul or incomplete." Does that mean that it had possibly produced some effect in the girl, though it had not taken properly?—That seems to be the meaning.

5022. (*Sir James Paget.*) It is clear in that case that both boy and girl had been vaccinated?—Both on the same day with the same matter, in the month of June of the year before.

5023. The girl had one small pustule?—Yes.

5024. What is your deduction from the case altogether?—I cannot make out any material difference between the result of the variolous test in the one and in the other. At page 210 I say:—"There does not seem "to be much to choose between the result of the test "in the vaccinated brother and the unvaccinated sister."

5025. She was not unvaccinated altogether?—I have explained before how this should be taken. It had not succeeded.

5026. (*Mr. Savory.*) Is that an instance which you quote as a control-experiment?—I quote it as such.

5027. That is what you call a control-experiment?—It is the only control-experiment that I can find, except one which was done at Milan, and, if I may pass to that, I shall now do so.

5028. (*Dr. Collins.*) Would you consider that that was a completely satisfactory control-experiment?—I should not insist upon the name, if any exception is taken to it, but it is an experiment where we get a means of comparing the effects of the method of variolation of the time upon two cases side by side, one of which was vaccinated and the other of which was counted a failed vaccination.

5029. (*Mr. Savory.*) But are not all the cases in which inoculation has been practised without previous vaccination control-experiments in relation to the effect of vaccination?—I am speaking at present only of the experimental test.

5030. This is an experimental test; if a person has been inoculated without previous vaccination and exhibits small-pox, that is a control-experiment in relation to the failure to produce small-pox in the vaccinated person?—The control-element appears to me to come in in the parallelism of the circumstances.

5031. (*Sir James Paget.*) Supposing that they were not brother and sister, but in adjoinging houses; in adjoining houses in the old time one person was vaccinated and another was inoculated without vaccination; would you view a control-experiment such as that as being of any weight against the hundreds of cases in which the difference is seen?—I was not thinking so much of the inference to be drawn, but I was putting it as illustrating the matter-of-fact effects upon two cases done by the same man under the same circumstances.

5032. At the close of the last and the beginning of this century, Woodville inoculated a large number of persons who had not been vaccinated, did he not?—I referred to Woodville's tests last Wednesday. I mentioned that they gave me the impression of being vitiated by a very large amount of accidental small-pox amongst them.

5033. I speak of those who had been vaccinated, then were inoculated, and in whom no eruption appeared, of whom there were a very large number?—I gather that he does not claim them to have been much more than a fourth part of his first series; he says one fourth had neither secondary eruption nor constitutional effects. As to that one fourth, we are bound to take Woodville's statement that the variolous test produced no effect. He does not say that for them individually; he lumps them all together. He does not give in the table of details anything about the variolous test.

5034. (*Chairman.*) There is another case to which you refer in your book, not a control-experiment, but still a considerable one, which took place in Paris. I would like to know what is your comment upon it; it is at page 244: "They invited a large number of represen-"tative physicians and surgeons in Paris to witness the "variolous test at four sittings upon 102 infants, some "of whom had been vaccinated a year before, and a "few of them 18 months before. The results are cer-"tified by all the invited witnesses; who included "eight members of the Institute, fourteen physicians "of the *ci-devant* Faculty of Medicine, six professors of "the École de Medécine, five members of the Army "Board of Health, four members of the Société de "l'École de Medécine (Bichat, Dupuytren, Auvity, and "Alibert), and thirteen others. This, of course, was a "great demonstration; but it only amounted to an "attestation that inoculated small-pox produced no "effect in most of the infants, and merely the local "pustule in the rest." What is your criticism upon that, because it looks at the first blush as a considerable test?—I have given the particulars of the test, as far as they are reported, upon a subsequent page, 259.

5035. You say: "The most essential fact in each case, "namely, the date of vaccination, is systematically "omitted." But some of them had been vaccinated a year before, and some of them as much as 18 months before? In reading your work, I did not so understand it, because you say the date of vaccination is systematically omitted, whereas on page 244 to a certain number of them you give it. You say: "Some of them had "been vaccinated a year before, and a few of them 18 "months before"?—As far as I remember, it is in the original a general statement. For each of the 102 cases I can find no date of vaccination.

5036. (*Dr. Bristowe.*) It may be presumed that all these persons experimented upon had vaccine marks upon the part where vaccination was performed, and that they were seen by the distinguished men who watched the operation?—I should presume that myself.

5037. (*Chairman.*) What are the other cases to which you wish to call attention?—Before coming to the other control-experiments I would say that the one read from Ballhorn and Stromeyer is one of five variolous tests which they are known, and are all they claim, to have applied. They made one other variolous test in the same year, which I have also transcribed verbatim, though I do not wish to dwell upon it. Three others were made the year before, and I have looked for the particulars of them, but cannot find anything worth noting. The other control-experiment, as I will call it, without insisting upon the strict correctness of the word, was made at Milan by Dr. Sacco, the Director-General of Vaccination to the Cis-Alpine Republic. That was on the 31st of August 1802. The test was made with great formality; it described in the Italian as a "solemn public test," and it took place at the Orphanage della Stella della Commune di Milano in the presence of many of the authorities of the Republic, of the professors of the arts, and other learned persons. I quote the facts from the report as printed in the Opuscoli scleti sulle scienze, edited by Amoretti, volume 22, Milan, 1803. Sixty-three children, mostly inmates of the orphanage, as I gather, were inoculated with small-pox from a child in attendance, who had a copious natural small-pox at the eighth day. Those 63 had been vaccinated, one of them in December 1800 and another in January 1801, and, as far as I can make out, all the others subsequently to the 10th of June 1801. Amongst the 63 vaccinated children tested "two individuals" (I am quoting now) "were "inoculated who had neither had small-pox before nor "been vaccinated." The names of those two are then given: Antonio Fumagalli, aged 13 years, "suspected of "having had small-pox," although it is previously said that he had not had it, and Massimiliano Bianchi, aged two years. Another control-experiment was made upon two other persons who had had small-pox before, they still showing the marks of it upon their faces; the names of those also are given. I now come to the results. The assembly adjourned for 15 days until the 14th of September, and the narrative continues: "The said "authority and the appointed professors having re-"assembled, Dr. Sacco made his report of what had "happened to the inoculated, and presented them one "by one to those present." Then I have here, in the original language, the result of the test upon the 63 children. "In all it was found that the human small-"pox had not in general produced any effect, whether "local or constitutional"—that is the original language. To say that "in all it had not produced any effect," and then to qualify it with "in general," seems a contradiction.

5038. (*Dr. Bristowe.*) But may not the word "generally" be used in the same sense?—

(*Sir James Paget.*) What are the words in the original?—"*In tutti trovossi che il vajulo umano non avea generala-*"*mente prodotto alcun effetto né locale nè constitutionale.*"

5039. That it had not produced any effect, local or constitutional?—That it had not done so generally. I showed it to a friend of mine who knows Italian well, and he was struck with the irregular construction.

5040. (*Mr. Savory.*) Is that a strong argument against vaccination?—No. Then the report gives three cases out of the 63 in which something followed.

5041. (*Chairman.*) Probably it was intended there merely to speak first generally?

5042. (*Sir James Paget.*) To the exclusion of the three cases?—I suppose that is what it means; but I commented upon it because it certainly is an unusual form of expression.

5043. (*Chairman.*) Can you give us the words which follow the introduction, the mention of the three cases?—My Italian stops there, but the report says that one of the three cases had after two days some "*bitorzetti*" or pimples which proceeded to exsiccate. The two sisters, Marina and Maria Villa, had a single local pustule on the right arm at one of the insertions, which dried up at the eighth day. That is the result.

5044. But does not that, seeing that he specifies the local pustule in those three cases as being exceptional, indicate that in the 59 cases there was no local pustule?—I will take it so. I now come to the tests upon the two sets of persons whom I have quoted as controlling the general experiment:—"The same pimples or pustules "were produced in those individualswho had suffered the "confluent small-pox." "The same" I suppose refers to the three cases among the 63, but that is all he says. Then I come to the others who had not had small-pox or vaccine before: "The two persons who had neither "the small-pox nor the vaccine were found to have been "completely attacked (*completamente attaccati*) by human "small-pox, having been inoculated on the same day (as "the vaccinated). Antonio Fumagalli had on the right "arm four pustules, which ran together and dried up on "the eighth day, with slight fever and some pain in the "axilla. Massimiliano Bianchi had three pustules on the "left arm, two on the hand, two on the shoulder, three "on the right arm, with one on the forehead, accom-"panied by fever repeated for three days and slight "sickness."

5045. What is your criticism with the view of invalidating this?—I should prefer the criticism not to come from me.

5046. I thought you were citing this for the purpose of showing that there was no proof in these early times of the efficacy of vaccination judged by the variolous test?—My object was to show what one can find in the course of historical inquiry as to the variolous test, without approaching the matter from a biassed point of view. I cannot say that I am free from bias now, but I began all this in the ordinary way of historical inquiry. I have looked high and low for facts, and those are the facts as well authenticated as I can find them; there are a good many more here.

5047. (*Mr. Meadows White.*) Have you any instances where the variolous test failed?—Yes, some very striking cases, such as those of Thornton of Stroud, who was the first to practise vaccination independently of Jenner; they are given at page 94. Thornton's cases were published byDr. Beddoes of Bristol in his Contributions to Physical and Medical Knowledge in 1799, a work of value inasmuch as it contains the first papers of Sir Humphry Davy. After describing the vaccination of five persons, a father and four children, he says: "From the long continued local excitement he" (Mr. Thornton) "began to hope that the virus might "imperceptibly have crept into the habit, and proved a "security against the variolous infection." He then mentions that he inoculated them with small-pox, and all four children "received the infection and passed "through the stages in the usual slight manner."

5048. (*Chairman.*) What do you make out to be the meaning of "the usual slight manner"?—The usual result of small-pox inoculation, when used as a protection. This was only a few months after the Jennerian practice had been recommended.

5049. (*Professor Michael Foster.*) Was Thornton's virus used again?—No, I believe not.

5050. (*Mr. Savory.*) Assuming the facts as stated, would it be unreasonable to expect, in an early inquiry of this sort, that occasional failure should occur; would it not be contrary to the history of all experiments of this kind, that difficulties and apparant discrepancies and failures should not occur?—They were indeed failures.

5051. Would it be fair to style cases of this sort, in the face of evidence to the contrary, as "damning experience of cow-poxing"?—I was trying to show how it ought to have struck their contemporaries.

5052. But would it not have been peculiar if it had been uniformly successful, was it not the fact that they did not know the best time for taking the lymph; does not Jenner in a later paper show that the time at which the lymph is taken makes a material difference, does it not therefore seem natural that there should have been a number of cases of failure?—As far as the experimental variolous test goes, we must take the earlier cases, or none at all.

5053. (*Sir James Paget.*) Have we any evidence that Thornton used the lymph of the true cow-pox?—He used it from the same cow-house as Jenner himself took it from, in the village of Stonehouse, near Stroud.

5054. (*Dr. Collins.*) Does there exist a large body of evidence besides that which Woodville put together, to show that those who had had cow-pox could not be inoculated by the variolous test?—I have endeavoured to collect every case I could by going through files of contemporary English journals, of foreign journals, and of pamphlets. I have put all the variolous tests into this book, with full particulars, as far as I could get them, in each case.

5055. (*Professor Michael Foster.*) But you have rejected all those in which the simple statement is that the variola did not take?—I have not rejected them. I did not wish to put any stigma upon them. I say that for my purpose that experiment is of no use.

5056. Is it not the fact that at first in almost every case the experimenter used the variolous test subsequently?—That was by no means the case; but I set about the thing in the way of making a historical inquiry. I scrutinised the facts with a great deal of closeness, in fact, with all the more closeness because cow-pox did not appear to me to be a disease which had much antecedent relationship to small-pox at all. That is why I did scrutinise matters of fact closely. And this book contains the result of my scrutiny. The other variolous tests that I would wish to mention, continuing my reply to the question put to me by Mr. Meadows White, are, first, the group of five cases that were tested at Stroud within a week or two of the Thornton cases (they are at page 95), and also two interesting sets of cases, reported at considerable length in the sixth volume of the "Medical and Physical Journal," by Dr. John Fawssett, of Horncastle, and Dr. John Stevenson, of Kegworth. I have read those again within the last few days to satisfy myself that I am correct; but, as I have not made any transcript of them, I can merely refer to them. Then, besides these, there were all the variolous tests made, generally with a good deal of formality, in Paris, Vienna, Milan, and Frankfort. I especially refer to the Frankfort tests as having been described by the great anatomist Von Sömmerring, whose methods were very precise.

5057. (*Chairman.*) But I apprehend that you do not attach any importance to the observation of the observer, that he saw results after inoculation without prior vaccination or small-pox which he did not find in the case of inoculation after either vaccination or small-pox, unless he describes exactly what were the results he saw?—If there had been any explicit contrast drawn, if the matter had been discussed with details that could be used for a contrast, I would have paid every heed to it; but these are cases where I find no such thing.

5058. Taking the case of an experiment made by a person who knew what inoculation was and what its effects were, and who made an experiment for the purpose of showing whether or not vaccination had the same effects in relation to subsequent small-pox as inoculation, if, upon any of those experiments, he came to the conclusion that it had the same effects, would it not be natural to give him credit for having seen something which led him to that conclusion, though he does not describe it in detail; is not one led to the conclusion that the properly competent observer who made the experiments, finding the same results in cases where vaccine matter was introduced, might come to the conclusion that vaccine was a great protection?—That is the conclusion come to by the observers I have mentioned (Fawsset and Stevenson), and also in the case of Shorter. At first Shorter's faith was shaken, but after he got Jenner's reply it re-established his faith, and he resumed the practice.

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5059. Take a man like Woodville, for example?—Woodville's experiment is a peculiar one in this way—that it was done in the atmosphere of the small-pox hospital, and a very large number of the 200 cases, of which he gives the particulars, took small-pox accidentally; and Woodville, not knowing the real difference at the time between cow-pox and small-pox, could not understand the eruptions that followed; he admitted in the end that they were concurrent eruptions of small pox running side by side with cow-pox; but at the time Woodville published his report that was not ascertained; and it would appear that the whole of the cases were involved in a kind of doubtfulness which takes away from their value as scientific tests.

5060. (*Sir James Paget.*) Is it not the fact that in the end Woodville preferred vaccination to inoculation?—Woodville adopted vaccination, and he states his reasons for his conclusion.

5061. Surely his conclusion carries strong evidence that he had watched the difference between the two?—Woodville's testimony did more than anything else to recommend vaccination to the medical profession in England.

5062. Is it not the fact that men who had been previously inoculating accepted vaccination as far preferable?—It became the established practice in a year or two.

5063. (*Mr. Savory.*) Do you refer to Mr. Fry's experiments in your book?—I have not, but I have them before me.

5064. Why did you not include Mr. Fry's?—There were limits to the size of my book.

5065. (*Professor Michael Foster.*) Do you know Mr. Dunning's cases?—I do not know whether I have noted them.

5066. (*Mr. Savory.*) Did you exclude Mr. Fry's cases on the ground of want of space?—I forget why I excluded them; but if there is any importance attached to them I shall be glad to go over them—they are given in Jenner's "Further Observations."

5067. (*Chairman.*) The evidence of Mr. Fry, to which Mr. Savory has called attention, appears to have some bearing upon the point to which you made allusion as to there being no evidence that people who had caught the cow-pox, apart from being purposely inoculated, had received any protection by reason of it. You have called attention in your book to the fact that the view which led to the adoption of vaccination, or rather to the first suggestion for its adoption, namely, that those who had suffered from cow-pox caught naturally received a natural protection against small-pox, is not supported by fact?—That there was no satisfactory evidence of it.

5068. But Mr. Fry's experience goes for something upon that point, because he speaks of not less than 40 whom he had seen inoculated for small-pox who at former periods had gone through cow-pox. Those must have been persons who had caught the cow-pox, not who had been inoculated with vaccine matter?—I may call your attention to the fact that Mr. Fry in a single year inoculated, probably in his own parish, 1,475 persons, pretty well the whole parish I should suppose; that was at a time when nearly every one was supposed to have had small-pox; and it is of those that he adduces 30 or 40 instances. He says the inoculation of the milkers produced no constitutional effect, "nor any "greater degree of local inflammation than it would "have done in the arm of a person who had before gone "through the small-pox," which is the same phrase that Jenner uses in his reply to Shorter with regard to two cases which had undoubtedly the local pustule.

5069. But is he not distinguishing between the effect it produced upon these 30 and the effect it produced upon the others?—Yes; and the distinction is drawn also for some cases which had not had cow-pox before.

5070. (*Professor Michael Foster.*) Thornton was not convinced of the preventive power of cow-pox, to begin with?—We hear no more of Thornton.

5071. Did he not make his contribution to Beddoes' Journal with that view?—Yes; I think in those days they were all genuinely anxious to find out what there was in it. The opposition did not really begin till 1804.

5072. (*Mr. Savory.*) Do you think there was ever a time when there was not some opposition to vaccination?—Moseley opposed it from the outset, and there were others, but they did not write upon it till 1804 or 1805.

5073. Are you correct in saying that there was nothing written in opposition till 1805; was there not an anonymous pamphlet issued in 1800?—Yes, there was; Professor Crookshank has included it in his volume of Reprints.

5074. (*Professor Michael Foster.*) Of the Colborne family of which you speak of two as having stood the variolous test better than the others, we have the account given by Mr. Hughes, and set out with particulars: in three of the cases, a lad aged 17 and two of the Colborne children (one 4 years, the other 15 months), the cow-pox inoculations came to early maturity, and were scabbed under the usual time. The lad was inoculated with small-pox on the 20th December, being the eighth day from his vaccination, and the two children on the 21st, being again the eighth day. They all developed small-pox, both the local pustule and the general eruption with fever. The remaining two cases—a lad aged 15 and the third Colborne child, aged two years and a half—were also variolated on the 21st December, or the eighth day of their vaccination; but these two developed the local pustules only——

(*Mr. Savory.*) But that local effect—that pustule—was recognised by the observer as not being small-pox, because he says they did not take the small-pox?—Yes, that is what he says of two out of the five.

5075. That was the view taken by the doctors at the time?—Not by Shorter, whose cases I have read.

5076–7. After he had read Jenner's argument he admitted it?—Yes. Then, besides the cases of Mr. Fry, which have been called attention to, there were a good many more cases of milkers, some of which we have in detail and some merely summarised. Of the latter kind there was one group, printed in the Appendix to the report of Admiral Berkeley's Committee of 1802, by Nash, of Shaftesbury. I have here the words. This was a posthumous document; it was before Jenner's time, but no doubt Admiral Berkeley's Committee thought well enough of it to reproduce it. "I have "now inoculated above 60 persons who have been "reported to have the cow-pox, and I believe at least "40 of them I could not infect with the variolous virus; "the other 20, or nearly that number, I think it very "reasonable to presume (as they were no judges), had "not the real cow-pox." Then Pearson gives, in his examination of Admiral Berkeley's report, a further statement, from Nash, which is not to be found in the Appendix, to the effect that in the 40 who were counted as not having taken the small-pox the arm was inflamed, and that the difference between them and the others was that the variolous pustule did not mature to the same extent, but that the inflammation was more diffused over the arm.

5078. (*Sir James Paget.*) Does he call it variolous?—He calls it the pustule, at all events; I forget whether he says it was variolous.

5079. (*Mr. Savory.*) The term "pustule" was used very widely in those days, was it not?—I do not know that.

5080. (*Professor Michael Foster.*) They took the limpid "matter" from "pustules," did they not?—The terms "pustule" and "vesicle" were used synonymously by many writers in those days, no doubt.

5081. (*Dr. Collins.*) I find that your own view of Woodville's cases is remarkably corroborated by Dr. Jenner's own expressions, as you will see by referring to his letter to Dunning on page 184, Vol. I., of Crookshank, when he says "Woodville at that time, and his "coadjutor Wachsel, knew nothing of the cow-pox; "this is clearly evinced by Woodville's first pamphlet, "where he gives 300 cases of small-pox and calls them "cow-pox"?—I think that is not an unfair criticism upon what actually happened; but if there was any confusion in Woodville's mind, or in the mind of anyone at the time, it was owing to Jenner's mode of describing cow-pox; but we have the facts for our own interpretation, and we can come to our own conclusion upon them.

5082. (*Sir James Paget.*) Have we not the fact that Woodville, who had been the principal inoculator in his time in England, became clearly of opinion that vaccination was better, and that those vaccinated were differently affected from those not vaccinated?—Yes, no doubt Woodville adopted the practice of vaccination with enthusiasm, and started the lymph which was in use afterwards.

5083. (*Chairman.*) Do you accept as absolutely to be relied upon as accurate what Jenner says, that Woodville

had confounded small-pox with cow-pox?—For a considerable time he could not understand the eruptions which complicated his vaccinations at the Small-pox and Inoculation Hospital.

5084. But seeing that your criticisms have been somewhat strong upon Jenner, do you accept Jenner's view as accurate when he says that Woodville had mistaken the one form for the other; may it not be that he had mistaken something that Woodville had said?—I should not like to have to answer for statements made by Jenner.

5085. You would not rely, as impeaching Woodville's experiments upon what Jenner said?—Not because Jenner said it.

5086. (*Professor Michael Foster.*) Was not it Jenner who put it in a somewhat clearer way somewhat later in a letter to the Medical and Physical Journal, in which he said that the occurrence of pustules after vaccination was probably due to the introduction of variolous matter?—There was at first no agreement between them as to what the prodution of pustules in Woodville's cases was due to; they thought it might have been due to the mixture in the constitution of the vaccine and the small-pox infection; and to test that they tried the effect of inoculating with vaccine mixed with small-pox matter, the result of which was that it produced either the one or the other, but no kind of hybrid: and sometime later on it was admitted that Woodville's cow-poxed cases had caught small-pox naturally at the hospital during the progress of the first infection.

5087. (*Dr. Collins.*) Jenner apparently regarded the whole 300 cases as cases of small-pox, and not cow-pox?—Yes.

5088. (*Chairman.*) Does it appear whether Jenner saw them himself, or was merely commenting upon what somebody else said?—He came up to town at once when this happened.

5089. (*Mr. Hutchinson.*) You refer in your book to the Frankfort cases—at page 206 you quote from Von Sömmerring: "Fourteen children have been vaccinated, "all of whom were inoculated with variola afterwards, "and not one of whom had any eruption," do you adhere to that?—That is not the full quotation, but I am quite willing that those cases should be taken *quantum valeant*. That is the principle on which I proceeded in collecting these variolous tests.

5090. That is your estimation of the value of the 14 cases; for what reason do you reject them?—I have not rejected them. On the contrary, I have unearthed them from a rather obscure source, and have printed them here, so that they may make any impression which they can make.

5091. From an obscure source?—I could not get the original pamphlet, but there is a considerable summary given in the medical journal of the time.

5092. They are by Von Sömmerring. You say at page 227, "The absence of the general eruption was "therefore no marvel"?—I am glad that you have given me an opportunity of explaining that. I think the absence of the general eruption was no marvel where the small-pox matter was inserted soon after the cow-pox, which was the case in Von Sömmerring's cases, as it was certainly the case in the great body of variolous tests which were officially communicated to the Prussian Medical Department—in them the test was tried on the eighth or tenth day, and I assume it was about the same in Von Sömmerring's experiments. I say the absence of the general eruption was no marvel, for this reason: The effect of cow-pox in the earlier removes from the cow was to cause a considerable swelling of the nearest absorbent glands, just as it used to do in the milkers, in whom it produced a painful affection in the glands of the armpits, which caused them to go about with their shoulders raised, so that the people knew at a glance they were suffering from cow-pox. And that happened with a good many trials with matter not far removed from the cow, as we know from the published accounts. I shall not assume that it happened in all of them, but we know that such was often the case, that the matter got into the lymphatic glands, and caused pain and swelling in them. From that I conclude that another substance inoculated into the skin at or near the same parts, as it usually was, had not a good chance of being absorbed into the circulation, because it followed upon an acute inflammation of the lymphatic glands which should have absorbed it.

5093. That is an ingenious explanation. Do you admit the fact that previous vaccination did, in those 14 cases, prevent the successful inoculation with variola?—I only want the things to speak for themselves.

5094. You admit, do you not, that the testimony is conclusive that in those 14 cases it did in some way prevent successful variolation?—I should not confine myself to one thing as restricting the amount of small-pox produced by the test. I have already expressed the opinion that the mode of small-pox inoculation used in those years was chosen deliberately for its limited effects.

5095. Where does the evidence break down in those cases, the cases being well reported, and the statement being clear that there were 14 of them?—I am not concerned to overthrow those cases.

5096. (*Sir James Paget.*) They are important facts, if they are not overthrown?—No doubt they ought to weigh.

5097. (*Dr. Collins.*) You admit a convalescence prophylaxy, a protection lasting during the convalescence; or, to put it in other words, do you explain those cases by a protective influence or an inhibitive influence being operative in the system or in the lymphatics upon the variola poison by virtue of the antecedent vaccine?—I think I stated that the obstruction, so far as there was an obstruction, was of a mechanical nature.

5098. (*Dr. Bristowe.*) Were the vaccination and the cow-pox done in the same arm?—The only instance known to me in which mention is made of its being done in a different part of the body, is in the cases of Dr. Voisin of Versailles, of which I have given an account.

5099. (*Professor Michael Foster.*) In the cases of Mr. Hughes, where the patients were vaccinated upon the left arm, it was thought prudent to inoculate them with variolous matter in the right arm; do not you think that every "intelligent practitioner" would take the other arm in such a case?—I infer it was unusual from the prominence given to it in the Versailles cases, and also from some statements made by the opponents of vaccination in Paris. From their pamphlets I gather that the opponents had made a point of that, and that they had requested the test to be applied upon a different part from that in which the vaccine matter has been inserted.

5100. (*Dr. Bristowe.*) Have you any other grounds besides those you have given for your theory, that if the lymphatic glands had been affected by some previous inflammation they could not be successfully inoculated in the arm?—I demur to the word "theory."

5101. You are bringing this forward, that the lymphatic glands being affected by the preceding inflammation, the inoculation did not take in some of the experiments; have you any evidence to support that view?—I have no experiments directed to that point, and I know of none made by anyone else to test the point.

5102. Then it is only hypothesis?—I cannot say that it is hypothesis. I can only mention the facts—the mechanism of the lymphatic glands, what happens to it when they are inflamed, and the fact of small-pox inoculation following close upon the other.

5103. (*Mr. Savory.*) But you do not even limit the statement to inflammation, for in another case you explain the facts by assuming that the glands were clogged with tuberculous matter?—That occurred to me from what was said of Phipps afterwards, that he was consumptive.

5104. But what does Dr. Baron say about that; does he say that he was consumptive? ——

(*Professor Michael Foster.*) Does not Jenner say, "I "fear he has tubercle upon the lungs;" and does not he shortly afterwards say, "he has been poorly, but is "now materially better"?—I will gladly concede all that Mr. Savory requires about that.

5105. Do we thoroughly understand the nature of the absorption of the virus?—It went into the lympathic glands in both cases.

5106. Do the profession thoroughly understand how the poison is absorbed?—I have never heard but one view of it.

5107. (*Mr. Savory.*) I read in your book "Poor "Phipps, as Jenner used to call him, was inoculated "20 times after that, and never 'took'; he was "Jenner's show case of resistance to small pox; he "was a poor consumptive or scrofulous youth with his "lymphatic glands so clogged (after the cow-pox?) "that any subsequent inoculation of virus on the arm

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"had no chance of being absorbed." As compared with that I find this in Baron: "A short time after-"wards we passed Phipps, his first vaccinated patient. "'Oh, there is poor Phipps' he exclaimed. 'I wish "'you could see him; he has been very unwell "'lately, and I am afraid he has got tubercles in the "'lungs. He was recently inoculated for small-pox, "'I believe for the twentieth time, all without effect.' "At a subsequent visit (Oct. 1818) I found lying on his "table a plan of a cottage. 'Oh,' said he 'that is for "'poor Phipps. You remember him; he has a "'miserable place to live in; I am about to give him "'another. He has been very ill, but is now materially "'better.'" Do you think that statement of Jenner's warrants this assertion of yours?—It stands so written, and, as I do not think it is a matter of very great importance, I am inclined to let it stand as it is.

5108. (*Chairman.*) Have you any other facts beyond those which have just been read to you as the foundation of this statement contained in your book about Phipps' condition?—None.

5109–10. Does that cover all that you were desirous of calling attention to with regard to the variolous test in these early cases?—It does.

5111. What is the next point to which you desire to call attention?—The next point is that a certain number of the early vaccinations were subjected to what one might call the epidemic test; that is to say, small-pox broke out where they were, and a certain number of cases of small-pox occurred amongst the vaccinated. I am not prepared to prove in the way which might be thought necessary the details of all those cases, but I will put it in this way: that such cases of vaccinated children, or others, as took small-pox afterwards were explained away by Jenner and his supporters upon the ground that the vaccinations had been spurious. The same plea was used commonly in France and in Germany. I have given more particular accounts for France and Germany in this book than for England, but there are cases also reported in the English practice, particularly nine cases reported by Dr. Stokes of Chesterfield, which I have referred to at page 173; but I do not attempt to submit the details of any of those cases, because it appears to me that it would be endless labour; and I must limit myself to saying that the plea of spurious vaccination was adopted to explain such cases of small-pox after vaccination as did occur; that it was a very elastic term; and that it appears to have been applied co-extensively with the failure of cow-pox to effect protection.

5112. Supposing that vaccination was not the absolutely complete protection that was supposed, might the case still not be a good one for vaccination?—Historically it was a question of absolute protection or none; the plea of partial protection arose at a much later date, and, as I am dealing with the case historically, it was either "protect" or "not protect."

5113. That is to say, that at that early period of vaccination the suggestion made in cases of failure was that there must have been wrong vaccine used; but does that prove anything more than that those who first introduced the matter to public attention may have overestimated the value of the discovery which they had made?—They attempted to account for every single case of failure down, I think, to about the year 1825.

5114. But is it an uncommon thing in the history of discoveries or inventions, that those who first discover or invent, anticipate results greatly in excess of those which experience proves are derived from them, even though they are valuable discoveries or inventions?—As it appeared to Jenner and his contemporaries there was no third course; it was either hit or miss; that is clearly stated by Dunning.

5115. (*Sir James Paget.*) Does that imply more than that they were mistaken?—That position was departed from later on, I admit; they may have been mistaken, but I am not going to endorse the statement that they were mistaken.

5116. (*Chairman.*) Do you mean that they were wilfully deceiving?—No, by no means.

5117. Then what is the *tertium quid*; because if they were wrong, then they were either mistaken or they were wilfully deceiving?—The middle course was adopted later; that is to say, they said afterwards, that, although vaccine does not protect from small-pox, yet it determines a milder form of small-pox.

5118. And diminishes the liability to attack, as I understand, they suggested?—I am not aware that that plea was raised; they said that it modified the kind of small-pox which ensued; but that was a rather late development.

5119. I do not quite understand how that becomes important; what do you think that proves?—If you ask me my opinion, it seems to me the conclusion ought to have been that the cow-pox had no relation to small-pox at all.

5120. Then supposing experience to have shown that, although certain of those who were vaccinated took small-pox, yet nevertheless the vaccinated class took it in less proportion than the unvaccinated—supposing that to be established, how would that be affected by the fact that those who first discovered small-pox imagined that nobody could take small-pox who had been vaccinated?—I must keep within my historical lines. I have no statistics to put in from contemporary experience. I am dealing with the facts as they presented themselves to the first vaccinators, and with the facts upon which the assent of the profession was given to the practice as early as 1800 or 1802.

5121. Supposing it came to be found that a certain number of people who had been vaccinated afterwards took small-pox, would that show that vaccination was not valuable as a protection against small-pox unless it were at the same time shown that the vaccinated had suffered in as large a proportion as the unvaccinated?—That is the statistical argument which is used; but as I have not got the statistics here, and as I am not prepared to enter upon the statistical part of the case, I would beg to be excused from giving a categorical answer to the question.

5122. But would it not be essential to any conclusion as to whether vaccination was useful or not, to weigh statistical evidence from the earliest introduction of vaccination down to the present time, as far as it can be obtained, as well as the other tests used in the early introduction of vaccination?—I dwelt upon the early tests and the early evidence, because it seemed to me to be of the first importance for explaining how the original authority arose in favour of vaccination—an authority which has been continuous down to the present day.

5123. (*Mr. Savory.*) Do you think that there are no facts down to the present day in support of vaccination?—To answer the question as you have put it would be to lead my answers into an argumentative line, a course which I am desirous of avoiding. I will gladly proceed with what I have to say in the direction of laying facts before the Commission rather than arguing from them.

5124. But we must look at the facts?—I have the greatest confidence in the conclusions to be drawn from the facts; but I am here to bring these forward as a class of facts which have not been brought forward before, and as a class of facts which I myself regard as peculiarly relevant to the questions at issue.

5125. (*Chairman.*) Do you think upon these early facts to which you allude that the conclusion would be justified that vaccination was an illusion without an examination of the facts which experience has furnished us with during the many years that vaccination has been in operation?—No, I do not; and, personally, before I came to a conclusion in the matter, I examined the statistical evidence also.

5126. And, as I understand it, drew your conclusion from the early history of vaccination that it is a delusion and an imposture which has been fostered by the medical profession, and which has no other foundation?—I suppose the reference is to page 352, where I say: "The "anti-vaccinists are those who have found some motive "for scrutinising the evidence, generally the very "human motive of vaccinal injuries or fatalities in their "own families or in those of their neighbours. What-"ever their motive, they have scrutinised the evidence "to some purpose; they have mastered nearly the "whole case; they have knocked the bottom out of a "grotesque superstition." I put it upon the anti-vaccinists, and give references to their writings.

5127. (*Sir James Paget.*) Do you adopt that expression?—I think they have shown that. I would not have said that much if I had not made a careful examination of the statistical evidence, and allowed it to weigh with me along with the pathological and historical facts to which I have been calling attention.

5128. (*Dr. Bristowe.*) Then you agree with Mr. White?—I do, as you ask me.

5129. (*Chairman.*) What is your next point?—My next point is the scientific connexion between cow-pox

and small-pox, as sought to be proved by the experiments of Thiele, Ceely, and others, down to Dr. Voigt, of Hamburg, whose experiments were referred to, I believe, at one of the earlier sittings of the Commission. I shall not attempt to go over each of those experiments; indeed, I do not see what they were designed to prove. The attempt was to inoculate small-pox upon a cow at one place or another. If the skin of the teats did not answer the purpose, they chose some other more susceptible part, and they inoculated small-pox. The result, in a number of those cases, was certainly to produce small-pox; the matter taken from the cow produced small-pox in the human subject; but the experiments of Dr. Voigt, of Hamburg, which are the most recent, have been quoted as free from ambiguity and as showing that small-pox after its inoculation upon a calf is transformed into cow-pox. I have read Dr. Voigt's paper three times over, and spent a great many hours over it. I have here notes as to matters of fact in it which I wish briefly to put before the Commission, without expressing any conclusion of my own. The experimenter inoculated three calves in succession with small-pox, and the result in each of those cases was the kind of small-pox pustule or pimple, or rather hard nodule, that appears to have followed the experiments of Chauveau. But in his fourth experiment he inoculated small-pox at five shallow incisions, from a discrete case, on the shaven surface of the left hypogastrium, and at the same time he inoculated cow-pox matter at a spot, as he says, sufficiently remote from the other; but he does not say where the spot was. The cow-pox matter that he used was of the seventh day, it was a day older than the matter ordinarily in use upon calves at the Hamburg Calf-lymph Station. The result of that experiment was that four of the five points where small-pox matter had been inserted came to nothing; the fifth he says became a large yellowish-white vesicle which was cut out at the end of the sixth day after the matter had been taken from it, the wound being filled up by a black crust some time afterwards. The result of the cow-pox inoculations on the same calf was that a number of vesicles were produced from which lymph was taken. It was successful in the trial upon children—it had produced vaccine vesicles which, he said, were by no means brilliant in the calf, but, at all events, it produced satisfactory vaccine vesicles upon the children. Then, from the large pearly vesicle which he claims as the single one of the five small-pox inoculations which came to maturity—from that large pearly vesicle he inoculated a calf at 12 incisions, all of which produced a crop of vaccine vesicles of the very best quality, and from that calf he proceeded to inoculate a child which had axillary swelling upon the ninth day, and six discrete nodules under the skin for several weeks afterwards. A calf inoculated with the same matter had beautiful vaccine vesicles, of which the crusts fell about the eighteenth day. The other inoculations upon children were done from the next calf in succession; the second child was inoculated at eight places with this matter, of which we are trying to find out the character, and had an areola and pain in the axilla. A third child was also inoculated at eight places, which upon the fourteenth day had all turned to large grey ulcers surrounded by erysipelas. The fourth child had also eight pustules, and the case was complicated with interstitial pneumonia for several weeks. In the case of the fifth child the vaccination was complicated with measles. These are the five cases. Dr. Voigt himself discusses the question whether he had not mixed up on the calf's hypogastrium the small-pox inoculation and the cow-pox inoculations. This was the first case in which he used the two concurrently. In his three earlier experiments he had used only small-pox; in the fourth trial he used both side by side; and he is endeavouring to meet an objection, as far as one can see, that he might have mixed up the vaccine vesicles with the single small-pox effect which remained at one of the five inoculated points. In reply to that hypothetical objection he says that not only was the product unlike that of his three former trials, and unlike the result of Chauveau's experiment, but it was somewhat unlike cow-pox itself; it produced larger vesicles, and more active matter, than those produced by the ordinary calf lymph in circulation at his institute.

5130. What would be your view as to that?—I must leave the facts to speak for themselves. I would rather not express an opinion upon a contemporary's experiment; but I thought it desirable to bring the facts before the Commission, because at a former sitting they seem to have been stated in a general way, and a conclusion drawn from them without any attention to details, which I should say are at any rate ambiguous.

5131. Did he continue to vaccinate children from that matter?—The detailed trials of the vaccination of the children end with the fifth child; he took no matter from these children, as I understand; it was carried on from the calf.

5132. (*Professor Michael Foster.*) Did he not carry it through several additional generations of calves before he sent it into circulation?—Yes, it was carried through several additional generations of calves; and in his paper he says that in inoculating with the old vaccine lymph of the Hamburg establishment, and with this new lymph, both on the same calf, he observed an approximation of the one to the other, inasmuch as the new lymph became milder, and the other, as far as he could see, became rather more severe, so that they approximated. It was used in practice certainly for a year or more, and then something happened, owing to the bad ventilation of the house in which the calves were kept, when it appears to have met with a temporary check.

5133. (*Sir James Paget.*) What would you think he produced in the calves?—I would prefer that the Commission should draw their own conclusion.

5134. (*Professor Michael Foster.*) Why do you bring the facts before us?—Because they have not been before you already; you have had a general statement, but no details.

5135. (*Dr. Bristowe.*) Have you formed any opinion?—I have.

5136. Do you object to give us your opinion, or the grounds of your opinion?—I do not object to giving my opinion upon historical points; but I decline the responsibility of saying that any contemporary has drawn a wrong inference from his facts.

5137. (*Dr. Collins.*) Do you think it fair to say that the experiment of Dr. Voigt served, as has been stated, to illustrate that small-pox inoculated upon the cow would give cow-pox?—I think the evidence is insufficient for that conclusion.

5138. (*Sir James Paget.*) On what material point do those experiments differ from Ceely's?—Ceely produced small-pox with his matter from the cow. His assistant, in taking the matter, pricked his hand, and he had a local pustule, as I understand, and a small-pox eruption.

5139. But children vaccinated from that matter in the cow had not that eruption, had they?—They had an eruption which he called strophulus, or another name, but I do not wish to draw conclusions from Ceely's results either. I have been desirous of avoiding even an expression of my own views, because that makes it the more difficult to get matters of fact brought forward.

5140. (*Dr. Collins.*) Do you think there exist any experiments which are not ambiguous which would suffice to demonstrate the possibility of converting small-pox into cow-pox by inoculating a cow with the virus?—I know of none.

5141. (*Mr. Savory.*) Then surely you are prepared to discuss the facts or would you rather make a simple assertion?—I would rather put in matters of fact than matters of argument.

5142. (*Sir James Paget.*) Then what was it you would say that Ceely gave to the children whom he vaccinated?—I believe he gave them small-pox; that is to say, small-pox of the inoculated sort.

5143. And that carried on through several removes?—Yes, as had been frequently done in the last century.

5144. And all of them cases of small-pox?—I believe so.

5145. It is an important point to know whether he really gave small-pox to the children?—That is the only way in which I can explain it.

5146. You think that those results have been continued by Ceely's experiments, by Badcock's cases, and in thousands of cases?—I do not know how long Ceely's matter was used. Badcock's was used far and wide, but I do not know anything of the particular means by which Mr. Badcock produced his results.

5147. Keeping to Ceely's, do you think that Ceely in the successive vaccinations which he carried on from child to child, and from arm to arm, really gave them small-pox?—If it was small-pox in the first I do not know what else it could have become in the other cases.

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5148. (*Professor Michael Foster.*) That the last case of vaccination with this matter which he described was nothing else than ordinary small-pox?—It would appear to me to have been nothing else than ordinary small-pox as inoculated.

5149. (*Dr. Bristowe.*) In what respect does that differ from cow-pox?—The two diseases are different in their local effects, and also in the epidemiological facts and in their clinical history.

5150. (*Chairman.*) You say that they presented to Ceely the features of vaccination, yet they were small-pox; so that in this particular kind of small-pox they produced all the symptoms which would have been found in cow-pox?—They produced a pustule which the doctors at Cheltenham thought was, on the whole, more correct than the contemporary vaccine vesicle; that is the phrase I find contained in one of the books, and I let it go for what it is worth.

5151. (*Sir James Paget.*) Ceely was a man of singularly accurate observation and care; he was familiar with vaccine, and he was familiar with the diseases of the cow; he watched for any instances in which having, as he believed, vaccinated from the cow, he had given small-pox. Do you think that he, with those cases before him, could have done wrongly in regarding them as cases of vaccination?—I think that nothing was impossible in the matter.

5152. (*Chairman.*) If that was so, must not small-pox in one of its forms be very similar to cow-pox, if the total results are so similar that the most competent observer mistakes in a large number of cases one for the other?—He was a competent observer, I admit, but he was always under the influence of an idea—Jenner's original idea—that cow-pox was the small-pox of the cow. Although he knew the facts as regards the cow better than anybody else before or after, he was still under the influence of the idea that he was going to prove the identity of cow-pox and small-pox by this experiment upon the heifer, when one would have supposed that a very brief study of the epidemiological history of small-pox, and, on the other hand, of the morbid anatomy of cow-pox, would have kept him right.

5153. He had inoculated small-pox, and had watched the diseases of the cow more carefully than anyone; could he have come to the conclusion that those were genuine cases of vaccination?—They may have made such an impression upon the mind of Mr. Ceely, according to the principle *credo quia impossibile* which has a wide application to mysterious things.

5154. (*Dr. Bristowe.*) But you have no ground for believing, have you, that there is any anatomical difference between cow-pox and small-pox?—I have indeed. I stated so at the beginning of my evidence.

5155. (*Dr. Collins.*) Is it not the fact that the local phenomena which are known to follow vaccination have been known to follow the insertion of various morbid fluids?—Presuming that you refer to horse grease, a vesicle like the vaccine vesicle has been produced by the inoculation of horse grease.

5156. (*Sir James Paget.*) Always, or as a rule?—I cannot say always; but it has been accepted as very like. The best instance of that is the case reported by Fewster, of which I have given an abstract.

5157. (*Chairman.*) You say that Ceely believed it because it is impossible. Do you believe that it is impossible that there may be a common nature between small-pox and cow-pox? Would not one of the modes of testing that be ascertaining by means of experiment? Supposing Ceely's experiment to be really well recorded and accurate, what is there in the nature of things which necessitates setting that aside because something else proves that it is impossible; that is what I do not understand?—In the first place, the matter taken from the heifer and accidentally inoculated in the hand did produce small-pox (that, I think, is admitted), a local pustule, and eruption. Secondly, the same matter, when used upon children, did in some produce eruptions which Mr. Ceely does not call variolous; he calls them strophulus, and other names which I have no means of interpreting.

5158. But if by means of this vaccine matter you ultimately produce an appearance which is exactly that of vaccination—that is to say, of the cow-pox, where the small-pox was not in question at all—would not that tend to show that there is something in common between those two diseases, if small-pox produces, under particular circumstances, when taken from the cow, a result indistinguishable from that which cow-pox produces?—I am unable to assent to the term "indistinguishable" for this reason, that I have not seen what the result of Badcock's lymph is, and I have never seen any picture of the kind of vesicle or pustule which he produced by small-pox matter passed through the cow.

5159. I am speaking in ignorance, but I thought Ceely gave a picture in illustration of the case, which he said was indistinguishable from the ordinary vesicle produced by vaccination?—My recollection of Ceely's pictures is that they were like pustules in respect of the purulence of the contents; they were not the clear whitish vesicle of cow-pox; they were darker, and much more vascular; they were more like pustules than the vaccine vesicles.

5160. (*Sir James Paget.*) Does not he give coloured illustrations showing how, at the first, the seat of vaccination from the cow was surrounded by a large area of deep redness, and that in later removes there were characters of the most perfect vaccination?—The statement which I remember is, that the doctors of Cheltenham thought they were rather better than the ordinary vaccine vesicles of the time.

5161. Could any one who had ever seen a case of each kind confuse the appearance?—The result of the inoculated small-pox was often to produce what were called bastard pimples, which might have been called strophulus.

5162. (*Dr. Collins.*) Do you remember what was the name Mr. Ceely gave to the eruption in the case of his house-surgeon?—No, I do not remember that; it made the impression upon him that it was a case of genuine small-pox; he inclined to admit it; it was taken from the cow, and it produced what Mr. Ceely admitted to be small-pox when it accidentally inoculated his assistant's hand.

5163. (*Sir James Paget.*) Will you go so far as to admit that small-pox matter passed through the cow, and thence transmitted through a series of children, may produce a condition which is not distinguishable from the ordinary vaccine?—Not having seen the result, I should not like to say.

5164. (*Chairman.*) I do not quite understand why you take one of the facts which Ceely records as absolutely indisputable, while the other is to be regarded as suspicious?—I think the two are irreconcileable. The probabilities are in favour of the whole having been of the same nature. If the first case was small-pox, so were all the rest. The cow was out of it by that time.

5165. If you accept the statement that the first was small-pox, why should you reject or throw a doubt upon the statement that the last bore all the marks of, or was indistinguishable from, an ordinary case of vaccination?—I cannot give my assent to his conclusion.

5166. But I am asking upon the statement first, why should we the less accept the one statement than the other, coming as they do from a presumably competent observer?—These are questions of how one's mind is affected by facts. All observers are liable to draw erroneous conclusions from their premises, and I think he has drawn an erroneous conclusion. I take it as having been stated according to his belief.

5167. But supposing he accurately observed it, would it not seem to show that by transmission through a series of subjects, small-pox might ultimately be produced indistinguishable from vaccinia?—It may have been indistinguishable to his eyes; it may have been indistinguishable to the eyes of most people; but the probabilities weigh very strongly against its having become cow-pox in its descent.

5168. But I am supposing small-pox ultimately to become indistinguishable from cow-pox?—It was no doubt a form of pearly small-pox vesicle that was used by Thiele for his experiments with the same object as Mr. Ceely.

Adjourned till Wednesday, the 22nd January 1890, at 1 o'clock.

At 8, Great George Street, Westminster, S.W.

Twenty-second Day.

Wednesday, 22nd January 1890.

PRESENT:

THE RIGHT HON. THE LORD HERSCHELL IN THE CHAIR.

Sir JAMES PAGET, Bart.
Sir W. GUYER HUNTER, K.C.M.G., M.P.
Sir EDWIN HENRY GALSWORTHY.
Sir WILLIAM SAVORY, Bart.
Dr. JOHN SYER BRISTOWE.
Dr. WILLIAM JOB COLLINS.
Mr. JOHN STRATFORD DUGDALE, Q.C., M.P.
Professor MICHAEL FOSTER.
Mr. JONATHAN HUTCHINSON.
Mr. J. ALLANSON PICTON, M.P.
Mr. F. MEADOWS WHITE, Q.C.

Mr. BRET INCE, *Secretary*.

Mr. CHARLES CREIGHTON, M.D., further examined.

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5169. (*Chairman.*) I believe you have something to say with reference to the epidemic history of small-pox? — I wish to put in a table of the epidemic history of small-pox as far back as we can trace it, so as to have a continuous view of the disease as an epidemic. With that object I have used the London Bills of Mortality from the year 1629 to the year 1848; and, for the purposes of comparison, I have taken one other disease in London which ranks even higher than the small-pox itself as a steady disease from year to year, namely, fevers; and in another column of the table I have given the deaths from all causes. I put in that table. (*The table was handed in. See Appendix X., page* 289.) For convenience of reference I have represented in a diagram the curve of small-pox in a blue line, and of fevers in a red line; and as the increase of both of those diseases in London appears to be related to the cessation of plague, I have also averaged the deaths from plague from 1629 down to its practical extinction in 1666 in a black line. (*The diagram was handed in. See Appendix X., facing page* 290.) The most difficult question which arises in connexion with the comparison between small-pox and "fevers" is to determine what is included under "fevers."

5170. Were there no burial bills in cases where the death was alleged to have arisen from fever prior to 1629?—Weekly bills were not compiled prior to that date; they were subsequently compiled by parish clerks with great care, and a copy of them was sent to the Lord Mayor, and to the Secretary of State.

5171. Of course it cannot be assumed that there were no fever or small-pox cases prior to that date?—Not at all.

5172. Are there other diseases mentioned after 1629 besides fevers and small-pox?—Yes; the classification is almost as complete from the first as it became a good number of years later; but I choose only the two great epidemic diseases for the purpose of comparing them.

5173. What are included in "fever"; you have no means of saying, I suppose?—We have the means of judging so far by the cotemporary accounts of the London fevers, of which there are a good many. I have written the names of the authors opposite to the year in which the author had written on, or had observed the fever. Some of these accounts are sufficiently precisely written to enable us to identify the fevers with the fevers of more recent times. The principal disease which appears to have been included under the term "fever," and which is not now included, must have been a certain amount of pneumonia; but the bulk of the fevers appears from the authors to have been typhus fever. The descriptions of all the cotemporary writers, from Sir Edward Greaves in 1643 to Willan in 1801 and Bateman in 1816, correspond, upon the whole, to typhus fever. The amount of ague, also, we have the means of ascertaining. The actual deaths from it in London appear to have been exceedingly few. We learn that from the figures of the years 1667 and 1668, and again of a later period for which they are entered in a separate column. Scarlet fever also appears to a certain extent, and when it is entered separately it amounts to a very small total. The question of enteric fevers, as they are called, has been much discussed, and Dr. Murchison professes to have found in the descriptions of a lenten fever by Strother in 1729 a type of disease which he thought would correspond with enteric fever; but making all those deductions from the total of fevers the bulk of the diseases called fever in the Bills of Mortality appears to have been typhus fever, then described as pestilential fever, contagious, malignant fever, petechial fever, and by other such terms.

5174. Do the Registrar-General's totals cover the same area as the London Bills of Mortality?—No, the latter cover a smaller area.

5175. When you give during these years the number of fevers and small-pox cases, do they cover the whole of London?—Yes, they do.

5176. Then these will none of them bear comparing with the deaths in the earlier years?—That is quite true, but my object in carrying the table down to the year 1848 was that that year was the year of the great epidemic of typhus fever, which practically ends the history of the old London fevers on the great scale.

5177. From which date do you consider the fever and small-pox returns to be taken the Registrar-General's Returns, and not confined to the London Bills of Mortality?—1838.

5178. (*Dr. Collins.*) Are your figures rates, or are they total numbers?—They are the actual deaths.

5179. (*Dr. Bristowe.*) You know, I have no doubt, that tuberculosis would have been included formerly in the term fever?—We have various criticisms upon the Bills of Mortality, more particularly by Dr. Fothergill He from the year 1751 published every month for nearly five years in the "Gentleman's Magazine" an article upon the weather and prevalent diseases of London for the corresponding month, and he more than once adverts to the incorrectness or untrustworthiness of the London Bills of Mortality, but he does not take exception to "fever" as including too much. On the other hand, he says that both consumption and convulsions included a great deal too much, convulsions being the heading under which were included nearly all the fatal diseases of infancy. Consumption, according to Dr. Fothergill, might include even cases of fever; he said that the searchers when they went to see a body after death wrote down many deaths as due to consumption, judging merely by the wasted look. That goes to show that the number attributed to consumption was too large.

5180. There is no doubt that those diseases were included among fever?—What were called brain fevers were included, no doubt.

5181. (*Chairman.*) Would you suppose that the heading "Fever" from 1838 to 1848 include the same items,

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and those only, as were included in the earlier years, or less, or more?—We have the evidence of Sir Thomas Watson that the epidemic of 1838 was almost pure typhus as I understand it, and that seems to have been the impression of Dr. Murchison for the epidemic of 1848.

5182. But taking the years between 1838 and 1848, would diseases, which in earlier years had been included under the heading "Fever," be given under a different heading, so that fever would be more strictly confined to that which would now-a-days be included under "Fever" than it would have been in earlier years?—Yes, it would. Mr. Marshall, who wrote upon the Bills of Mortality in 1832, pointed out that inflammatory diseases did increase in proportion as fevers declined.

5183. (*Sir William Savory.*) Do you take the term "fever" as you find it in the reports, or do you add a certain number of diseases together?—I take it as I find it, and for that reason I excluded the spotted fevers and the purples, which have a column to themselves.

5184. (*Sir James Paget.*) Upon whose evidence as to the cause of death are the Bills of Mortality founded?—Upon that of the searchers, I believe.

5185. Were they medical persons?—No; they were women.

5186. Would you put any trust in their reports?—I would put a good deal of trust in them. Dr. Fothergill himself, though he criticised the Bills of Mortality, considered that the small-pox figures were practically reliable, and the case of fever is not very different.

5187. But in an ordinary case would you take the evidence of a woman searcher as to fever as being practically accurate?—On the whole it would be.

5188. Take cases of tubercular meningitis, blood poisoning, hectic fever, cases of numerous local diseases which really have been diagnosed within the last half century and which had all been put down amongst fevers; what would you say as to those?—I would allow a deduction for those.

5189. (*Chairman.*) What is your reason for saying that the great bulk of these cases are to be regarded as cases of typhus?—We have the contemporary evidence of a long series of writers who wrote their books when the fevers of London rose to epidemic height, as in 1741. We also know that the same fever was epidemic generally over large parts of England. Strother, for example, writing in 1729, says that the deaths from that fever raised the bill of mortality to near a thousand in one week.

5190. (*Dr. Bristowe.*) But typhoid fever was not then distinguished from typhus, so that all cases of typhoid were then regarded as typhus?—That would be so.

5191. How can you separate the cases of typhoid from those of typhus at that time? Is it not equally arguable that the fever cases were mainly typhoid as that they were mainly typhus?—It is incredible to me that they would have been mainly typhoid.

5192. (*Chairman.*) Why incredible?—Because the description given by contemporary writers was that it was a contagious fever epidemic over a large area.

5193. Has it always been recognised that that would not be a proper description of typhoid? I thought there was no clearly defined distinction made between the two until comparatively recent times. If that is so, if the two classes of typhus and typhoid were equally regarded as contagious and they made no distinction between the two, must not that have been because they erroneously included the other and larger class with the contagious fevers?—The common belief of all epidemiologists is that if typhoid existed in those days it existed to a very small extent. Again, when they were discriminated, typhus was found to be more distinctively the fever of the old seats of epidemic fever and typhoid, more distinctively the fever of the newer parts of the town. That was especially the case in Edinburgh. We find nothing in the descriptions of fever in the 17th and 18th centuries to lead us to suppose that it was mainly typhoid.

5194. Was not that because they were not able to differentiate the one from the other?—I have observed that in Dr. Bateman's account, without using the names, he describes occasionally fevers which had more the symptoms referable to the bowels than to the head, but it was then only an intercurrent affection among typhus fevers. I am aware that in Paris it was discovered sooner than in this country.

5195. More typhus and less typhoid?—It is new to me to hear it contended that typhoid was as prevalent in the 18th century as it is now.

5196. (*Sir James Paget.*) I am only asking you the grounds on which you maintain that it was not as prevalent then as it is now?—The fever indicated in this red line was the contagious epidemic fever which sometimes prevailed all over the country and from year to year in London—the gaol fever, workhouse fever, or ship fever. It occurred in particular localities and under particular conditions of living, all of which point to typhus and not to enteric fever.

5197. You have spoken of Sir Thomas Watson, whom we should all admit to be a most accurate observer, and seeing that for 20 years he did not discern the difference between typhoid and typhus, surely we may believe that his predecessors failed as much as he did?—My recollection from reading Sir Thomas Watson's lectures is that in 1838 he found no cases examined at the Middlesex Hospital having the anatomical characters of typhoid, although he had often seen cases with those anatomical characters in former years.

5198. Is it not certain that a great many cases were examined and recorded and regarded as cases of typhus?—I am not resting upon the name typhus at all; I am trying to construct the prevalent type of fever from the details and concrete descriptions given by this series of writers, and the use of particular words is not important.

5199. But the use of words is certainly important in the matter, as determining what you say, that the course of typhus fever has been like that of small-pox with similar rising and falling frequency. Have we any record which is to be relied upon as to what the frequency of typhus was if they included with it typhoid and other diseases?—

5200. (*Sir William Savory.*) If typhoid is not included in typhus, what became of it?—I am prepared to admit that it was included in the fevers, but we have no means of estimating the amount of it; and the impression that one gets by reading all those authors, beginning with Sir Edward Greaves in 1643 and going down to a recent date, is that the prevalent fevers of England, and of London in particular, in the 17th and 18th centuries, were fevers which are now described by the name of typhus; and that holds good not for London only, but for provincial towns and many villages throughout the country, and, in fact, for the whole of Europe. The best writers on epidemics that I know, Professor Hirsch and the late Professor Häser, speak of typhus fever as being the predominant fever of the 17th and 18th centuries.

5201. (*Sir James Paget.*) Are you aware that specimens of typhoid were collected by John Hunter, who must have collected them before the year 1780?—I have read it in your own Bradshawe Lecture.

5202. That surely is a matter of fact bearing on the matter, if they were not at all regarded as cases of typhus?—I quite admit that they were probably not all typhus; but it is merely a matter of deducting so much from the total of fevers.

5203. How much?—I cannot say how much, and I think no one else can say. I do not think that any little difficulty of that sort takes away from the significance of the epidemic history of typhus fever in London as compared with that of small-pox.

5204. You admit, then, that in this line you think that typhus includes typhoid?—I accept Dr. Murchison's conclusions.

5205. Not Dr. Murchison's?—I would rather take Dr. Murchison's authority.

5206. (*Sir William Savory.*) You think that typhoid is included in the red line?—I think there would have been a certain amount of typhoid included.

5207. Can you tell us what amount?—No.

5208. (*Chairman.*) What other disease was there that would vary greatly in amount outside of fever and small-pox?—Dysentery was the most remarkable variant, I should think.

5209. I observe that in comparing the years 1725 and 1726, if you take the sum total in each of those two years of fever and small-pox, there was scarcely any variation; in fact, in the second year it was just slightly less than in the former as regards the mortality of the two combined; whereas the total number of deaths was 14,000 in excess in the latter year. Therefore there must have been some disease which was very greatly more prevalent in the latter of those two years than in the former; do you know what it was. I have noticed one or two cases of those great variations?—I cannot recall the facts for the particular years; but dysentery for a series of years varied enormously and some-

times the deaths put down to dysentery were several thousands. That was an incident in the history of disease in London which did not last very long, but while it lasted it was very severe. Then the weather would make a difference to the number of cases put down to asthma and "tissick," and such like things.

5210. Where are the figures to be found from which these tables are compiled?—There is a collection of them from 1658 in the British Museum, and I rather fear that the earlier ones are lost; but contemporaneously with their publication they were used by Captain John Graunt in his book (1659) upon the Bills of Mortality in London, and he abstracted the totals in a table.

5211. Where have you taken your figures from, from that book of Captain John Graunt?—I have taken my figures previously to 1658 from Captain Graunt's book, but from that date down to the end of the table I have taken them from the printed originals of the yearly bills in the British Museum.

5212. That is to say, right down to 1837?—Yes. The Company of Parish Clerks still exists, and no doubt has a number of documents, but I doubt whether they have anything previous to 1658.

5213. (*Mr. Meadows White.*) Is there any recognised difference between specific causes of typhoid and specific causes of typhus?—A very marked difference so far as I know. In forming my own judgment it was based on that very point, and I was proposing to read a passage illustrating it.

5214. (*Chairman.*) Perhaps it might be convenient if you were to do so now?—The question put to me by Mr. Meadows White raises the other question, why typhus fever was so common in London in those years, and that, I think, is associated with the question why small-pox was so common. As to the conditions upon which the London fever depended we have a considerable number of statements made by those contemporary writers, whose names I have written across the diagram. Especially after the year 1770 we have various writers touching on it, and at a still earlier date we have the treatise on Medicine by Dr. Browne Langrish, which was entirely devoted to the London fevers, wherein he speaks of as many as nearly 3,000 persons living within the compass of an acre. The complaints of overcrowding, insufficient ventilation, and domestic filth turn up in several books on the London fevers in the 18th century. However there was a considerable improvement after 1766 when the sanitary improvements began in the City of London, namely, improvements in the paving of streets, in the scavenging and in many other matters of sanitation,—the city of London having followed the city of Westminster at an interval of four years, the Westminster improvements dating from 1762. But as late as 1801 we have a specific and minute description by Dr. Willan of the state of things under which the London fever,—what Dr. Willan calls the malignant contagious fever,—existed; and that is what I propose to read as explaining the unwholesome conditions under which both fever, and I should say also small-pox, existed in London, and prevailed in London during the last century to a much greater extent than they prevail now. Dr. Willan says: "Among the poor the mortality from "this cause" (the malignant contagious fever) "was "very considerable notwithstanding the attentive ad- "ministration of proper articles of diet and of suitable "remedies, with plenty of wine. The good effects of all "these applications are often superseded by the miser- "able accommodations of the poor with respect to bed- "ding, and by a total neglect of ventilation in their "narrow crowded dwellings. It will scarcely appear "credible, though it is precisely true, that persons of the "lowest class do not put down clean sheets on their beds "three times a year; that, even where no sheets are used "they never wash or scour their blankets and coverlets, "nor renew them till they are no longer tenable; that "curtains, if unfortunately there should be any, are "never cleaned, but suffered to continue in the same "state till they drop to pieces; lastly, that from three to "eight individuals, of different ages, often sleep in the "same bed, there being, in general, but one room and "one bed for each family. To the above circumstances "may be added that the room occupied is either a deep "cellar, almost inaccessible to the light, and admitting "of no change of air, or a garret with a low roof and "small window, the passage to which is close, kept "dark in order to lessen the window-tax, and filled not "only with bad air, but with putrid excremental or "other abominable effluvia from a vault at the bottom "of the staircase. Washing of linen or some other dis- "agreeable business is carried on, while infants are left "dozing and children more advanced kept at play whole "days on the tainted bed; some unsavoury victuals are "from time to time cooked; in many instances idle- "ness, in others the cumbrous furniture or utensils of "trade with which the apartments are clogged, pre- "vent the salutary operations of the broom and white- "washing brush, and favour the accumulation of a "heterogenous, fermenting filth. The rooms do not "change their condition until they change their tenants. "Often, indeed, so little care is taken that enough of "the contagion remains to infect all the inmates who "successively occupy the same premises. I recollect "a house in Wood's Close, Clerkenwell, wherein the "fomites of fever were thus preserved for a series of "years; at length an accidental fire cleared away the "nuisance. A house notorious for dirt and infection "near Clare Market afforded a further proof of negli- "gence; it was obstinately tenanted till the walls and "floor giving way in the night crushed to death the "miserable inhabitants. From all these causes com- "bined there is necessarily produced a complication of "fœtor, to describe which would be as vain an attempt "as for those to conceive who have been always accus- "tomed to neat and comfortable dwellings. The above "account is not exaggerated; for the truth of it I "appeal to the medical practitioners whose situation or "humanity has led them to be acquainted with the "wretched inhabitants of some streets in St. Giles's "parish, of the courts and alleys adjoining Liquorpond "Street, Hog Island, Turnmill Street, Saffron Hill "Old Street, Whitecross Street, Grub Street, Golden "Lane, the two Brick Lanes, Rosemary Lane, Petticoat "Lane, Lower East Smithfield, some parts of Upper "Westminster, and several streets of Southwark, "Rotherhithe, &c. It cannot be wondered at that in "such situations contagious diseases should be formed, "and attain their highest degree of virulence. The "inhabitants of the second storey in houses occupied "by the poor are usually better accommodated, and "therefore experience, during sickness of any kind, "the best effect from public and private charities. But "persons thus stationed suffer from contiguity and from "their friendly attentions to those above them, or to the "tenants of the cellars; so that in whatever part of the "house a fever commences, it is soon diffused among "all the inmates and their occasional visitors, especially "in seasons which favour its progress, like the last "autumn and winter. It is a melancholy consideration "that in London and its vicinity hundreds, perhaps "thousands, of labourers, heads of families and in the "prime of life, are thus consigned to perish annually, "being often so situated that medical applications or "cordial diet cannot in any way alleviate their dis- "tress."

5215. (*Dr. Bristowe.*) What was the date of that?—1801.

5216. (*Chairman.*) You read that as I understand as explaining the larger number of deaths from typhus fever at that time?—Yes, and as explaining its continuance as the standing disease of London throughout the whole of the period covered by this diagram.

5217. (*Mr. Picton.*) And you omit small-pox?—I was coming to that;—that the conditions favourable to small-pox are to a large extent the same as the conditions favourable to typhus.

5218. (*Dr. Bristowe.*) How do you account for the small death-rate from small-pox and fever in the 20 years that follow?—I was not proposing to account for that.

5219. I simply ask whether you can account for it?—If I were to set about answering the question systematically I should do it in the way in which epidemiologists approach all other questions of epidemics; that is to say, I should thoroughly sift the whole of the circumstances.

5220. You have not any reason to give?—I should not like to give a reason in the brief time that I have.

5221. (*Professor Michael Foster.*) How does your quotation illustrate the question that was put to you by Mr. Meadows White?—The question as I understand it was whether there were specific conditions of the respective fevers.

5222. (*Mr. Meadows White.*) My question was whether these specific causes, if there were any, co-existed during this period. The presumption or the inference I suppose would be that the results might have followed?—Dr. Willan describes the conditions of overcrowding, want of ventilation, and indoor filth which

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correspond to the conditions of typhus fever as we know them in all countries; and these are very different from the conditions of enteric fever, which, as I understand it, is largely an affair of a tainted soil.

5223. (*Sir James Paget.*) Does Dr. Willan give any account of the water supply of that time?—I do not think he does.

5224. Is it not supposed that typhoid depends very largely upon that?—Yes, in connexion with a foul soil.

5225. And that he does not mention?—No.

5226. (*Chairman.*) Does that conclude all the points to which you desire to call the attention of the Commissmission?—I should like to point out that in the diagram the decline of small-pox from the year 1805 is shown; that this corresponds to a decline in the fever line also; and from the accounts given by Dr. Bateman quarterly of the diseases and weather of London, we know that the fever declined actually more than the small-pox. If this diagram is misleading at all for the earlier years of this century, it is misleading in understating the amount of small-pox, and in overstating the amount of fever which might be regarded as typhus fever.

5227. I do not quite understand how that arises?—It arises from the contemporary evidence of Dr. Bateman who kept a quarterly record of the weather and diseases of London, as he was able to do by means of his dispensary practice; and from a study of these reports extending from the year 1804 to the year 1816 we see that small-pox was not so very different from what it had been in his earlier experience; whereas fever was so rare that he expresses his surprise at its comparative infrequency.

5228. I suppose that would only be an indication of the state of things in a particular district?—But that district was one from which the class of diseases mostly came.

5229. (*Sir William Savory.*) Did you concern yourself with the diminution of mortality in reference to age?—For small-pox in particular do you mean?

5230. No, as regards both small-pox and fever?—There is no means of estimating the ages as regards fever.

5231. I think we have had it in evidence, have we not, previously that there was a striking fact with regard to that?—That, I think, would probably refer to a later period than that which I have included in this diagram.

5232. (*Chairman.*) Is there any other point to which you wish to call the attention of the Commission?—No, that is all.

5233. (*Sir James Paget.*) I would just ask with regard to this line indicating the frequency of fever marked "mostly typhus" whether it is to be admitted that under the head of "fever" a great number of diseases were included which are now separated from it, and if so whether that separation of those diseases as years go on within this century would not apparently make the number of cases of typhus diminish although, really, they might have remained in the same proportion; that is to say, if you separate gradually from the typhus all the cases of cerebral meningitis, pericarditis, and a great many more, you diminish the number of cases recorded as fever, although the number of cases of fever was practically the same as before?—After reading all the contemporary writers on typhus I cannot think it makes any material difference. For example, we have to deal with such a fact as that mentioned by Strother, that the contagious malignant fever of that day (1729) raised the Bill of Mortality to near one thousand in a week.

5234. But I am speaking of this century?—Yes, I agree as to this century. That was the point admitted, I think, by Marshall, who wrote upon the Bills of Mortality in 1832, that the number of cases detached as inflammatory diseases reduced the number of cases of typhus.

5235. There has been no corresponding reduction of the cases of small-pox by errors of diagnosis?—No.

5236. So that the lines do not exactly represent the facts?—No, they are only approximate.

5237. But may I not observe that it is the point of approximation upon which the argument seems in great part to be maintained?—It appeared to me that it did not matter how inaccurate the typhus line was owing to those errors, because now typhus is nearly extinct; there has been hardly any of it in London for several years.

5238. Are you speaking of this table alone from which you make your deduction?—In making the table and diagram I had it in view that typhus had come to an end or nearly so, in the subsequent years.

5239. But what occurs in 1889 hardly bears upon what occurred in 1848, does it?—As to the year 1848, it was the year of an epidemic for which we have the statement of Dr. Murchison, not only for London but for Liverpool and other parts of the country, that it was almost pure typhus.

5240. But must it not be admitted that if you deduct all the cases recorded as typhus in the previous century which were not typhus, the line marked in your diagram as typhus would indicate a greater proportion of cases in comparison with small-pox than the line in the previous century?—Yes, I admit that the line is too high all over; but I think that the cases to be deducted from it were probably steady from year to year, and if the line were corrected for those errors it would just be brought down by a certain uniform amount.

5241. But the errors were not detected in one year?—It seems to me that the cases included under the head of fevers which were not typhus would be more likely to be owing to causes of mortality always at work than to other epidemics confused with typhus.

5242. (*Chairman.*) But if there were then both typhoid and typhus may not the proportion between the two have varied from year to year; may there not have been more typhoid and less typhus; so that the total for the two years would have been the same?—The evidence as regards the amount of enteric fever is really very unsatisfactory; it is almost impossible to find a picture of enteric fever in any of the contemporary descriptions. I am willing to defer to the opinion of the late Dr. Murchison that it existed, but you may read through all those twenty or more writers who describe the fever of London, and you will hardly find anything that corresponds to enteric fever. More particularly the elements of contagion and of epidemicity over large areas and the condition of overcrowding upon which the disease depended are distinctive of typhus and not of enteric.

5243. (*Sir William Savory.*) The question which I put to you with regard to age in relation to statistics bears upon an answer of Dr. Thorne's at No. 744, on page 36 of the evidence before the Commission. The point is to show that there has been a gradual and striking diminution of small-pox under five years of age concurrent with the increased vaccination which does not obtain for other fevers. "It has gone down," he says, "from 62 per cent. of the total in 1851—60 to "24 per cent. of the total in 1881—87; whereas if "you look at measles, for example, you will see that "instead of such a diminution in infant deaths from "measles the number has been practically the same "during all the four periods." That is rather remarkable, is it not?—To estimate that correctly we should require to take the whole history of measles into account.

5244. It is not measles only, it applies to other diseases besides measles?—I should take each one upon its merits and trace its epidemic history as far as possible.

5245. That would be your answer?—Yes.

5246. Then may I read you this. Dr. Thorne says, "I suppose it would be impossible to instance any "word which is more utterly worthless as an indication "of disease than the word 'fever.' I was going to say "that I am sure my questioner must know that fever "was a term which had absolutely no value, or I will "not say absolutely no value, but no value for statistical purposes, until Sir William Jenner's day"?—That is all very well for a statistician, but for anyone who sets himself to study the history of epidemics as I have been doing, and hope to do still more, the London Bills of Mortality are precision itself compared with such other facts as the historians of epidemics have generally to be content with.

5247. (*Sir James Paget.*) You know that, practically, the persons who recorded the cause of death were the women watchers?—Yes, they were the women searchers.

5248. And you regard that as sufficient evidence?—Yes.

5249. (*Chairman.*) But though the London Bills of Mortality may be precision itself as compared with something else; that something else may be so very bad that that precision itself may not be worth very much?—I think it is worth a great deal. We are so often at a loss, in working over historical points, to get any-

thing at all, that one is comparatively comfortable when one comes to the period when the London Bills of Mortality begin. The whole question of their trustworthiness was discussed by Marshall in his book in 1832, and I should have thought that he had established the London Bills of Mortality upon a footing of relative trustworthiness. I think that they are especially trustworthy for those great epidemic diseases which recurred constantly, and of which the types were familiar to the people themselves, and to the comparatively humble persons who had the duty of recording the cause of death. The Company of Parish Clerks which employed the searchers was a most respectable company, with a long tradition, dealing with the London mortality from the time of the Plague; and not only are the Bills of Mortality the best thing of the kind in Europe for the corresponding period, but they seem to me to be a very useful record in themselves.

5250. (*Sir Guyer Hunter.*) You have read the account given by Dr. Willan of certain insanitary conditions which existed for the production and spread of fevers; what inference do you wish the Commission to draw from that statement with regard to small-pox?—The conditions which appear to me to be the favourable conditions for the one disease appear to me to be largely so also for the other; that is to say, overcrowding deficient ventilation, want of cleanliness of the person, and want of domestic cleanliness generally. What favours typhus fever in that way favours also the diffusion and continuance and extent of small-pox.

5251. Not its production?—No, not its production. I draw a distinction there, because I, in common, I suppose, with most persons, regard small-pox as an exotic to this country, whereas the general opinion is that typhus fever is indigenous.

5252. (*Sir William Savory.*) How do you deal with these questions of statistics that we have before us, such as Dr. Seaton's, for example, and those of Dr. Barry (you know them very well, of course) with regard to vaccination and the influence of vaccination on small-pox?—Dr. Barry's statistics are subsequent to my own inquiries altogether.

5253. You shut them out?—No, I do not shut them out, but it so happens that Dr. Barry's report was published after I had finished all the original inquiries which I was making upon the subject.

5254. Do you think they are worth attention?—No doubt they are for those who are making up their minds upon the subject.

5255. Are you making up yours?—No, mine is made up.

5256. So that you would not go into them?—I do not find anything in them that is irreconcileable with my convictions.

5257. And with regard to previous statistics, such as those of Dr. Seaton and others who have placed before us large tables showing the effect of vaccination upon small-pox, what have you to say?—I have not ignored them; I have gone over them all and given due weight to them in making up my mind.

5258. Have you given any weight to them?—I have treated them seriously as elements in this case.

5259. Have you given any weight to them?—They have not caused me to form an opinion other than I have formed.

5260. Can you refer us to any tables which you think should be of greater weight?—I have a certain distrust personally of statistical arrangements of all kinds. I prefer to take the facts in as concrete a form as possible, and to let any set of figures stand without being made up into parcels or abstracted into ratios or grouped in any way whatsoever.

5261. Can you give us any tables which you think should be more considered than those which I have mentioned?—I am not prepared to put in statistical tables, but I am quite willing to answer any questions that might arise on the statistical part of the case.

5262. You think that this table which you have handed in to-day is of more importance than those statements of Dr. Seaton and Dr. Barry?—I should not compare them at all. My table covers another part of the subject and a part which has not been touched upon before.

5263. Surely it is a statistical table?—It is a statistical table in a way, but it is merely a convenient form of bringing before you the epidemic history of small-pox.

5264. What is it besides being a statistical table; I mean that table which you have handed in?—Even if it were a statistical table, I have no objection to the term or to the method.

5265. But you have spoken slightingly of statistics?—No; I said that I had a distrust of the way in which they are sometimes parcelled out and abstracted. This table of mine contains no abstraction at all; it is a mere continuous record of the course of small-pox in London.

5266. It is natural that you should attach the most importance to your own table?—No. I must demur to that. It is a new thing that has not been brought before the Commission hitherto.

5267. There were some very striking facts related by Mr. Marson years ago, and by Dr. Barry recently, concerning the immunity which nurses who were vaccinated enjoyed from small-pox. Do you know Marson's statements?—Yes.

5268. Do you know Barry's?—No.

5269. Practically it amounts to a complete immunity of those nurses who were vaccinated; how can you account for that?—I could not account for any isolated fact like that without taking it into consideration as part of the whole question.

5270. Will you take it into consideration?—I take it into consideration from the point of view of the pathology of cow-pox, and of the experimental evidence of protection.

5271. Could you give us your explanation of their immunity as stated by Marson and Barry, not to speak of others?—I do not feel bound to explain why they they did not have small-pox. A great many people do not have small-pox.

5272. Can you give us any parallel facts of complete immunity, with such great exposure, as these nurses enjoyed?—There are, I believe, facts more or less parallel; but I object altogether to giving explanations of isolated phenomena.

5273. Do you recollect your statement towards the end of your article in the Encyclopædia Britannica about the Dublin Hospital?—I did make a statement about the small-pox hospital of the South Dublin Union.

5274. And it is a very important statement?—Yes, if you please.

5275. What do you say with regard to that?—I took it from the Medical Officer of the South Dublin Union small-pox hospital.

5276. You took it from whom?—From Mr. Frank Thorpe Porter.

5277. You took it from Mr. Phelan; you quote it from the Medical Press and Circular of March the 27th, 1872?—I quote it from a paper by Mr. Frank Thorpe Porter.

5278. At the small-pox hospital of the South Dublin Union all the 36 nurses enjoyed an immunity from the disease: 29 were not re-vaccinated but only the remaining seven; that is what you say, is it not?—Yes, that is the substance.

5279. Did you inquire whether those nurses had previously had small-pox?—I inquired into all that the writer gave us.

5280. Did you make any further inquiries beyond what you saw in that article in the Medical Press and Circular?—I referred to the article.

5281. Did you make any further inquiries?—None whatever.

5282. Do you not think that you ought to have done so before you ventured on such a statement as that?—I gave the passage and I gave the reference to it, and it is open to anyone to inquire for himself.

5283. (*Chairman.*) Do you think it a material or immaterial circumstance whether those nurses had or had not had small-pox?—I think that applies to all the nurses equally.

5284. That is to say, whether they had small-pox or not before applies to all the 36 nurses; is that, in your judgment, a material or immaterial circumstance?—If they had had small-pox before they would certainly be very unlikely to have it again; it would have been a protection according to all we know.

5285. That is to say, it would have been a material circumstance?—Yes.

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5286. (*Dr. Collins.*) Is there any mention of that circumstance made in that article from which you quoted?—I have here the author's words, and I should like to read them in order to show that I have not put anything into the Encyclopædia Britannica which I was not justified in stating.

5287. (*Sir William Savory.*) I did not suggest that you had put anything of the sort in, I was suggesting that you had left something out?—Then to show that I have left nothing out which the author gives I will read the passage.

5288. (*Chairman.*) But supposing that when you are investigating a case one of the authors whom you consult has not dealt fully with all the circumstances which you consider material, that would detract from the value of his statement, would it not?—It would if there were any reasonable suspicion.

5289. What I mean is that you have pressed very much upon us in relation to earlier observers that their statements are not to be relied upon, because in your judgment they have not stated all the material facts, and you have warned us against any conclusion being drawn from their statements accordingly?—If Mr. Porter had had any reason to suppose that the nurses all or any of them had had small-pox before I should have expected him to have mentioned it; it was an obvious thing to have stated. He was not prejudiced against vaccination at all; on the contrary. He was recording his experience at the temporary hospital of the South Dublin Union under a number of miscellaneous heads, and he mentioned in a short paragraph the experiment that he had made of leaving the nurses without re-vaccination.

5290. (*Sir James Paget.*) Do you accept his statement as more trustworthy than those made by Marson and others with regard to the nurses?—No, I gave it for what it was worth.

5291. Did you not single out this statement, and not put equal force on the statements of others?—I chose it because it was the only instance that I knew of any one trying the nurse question the other way about, that is to say, trying how the experiment came out when they were left without re-vaccination. There may have been other instances where nurses were not re-vaccinated, but this was a particularly convenient one; it seemed to bring the thing to a focus, and that is why I chose it.

5292. (*Sir William Savory.*) May I read you these two extracts from letters which I have received from Dublin; one from a gentleman who was formerly resident there, who says, "To my recollection the usage was that all "attendants on the sick, who had not had small-pox, "were vaccinated immediately on taking up the duty." And the other says, "I was in charge of the Dublin "district during the outbreak of 1879-80, and the south "Dublin small-pox sheds were frequently visited by me." (This is the letter of a gentleman who has been before us, Dr. MacCabe.) "The practice, then, was to employ as "nurses only such inmates of the workhouse as bore "evidence of having had small-pox: all others were "re-vaccinated." If you were to correct your article for a subsequent edition would those facts lead you to modify that statement of yours?—No; and for this reason, that the very next sentence to that which you have criticised contains the remark that at small-pox hospitals nurses are not rarely chosen from among those who have had small-pox.

5293. Then you would leave that statement of yours as it stands?—Yes.

5294. And you think that fair to the public?—I think so.

5295. (*Mr. Meadows White.*) Might I ask you to read the exact words of the author. I think you said that you had them?—The exact words of Mr. Frank Thorpe Porter in his paper in the Medical Press and Circular of the 27th of March 1872 are:—"With reference to re-"vaccination I have no faith in it. Not one of the 36 "attendants at the South Dublin Union sheds have "taken small-pox. Only seven of the number were "re-vaccinated, and as the remaining 29 enjoyed the "same immunity, wherein is the necessity of the opera-"tion?"

5296. But that is in favour of vaccination?—He adds, "It is only to be employed where there is no evidence "of the success of infantile vaccination.

5297. (*Sir James Paget.*) May we then assume that of these nurses all had been vaccinated or re-vaccinated. The statement is that out of 36 seven were re-vaccinated and 29 were not; but may it be assumed from that statement that those 29 had been vaccinated or had had small-pox?—The author assumes that they had been vaccinated; he assumes that they had all undergone one vaccination, and that is all that he assumes.

5298. They were not persons who were not protected by either vaccination or small-pox?—No.

5299. May we assume, therefore, that they were all in a sense protected?—They were all vaccinated. But the reference in the Encyclopædia Britannica comes under the head of re-vaccination, which is, I think, the head under which the question of nurses is generally put.

5300. (*Sir William Savory.*) You do not think that the points to which I have called your attention are of any importance in this matter?—I have no wish to depreciate their importance.

5301. But do you think that they have any importance? To put it on the lowest ground it is doubtful whether those nurses had had previous small-pox or not. Is that of any importance to the question which you raise?—If it is of importance, it is of as much importance for the seven who were re-vaccinated as for the 29 who were not re-vaccinated.

5302. Now, turning to another subject; in your evidence which you have already given you have stated more than once that no skilled person, no medical man at the time of the introduction of vaccination, and for some time afterwards, had seen cow-pox before it passed into a state of ulceration. You were asked, "Do you "mean by that the appearances were never seen by "medical men in the early stages of the disease?" and your answer was, "I think not"?—That refers to the disease on the cow's teats.

5303. Precisely. Now, here is the statement made by Jenner: "It appears on the nipples of the cows" (this is quoted by Crookshank in the second volume at page 8) "in the form of irregular pustules. At their "first appearance they are commonly of a palish blue "or rather of a colour somewhat approaching to livid, "and are surrounded by an erysipelatous inflamma-"tion." Do you think that Jenner wrote that from some description which had been given to him?—I think it exceedingly likely, or from what he saw on the milker's hands afterwards. The description corresponds with its appearance on the milker's hands.

5304. (*Professor Michael Foster.*) Your view is that he had not seen what he described on the teats of the cows but that he had seen it on the the milker's hands?—Yes.

5305. (*Sir William Savory.*) You infer that?—Yes.

5306. Then, again, at page 98, Woodville says: "To-"wards the latter end of January last I was informed "that the cow-pox had appeared among several of the "milch cows kept in Gray's Inn Lane, and upon ex-"amination of these, three or four were discovered to "be affected with pustulous sores upon their teats and "udder. These pustules corresponded in their appear-"ance with the representation and description of the "genuine cow-pox, as given by Dr. Jenner." Did he draw that, too, from a description which somebody had given to him?—I am unable to say how he arrived at it.

5307. But you infer that he did so, because you think that he never saw it?—Ceely, who described these things far more precisely than anybody else, tells us that he was never early enough on the spot to see the thing in the beginning.

5308. (*Professor Michael Foster.*) But did not Ceely give a picture of the vesicle stage? Does he not in the Transactions of the Provincial Medical and Surgical Association give a plate of the vesicles upon the teats?—Yes, a plate, very like one that Sacco gave before.

5309. He gives it as a plate of casual cow-pox?—Yes.

5310. And that you think he drew from his imagination?—It appears to me to be an idealised diagram.

5311. And Ceely, you think, was a truthful observer and a person who spoke the truth always?—I think so, very decidedly.

5312. (*Chairman.*) Why do you suggest that is an idealised diagram if he gives it as purporting to be something which he has observed, do you think it to be an idealised diagram because you do not think that he could have observed that which he says he observed?—I think there is no description in the text of that first diagram. On the other hand, there is a

very specific and concrete and minute description of the other plate, which is of an entirely different thing.

5313. Then your reason for considering it an idealised diagram is because of the discrepancy between the two diagrams?—Yes; and also from the fact that the text describes the one and does not describe the other.

5314. (*Sir James Paget.*) You did not see any drawings of Ceely's of what are deemed various other forms of pox upon the teats of the cow?—The only other form that I think he describes is the blister-pock.

5315. Are you aware that there are various drawings left by him showing the various kinds of pocks upon the teats of the cow?—I am aware only of the blister-pock—the white-pock.

5316. You have not seen those in the collection of the College of Surgeons given by his brother?—No.

5317. It seems so improbable that Ceely would have imagined and filled in one drawing when he appears to have made all the others with complete accuracy?—It is unlike him, I admit.

5318. Surely it can hardly be believed of him?—The picture appears to me to have internal evidence of being an idealised diagram.

5319. (*Sir William Savory.*) In the case of Ceely's assistant, Taylor, who was accidentally inoculated, you say that Ceely himself admitted that it was small-pox that Taylor had?—I think I said that he inclined to admit it.

5320. I think you say more than that. I think you state that he admitted it?—

5321. (*Chairman.*) I certainly understood that it was admitted to be small-pox. I will not say that you did use those words, but at all events it produced that impression upon me because it lead me to put some questions, as I thought, that I might take it as a fact that it was unquestionably small-pox?—He specially refers to the first case, that of Taylor's, as being somewhat disconcerting to him. He certainly did not say that it was not small-pox; he gave it a name, I believe.

5322. (*Sir William Savory.*) Upon what evidence do you state that Ceely regarded it as small-pox?—At Question 5162 you state: "It made the impression "upon him that it was a case of genuine small-pox; "he inclined to admit it; it was taken from the cow "and it produced what Mr. Ceely admitted to be a "case of small-pox when it accidentally inoculated his "assistant's hand." Upon what grounds do you make that statement?—The chief ground upon which that statement is made is that he treated the case of Taylor as one disconcerting to him. You will find that stated.

5323. You think that that fact, that he treated it in a certain way, should weigh strongly against his own statement, which is this: "This was evidently modified "vaccine in a sanguine habit"?—You have got to reconcile that with what he says elsewhere.

5324. Excuse me, that is what you have got to do?—There can be no doubt in anybody's mind that it was small-pox whatever Ceely may have thought, and I was wishing to give him the credit of inclining that way, because in the beginning of one paragraph he speaks of one case, namely, that of his assistant, Taylor, as being somewhat disconcerting; I do not say exactly in those words, but to that effect. That can mean only one thing.

5325. But that is the evidence upon which you assert that Mr. Ceely received it as small-pox?—That he inclined to view it as small-pox; that he inclined to admit that it was small-pox.

5326. In your work on "Cow-pox and Vaccinal Syphilis," at page 47, you write, "In the section of his "first memoir, entitled 'Affinity of Cow-pox and "Small-pox,' Mr. Ceely writes as follows:—'Neither "'the protective nor the modifying power of the "'vaccine, its co-existence with variola in the same "'individual, the striking resemblance in the form and "'structure of the two vesicles at a given period, nor "'its occasional occurrence as a secondary eruption, "'had satisfied me of their common origin.'" On which your comment is, "All the points here enumerated, not even excepting the occasional vaccinal "eruption, are, indeed, calculated to satisfy one of an "entirely dissimilar origin"?—That is my impression.

5327. Can you give us any reasons for that view?—I have given abundant reasons throughout the whole of this book. This book from first to last consists of the reasons on which I rest the dissimilarity of small-pox and cow-pox.

5328. Excuse me, here are statements of certain conditions which are said to prove the dissimilarity. On what evidence?—Mr. Ceely's enumeration is not quoted in proof, one way or the other; nothing is made to turn upon it; there is a mere remark after he has been quoted.

5329. Do you think that the protective or the modifying power of the vaccine (assuming it to exist) would be an argument against their similarity or for it?—Protection, if proved.

5330. Assuming the protective or modifying power of vaccine on small-pox to be proved, would that be an argument for their being similar or the reverse?—I do not see how an assumption can be brought into the matter at all.

5331. But you do bring it in, because you say, "All "the points here enumerated, not even excepting the "occasional vaccinal eruption, are, indeed, calculated "to satisfy me of an entirely dissimilar origin"; that is what I want to know?—It is somewhat textual criticism. If my comment is not strictly applicable to all the points it applies to most of them.

5332. Then "the striking resemblance in the form "and structure of the two vesicles at a given period," that again is an argument calculated to satisfy you of an entirely dissimilar origin. How is that?—The dissimilarity of the vesicles.

5333. Then the fact that the form and structure of the two vesicles resemble each other is an argument against the similarity of their origin?—If they resemble each other it would be an argument so far in favour of a common origin.

5334. But you say that it is not?—What that means is that they do not resemble each other.

5335. But that is not what you say, is it?—That is textual or verbal criticism, which might very well be turned into another channel. If you wish to test the value of those arguments about the dissimilarity of small-pox and cow-pox it can be done without turning it into a matter of verbal criticism.

5336. We have, of course, to judge of the value of vaccination by its effects, have we not?—Yes, by its effects.

5337. The source of the vaccine matter, the question of its history and its source would not be so important?—If you can follow out the effects and discriminate them from all intermixture of effects due to other causes of the history without studying the source.

5338. I was just asking you about this passage which you will endorse no doubt: "It would be more curious "than useful to trace to its several sources, the vaccine "matter now in circulation in the various countries of "the world"; that is true enough, I suppose?—That is to say, to trace it beyond the point up to which I had already traced it.

5339. Jenner relates the case of John Baker who "felt the effects of a fever." I am referring to your other work now, "Jenner and Vaccination," in which you say at page 68, "Having occasion to mention the "case in a note in his next pamphlet, he says, with "simple inadvertence, that the boy 'unfortunately "'died of a fever at a parish workhouse,' it is not even "a 'contagious fever'." Then you go on to say, "Reading between the lines, with the help of horse-"grease pathology and Jenner's own plate, we may "safely conclude that this child of five, lent for the "experiment by poor parents under some cajolery or "other, had an ulcerated or sloughing arm from the "virulent matter inserted into it, that he had erysipelas "(which is both a fever and contagious), that he was "sent to the parish workhouse, that he died there, and "that this village tragedy was all enacted within a "period 'soon after the experiment was made.'" Do you think that the facts of the case warrant such a passage as that?—I think they do; I think they warrant even a stronger passage.

5340. That is hardly equal to the occasion, you think?—It is hardly equal to the occasion.

5341. Again, on page 154 you state, "But even if we "attach no constitutional significance to the proper "eruption of cow-pox, the mere presence on the skin of "spots, or pimples, or vesicles, or blebs would hinder the "full evolution of small-pox by inoculation." Will you tell us upon what ground you made such a statement as that?—Interference by means of eruptions on the skin

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is a matter generally admitted; I did not know that it was controverted.

5342. I beg your pardon?—That pre-existing eruptions on the skin interfere with the evolution of any subsequent inoculation is, I think, generally admitted.

5343. "The mere presence on the skin of spots, or "pimples, or vesicles, or blebs would hinder the full "evolution of small-pox by inoculation" is your statement; can you give any evidence in support of that view?—I was not aware that it was controverted.

5344. (*Chairman.*) Can you tell us anywhere where it is asserted?—They said that the presence of eruptions upon the skin was an indication that inoculation should not be applied.

5345. (*Sir William Savory.*) That is another matter. It goes on: "'Cutaneous eruptions render a child an "'improper subject for inoculation until those dis-"'orders are removed'"; that is quite another thing?—But we know, as a matter of fact, from the experience of Jenner's nephew in inoculating a regiment, at Colchester I think it was, that the existence of itch amongst the soldiers prevented the vaccine itself from taking.

5346. (*Dr. Bristowe.*) You believe Jenner's nephew's statement then?—I quote it as a matter of fact which there was nothing to discredit.

5347. (*Sir William Savory.*) Have you any reason for believing it?—I believe it.

5348. Upon what grounds?—I am not going to give you any grounds for my belief in a matter of that sort.

5349. Again, on page 69 you state, "James Phipps, "we have seen, had subsequent eschars, which meant "deep ulcers"; is not that a rash assertion?—It was so described in another case of cow-pox which I give immediately before (page 45).

5350. But on what ground do you assert that subsequent eschars meant deep ulcers?—On the ground of a strictly analogous case described by Hughes, of Stroud.

5351. You infer from another case that because the eschar was followed by a deep ulcer this was also?—I say that is what it meant. It is all the indication that one has.

5352. Does an eschar necessarily mean a deep ulcer?—No, not necessarily.

5353. It might have been a very superficial one?—And it does not matter whether it was or not.

5354. (*Chairman.*) But does the same person who describes the eschar and calls it a deep ulcer in the Stroud case give the description in the case of Phipps?—No.

5355. Then I do not quite follow why you assume that, because one observer, rightly or wrongly, speaks of an eschar in which he also shows that there was a deep ulcer, therefore, when some other writer describes an eschar, there must necessarily be a deep ulcer?—Because, unfortunately, it is necessary to supplement Jenner's statements by reading the realities into them.

5356. But in the case of Phipps how do you know that it is the reality that you are reading into it? I do not quite understand how you can be sure that you are right in your reading into Jenner's observations, which you say is necessary, if you read into them something which some other observer has described in another case?—The correction that Sir William Savory wishes to make is that it might have been a shallow ulcer. I am prepared to admit it to that extent.

5357. (*Sir William Savory.*) But it would have been a very different thing if you had said it might be shallow or deep, because you are using this as an argument to show the mischief that might have been done, which is entirely an inference of your own and is not supported by facts?—I would strike out the word "deep," and leave "ulcers" without any adjective at all, if anything turns upon that.

5358. (*Dr. Collins.*) Can you tell us what significance is attached to the term "deep eschar" in the contemporary literature of the time?—It meant a hole left behind.

5359. (*Sir William Savory.*) You know that Hunter used the term escharotic in reference to substances such as the red oxide of mercury and blue stone, which are not likely to produce very deep sores, are they? Then, just once more, on page 335 you write thus: "This was the "real origin of the famous doctrine of small-pox 'modi-"fied' if not averted by vaccination, which is a favourite "apologetic plea of our own time. Modified small-pox "or varioloid, or 'varicella' in the sense of the Vienna "school, is merely mild or discrete small-pox, usually "of the common pustular type, which was as frequent in "the days before cow-poxing was practised as it has ever "been since." That is a very important statement; can you tell us upon what evidence you base it?—The evidence in support of that statement is very abundant, and as you have asked for it I shall give it to you. The point, I suppose, is that that kind of small-pox which was subsequently called varioloid or modified small-pox was as common before vaccination was practised as it has been since. The evidence on which that statement rests is that small-pox in the 18th century, as we know from full descriptions of a number of writers, had the same variety of types that it has now. The death-rate from small-pox in the 18th century was the same as it is now. The circumstantial accounts and general statements of writers, such as Sydenham, Morton, Huxham, Ruston, and others, in the 18th century, all convey the impression that there was a large proportion of all the small-pox mild, and sometimes whole epidemics are described as of a mild form. With reference to the death-rate, which is the most trustworthy evidence, as being a numerical statement, we have the collection of epidemics made by Dr. Jurin from about the year 1724 down to the year 1727, which collection was supplemented by one epidemic added by Dr. Scheuchzer, and that collection brings the whole number of cases up to 18,229.

5360. (*Chairman.*) Cases where?—In all parts of England.

5361. (*Professor Michael Foster.*) In the provinces, exclusive of London?—Yes, I think exclusive of London. And among these 18,229 cases, according to the returns made to Dr. Jurin by his correspondents there were 3,008 deaths, which gives, as nearly as possible, one death in six cases.

5362. (*Sir William Savory.*) You take, may I say very properly, the per-centage of deaths as a very good test of modification of small-pox, do you not?—Yes.

5363. Do you know what Mr. Marson says on that subject?—I have not his words in my memory.

5364. He says in the evidence which he gave before the Committee of 1871, at page 236 in answer to Question 4113, "There were 2,920 unvaccinated cases. "Of these 1,043 died, giving an average of 34·89 per "cent. After vaccination with cicatrix or cicatrices "there were 10,398 cases; of these 790 died, out of "whom 105 were affected by superadded disease in "some form or other of a fatal character, leaving the "mortality 6·65 per cent. or about 6¾" ?—I am familiar with all those statements about the difference between the death-rate of vaccinated and unvaccinated cases.

5365. You admit that?—I am familiar with the statements that have been made.

5366. What do you say to them?—I am still answering the question about the death-rate in former times.

5367. The question was not merely about the death-rate in former times; the question was whether the death-rate in former times was as great as it is now, before and after vaccination?—The present death-rate, one in six, was the death-rate in the 18th century.

5368. Marson's tables are here, which were taken from the same place and are strictly comparable, and the death-rate in unvaccinated cases was very much higher?—I am speaking of the death-rate all over.

5369. Is it not a much more accurate test to take the death-rate in the same place?—To separate the death-rate of the vaccinated from that of the unvaccinated appears to me to be begging the question that we are here considering.

5370. How?—If it assumes that the vaccinated were protected, if it assumes that they have to be excluded and put in a different class from the unvaccinated.

5371. It does not assume anything of the sort; it merely gives the number of cases of deaths, first of vaccinated, and secondly of unvaccinated people and contrasts the per-centage, showing a greatly reduced per-centage in the case of those who had been vaccinated. How does that beg the question?—It puts the whole subjects of small-pox into two classes, one vaccinated and the other unvaccinated.

5372. (*Chairman.*) But supposing that you wanted to find out whether vaccination was a protection, and the result of your investigation was (to put an extreme case) that you found that of the unvaccinated class that came

into a hospital all died, and of the vaccinated class none died, should you say that those facts were wholly unimportant in assisting you to form an opinion as to whether vaccination was a protection or not?—That would be a very remarkable fact which would arrest one's attention at once. One would be very much swayed by a fact such as that, if it happened.

5373. Then something less in degree, but pointing in the same direction, is of importance, is it not, in enabling you to form a conclusion? It is not an assumption; it is a fact. If, without assuming anything, you are coming with an open mind, desirous of ascertaining whether vaccination is a protection or not, how can you avoid dividing small-pox into the two classes when your desire is to compare the two? I do not understand what you mean by saying that that assumes something?—For a comparison with the 18th century I should take all small-pox cases now, both vaccinated and unvaccinated and collect the death-rate for the two together, and if I found that the death-rate now was the same as the death-rate in the 18th century, when there was no question of vaccination at all, I should allow that to weigh with me.

5374. (*Mr. Picton.*) Would you not think it right to inquire whether there were other conditions affecting the mortality?—Certainly.

5375. (*Chairman.*) No doubt you want to inquire into all the circumstances?—Yes.

5376. But I did not quite understand why you said that dividing small-pox into two classes assumed the point. If you are going to make a comparison you must divide it into two classes?—From my point of view the comparison between small-pox in the 18th century and the 19th century would be made irrespective of vaccination.

5377. But supposing you were satisfied that on a very large scale (I do not say it is so) over a great number of years and with a great number of patients the death-rate in the unvaccinated, other conditions being the same, was very much higher than in the vaccinated class, although the total per-centage remained the same as the total per-centage of the previous period, would not one element requiring consideration be this: whether that did not point to the disease being generally of a severer type?—Do you mean in the unvaccinated class?

5378. No, being of a severer type at the later period, so that those who were unprotected were carried off in a larger proportion than they would have been in the previous period, and that the death-rate was made the same only by the fact that the greater number was protected?—My answer to that would be that the division should not be made *quâ* vaccination but *quâ* something else, or rather that the division has been made *quâ* vaccination, when it might have been made *quâ* something else, and that something else is relevant to the difference in the death rate.

5379. What is that something else?—Very often the age. The same kind of difference in the death-rate can be, and has been made out, without any motive, by Dr. Murchison with regard to typhus fever. The patients admitted into the London Fever Hospital were classified by him according to their station in life: whether they could pay; whether they were paupers; or whether they were not paupers, but unable to pay; he has those three classes; and the range of mortality is very striking. I give that just as an instance of another disease which can be parcelled out in the same way as small-pox has been without any reference to vaccination at all.

5380. And is it uniform?—I do not know whether it was done in more than one table.

5381. I mean are the variations always in the same direction?—Yes; and the explanation in that case is that it in some way corresponds to the higher age. The variation in small-pox is very often the other way; namely, that infants die at an enormously greater rate than children above the age of 3, 4, or 5; and that that accounts for the heavy mortality among the unvaccinated to some extent.

5382. But some of these tables, I think, if I remember rightly, give the comparison at particular ages of vaccinated and unvaccinated?—We are unable to get exhaustive tables in this country because so many cases of fatal small-pox are returned without any statement as to vaccination; whereas in Germany they have got a good many returns by which it appears that under the age of one both the vaccinated and the unvaccinated died at the rate of rather more than 50 per cent. in Berlin in 1871–72.

5383. (*Sir James Paget.*) What is the age at which vaccination is compulsory in Germany?—It has been altered since those tables were compiled. Since 1874 the age has been before the expiry of the calendar year succeeding that in which the child was born.

5384. And surely the vaccinated and unvaccinated are in the same position if the child need not be vaccinated until the end of the year?—But these tables were compiled for the epidemic of 1871–72, when vaccination appears to have been taken earlier; and, as a matter of fact, they were vaccinated or unvaccinated according to the statements of those who sent in the cases.

5385. Whose tables are those?—There was a Sanitary Commission in Berlin which collected statistics and they have been accepted in a recent report of the Berlin Gesundheits-Amt.

5386. Is it not the fact that the Germans specially claim that their compulsory vaccination renders them the nation most free from small-pox?—They might claim it upon the ground of immunity from small-pox subsequent upon the great epidemic of 1871–72.

5387. But that that immunity is enjoyed by the vaccinated and not the unvaccinated?—It has been a very general immunity in Germany.

5388. But what immunity there has been has been specially among the vaccinated?—It may be so.

5389. (*Chairman.*) Can you give us the reference, where can we find those tables?—There is a book published, issued by the Berlin Gesundheits-Amt called (to, translate the title) "Contributions towards a Judgment "upon the Utility of Vaccination." It is a quarto volume, published in 1888, with a large number of tables compiled from the official lists that were kept of the small-pox patients in the epidemic of 1871–72. (The tables from which I have quoted are on pages 168–9.)

5390. (*Sir James Paget.*) Is that a public institution?—This book is understood to have been compiled by Dr. Koch, although his name does not appear. He is the official head of the Gesundheits-Amt at Berlin. I do not say that he endorses all those statements, but he puts them into his book as facts that have to be dealt with.

5391. (*Dr. Bristowe.*) In your quotation from your own book, "Jenner and Vaccination," upon which Sir William Savory examined you, you say: "Modified small-"pox or varioloid, or 'varicella' in the sense of the "Vienna school, is merely mild or discrete small-"pox"; why do you insert the term "varicella"?—It is explained on a former page that it was so used in Vienna by Hebra and others.

5392. But in Vienna "varicella" means our chicken-pox, which disease Hebra at any rate regarded as modified small-pox?—I had personal experience of it at Vienna. I had an attack of small-pox at Vienna, and was visited by a late professor of medicine who said that I was suffering from "varicella."

5393. I want to know your view. You put the above terms as synonymous; do you consider them so?—Not at all; I regard varicella as chicken-pox.

5394. Then it is an error in your book?—No, it is not.

5395. You say that the Vienna school looked upon varicella as small-pox?—No, that they called modified small-pox "varicella."

5396. And you do not consider that it is so?—No.

5397. In your the book you imply that it is, inasmuch as varicella in the sense of the Vienna school meant chicken-pox as it does with us, though Hebra regarded chicken-pox as a variety of small-pox?—What is the page that you are referring to?

5398. Page 335. "Modified small-pox or varioloid "or 'varicella' in the sense of the Vienna school is "merely mild or discrete small-pox"?—I see no error there. It says "Varicella in the sense of the Vienna school."

5399. (*Sir William Savory.*) I should like to ask you one more question to finish this part of the subject. In your article in the Encyclopædia Britannica on vaccination, you gave a table at page 28 of deaths from small-pox from 1847 to 1884; do you remember with what object you gave that table?—I really had no other object than to put in something that would be probably wanted by those who used the article.

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5400. But do you not think that that table is very incomplete without a statement of the population at the different periods?—That is so familiar to everyone that they make their own allowances for it.

5401. But do you not think that it might mislead someone with regard to the relative mortality of small-pox in different years if you do not give at the same time the increase in the population. Do you know that Mr. Picton has quoted this table in an article which he wrote in, I think, the "Contemporary Review"?—There is nothing misleading in the table so far as I can see.

5402. You do not think it is misleading not to put the population?—No. I deliberately chose actual numbers instead of ratios throughout as being more concrete.

5403. Have you read Mr. Picton's article?—Yes.

5404. Do you not think that that table has misled him in the argument which he has based upon it?—I did not observe it at the time, and I should think it very unlikely.

5405. (*Chairman.*) Do you mean to say that a thousand deaths from small-pox in a population of a thousand, and a thousand deaths from small-pox in a population of thirty millions would mean the same thing and point to the same conclusion?—No, not at all; I chose the actual numbers not with any intention of magnifying the amount of small-pox, or giving any colour to the facts one way or the other, but throughout the article I took actual numbers instead of ratios because they appear to me to be more easily apprehended by those who read. If you speak of a ratio per million living, in my experience it makes no impression.

5406. That may be quite true; but if you give the actual number ought you not to give the actual number of the population, too; because, supposing that the number of deaths remains constant while the population is constantly increasing, does not that show a diminishing of the disease?—The correction it appears to me can be easily made by most of us, because we are familiar with the increase of the population.

5407. But the unlettered and unlearned people who would be misled by ratios would not be likely necessarily to have in their minds variations of population in order to make the necessary correction?—I think that the population might have been introduced with advantage so as to prevent that error.

Adjourned till Wednesday next at 1 o'clock.

Twenty-third Day.

Wednesday, 29th January 1890.

PRESENT:

THE RIGHT HON. THE LORD HERSCHELL IN THE CHAIR.

Sir JAMES PAGET, BART.
Sir W. GUYER HUNTER, K.C.M.G., M.P.
Sir EDWIN HENRY GALSWORTHY.
Sir WILLIAM SAVORY, Bart.
Mr. CHARLES BRADLAUGH, M.P.
Dr. JOHN SYER BRISTOWE.
Dr. WILLIAM JOB COLLINS.
Mr. JOHN STRATFORD DUGDALE, Q.C., M.P.
Mr. J. ALLANSON PICTON, M.P.
Mr. F. MEADOWS WHITE, Q.C.

Mr. BRET INCE, *Secretary*.

Mr. Charles Creighton, M.D.

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Mr. CHARLES CREIGHTON, M.D., further examined.

5408. (*Sir William Savory.*) Referring to your evidence on the last occasion, at Question 5334, with regard to the likeness between the vesicle of cow-pox and that of small-pox, I asked, "But you say that it is not," and your answer as recorded here is "What that means is that they do not resemble each other." Do you mean by that answer that the difference is so great as to constitute an argument against their being similar diseases?—I am referring there to the difference both in the circumstances of the disease and in the form of it.

5409. We are discussing here only the form of the vesicle. That comes under a distinct head. If you refer back to a previous question, you will observe that you were asked, "Then 'the striking resemblance in the form and structure of the two vesicles at a given period.'" That is quoted, and in explaining it you say, "What that means is that they do not resemble each other." What I ask you now is, whether it is your opinion that they are so dissimilar that that constitutes an argument against the affinity of the two diseases, cow-pox and small-pox?—It constitutes a part of the argument.

5410. It is not the whole of the argument?—No.

5411. (*Chairman.*) It is an argument?—It is an argument.

5412. (*Sir William Savory.*) How do you reconcile that with this statement in your work on "Cow-pox and Vaccinal Syphilis" at page 95. "It is no small "testimony to the adaptability or manageableness of "morbid processes considered as species, that from "sources on the whole so dissimilar as cow-pox, horse-"grease, and human variola, an almost identical type "of vesicle should have been evolved on the infant's "arm."?—I was obliged to put in some such statement as that, because we know that variolous matter has been used under the guise of vaccine; and although I have never seen it myself, and am unable to give a first-hand opinion as to the appearance that those variolous vesicles may have presented, yet I put it in this form, as being the only way of accounting for the acceptance of such matter by the medical practitioners who have used it.

5413. But surely as these two statements stand before us they are contradictory?—If there is any contradiction, I think it is more a matter of verbal contradiction than anything else. The whole argument of my book points the other way, and if one were to sit down at a writing-table, and to meet the contention, I think it could be done satisfactorily in the course of an hour or two.

5414. (*Chairman.*) Do you mean that in your view they do not evolve an almost identical type of vesicle, or were you stating here the commonly received opinion?—The commonly received opinion, and also the presumption that there are certain appearances in the adapted vesicle upon which that opinion is based; but the whole of this sentence turns upon the "adaptability or manageableness of morbid processes."

5415. (*Sir William Savory.*) But this is a question of the appearance of the structure and it has nothing to do with morbid processes. We are discussing the appearance of the vesicle of cow-pox and the appearance of the vesicle of small-pox. In the one

case you adduce as an argument against their affinity that the vesicles are different, and in the other case you tell us that there is an almost identical type of vesicle?—The words "almost identical type" are not endorsed by me; they are rather to represent what has been the received opinion about it.

5416. But you state it as an opinion of your own?—I think not. If you will read the passage in its context you will see that the whole of the argument of this book is that there is no relation between the two diseases.

5417. (*Chairman.*) You say, "It is no small "testimony to the adaptability or manageableness "of morbid processes considered as species, that from "sources on the whole so dissimilar as cow-pox, horse-"grease, and human variola, an almost identical type "of vesiccle should have been evolved." If there was no identical type it would be no testimony at all?—A testimony to "the adaptability or manageableness" of those processes. That is where the emphasis in my opinion ought to fall. The stock of matter has been so modified by passing through a succession of cases that it has come to resemble the vaccine disease.

5418. But it is your statement that "it is no small "testimony to the adaptability or manageableness "of morbid processes" "that an almost identical type of vesicle should have been evolved"?—It seemed to me to be necessary to admit that, because variolous matter has been extensively used.

5419. (*Sir James Paget.*) From what source has it been derived?—Mostly from Badcock's lymph.

5420. Do you hold that to be still variolous?—I am inclined to call it so.

5421. Is it only an inclination?—I cannot explain it in any other way. We know from the experiments of Dr. Adams published in his work in 1807 that by using what was called the pearly small-pox he did produce vesicles on the children's arms which the parents accepted as the correct vaccine of cow-pox.

5422. (*Sir William Savory.*) If you will allow me to say so, that seems to me to be wandering beyond the answer to the question which I asked. There appears to me to be a contradiction between those two statements. The one is that the vesicles are so distinct as to constitute an argument against the affinity of the two diseases; and yet in another place you say that the vesicle is of an almost identical type?—I have explained that I inserted that paragraph deliberately because it seemed to me that one required to account for the fact that many medical practitioners have used stocks of lymph which had a variolous origin, and that the product of that lymph must have seemed to them comparable with the vaccine vesicle itself; but it was rather by way of defending their practice rather than of expressing any opinion of my own.

5423. In answer to Question 5307, you say: "Ceely, who described these things far more precisely than "anybody else, tells us that he was never early "enough on the spot to see the thing in the "beginning." Can you give us the reference to that statement of Ceely's?—I can give you the reference. It is at page 376 of Crookshank's second volume in the paragraph headed "Topical symptoms of the natural disease:—" "For these we are almost "always in the earlier stage, by reason of the "circumstances above mentioned, compelled to "depend upon the observations and statements of the "milkers."

5424. Is the ground for the statement that Ceely never saw it, the fact that he says: "We are almost "always compelled to depend upon the observations "and statements of the milkers," and lower down: "It is very seldom that any person competent to judge "of the nature of the ailment has access to the animal "before the appearance of the disease on others of the "herd"?—That is the ground.

5425. Reading that passage now, does it seem to you to warrant the statement that Ceely never saw the thing in the beginning?—The answer to Question 5307 had reference to an answer given by me on the first day of my examination (4828) with regard to the spontaneous outbreak of small-pox.

5426. Your answer is a very specific one: "Ceely, "who described these things far more precisely than "anybody else, tells us that he was never early enough "on the spot to see the thing in the beginning"?—That is a summary of Ceely's statement.

5427. That is the conclusion which you draw from Ceely's statement that, "We are almost compelled to "depend upon the observations and statements of the "milkers," and that, "It is very seldom that any "person competent to judge of the nature of the "ailment has access to the animal before the appear-"ance of the disease on others of the herd." Then if you read on it runs thus: "When the cow first affected "presents on the teats acuminated oval or globular "vesications, some entire, others broken, not un-"frequently two or three interfluent. Those broken "have evidently a central depression with marginal "induration; those entire, being punctured, effuse a "more or less viscid amber coloured fluid, collapse, "and at once indicate the same kind of central and "marginal character." Do you think that Ceely did not see that?—That seems to me to refer to the conveyance of the disease to other cows.

5428. This is a description of the vesicles?—But the point of my answer was that the spontaneous cow-pox which first appeared, in which there could be no question of contagion or infection from another source, was not seen at the beginning.

5429. What is your ground for the statement that Ceely never saw it?—If the passage quoted is not a ground for it there is no other so far as regards Ceely.

5430. (*Mr. Dugdale.*) Will you kindly tell me whether in your opinion vaccination affords any protection against small-pox?—I have been desirous of avoiding the broad question, but as you have asked it, I suppose I am bound to answer it. In my opinion it affords none.

5431. (*Sir James Paget.*) In your opinion vaccination affords no protection at all?—In my opinion none at all.

5432. (*Mr. Dugdale.*) Then if that be so, if vaccination affords no protection, one would expect to find that persons who were in infected houses were attacked in the same ratio in a small-pox epidemic whether they were vaccinated or unvaccinated?—There are always constitutional peculiarities to be taken into account. Many are susceptible and many are not; and no one can say where the susceptibility arises and where it is wanting.

5433. But constitutional peculiarities would not have any very serious effect on the percentages attacked, I suppose?—The same variations appeared in the last century when there was no question of vaccination at all.

5434. (*Dr. Bristowe.*) Do you consider that vaccination derived from Mr. Badcock's inoculations affords protection?—I consider it unnecessary to deal with that point at all.

5435. You do not give an opinion upon it?—I do not.

5436. (*Sir James Paget.*) If it be small-pox still, does not that form of small-pox protect?—That was a question which was answered in the negative by the vaccinists themselves in the beginning of the century; not as regards Badcock's lymph, but as regards what was admitted variolation at the time.

5437. Pardon me; Badcock's lymph was derived from small-pox passed through the cow; did that protect? You have told us that you regard it as small-pox passed through the cow and remaining small-pox still?—The facts as regards the effect of Mr. Badcock's lymph I believe have never been discriminated from the facts relating to vaccine lymph in general, so that we have not the data upon which to form an opinion.

5438. But supposing that the small-pox conveyed by Badcock's method, as you consider it, had protected, and that that conveyed by cow-pox had not protected, would there not have been a marked difference in the result?—I suppose they were all mixed up in practice. I do not think any one has ever traced them in separate channels, and I certainly have no knowledge of any difference between the effects of the one and the other.

5439. (*Chairman.*) But you have told us that you consider that an attack of small-pox would be a protection against a second attack?—A natural attack of small-pox.

5440. You do not think that inoculation of small-pox would protect against a second attack?—I have rather desired not to express an opinion upon that, because it would be a gratuitous opinion, as the matter does not arise; but no doubt, when small-pox as inoculated towards the end of the last century was reduced to a

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mere formality it constantly failed to protect from small-pox.

5441. (*Sir James Paget.*) Is there evidence of that?—Yes, there is a great deal of evidence.

5442. What evidence is there?—There is the evidence of the admissions of the vaccinists themselves.

5443. But we have the same evidence with regard to the vaccinations of the present day; we may admit certain failures, but there is a general claim that they have protected?—That raises another controversy, but to use an expression which I have already used, it seems to me a gratuitous one.

5444. But as a matter of fact it is surely of importance, in the pathology, to say the least of it, of these cases where there is the form of vaccination, whether it be called vaccination or transmitted small-pox, to know whether it protects?—I regard it as one and indivisible in its results.

5445. In both cases completely negative?—Completely negative.

5446. Absolutely no protection at all in either?—That is my opinion.

5447. (*Mr. Meadows White.*) I understood you to give that opinion, after having considered all the statistics which have been obtained upon the matter up till the writing of your article in the Encyclopædia?—Yes.

5448. But you had not studied for instance Dr. Barry's Report, which was subsequent?—Dr. Barry's Report was subsequent.

5449. But I understand that you have come to the conclusion that there is no protection whatever in vaccination, after having given considerable study to the statistics, which had been collected and furnished to the various Commissions?—I came to that conclusion, and perhaps I might tell you why: First of all, because of the large amount of negative evidence, and, secondly, because of the impossibility of finding any half-way explanation of the process. It either protects or it does not protect.

5450. (*Chairman*). What do you mean by "half-way explanation"?—The evidence of modification appears to me to have no scientific basis.

5451. Do you mean that it is impossible to conceive of a protection which should not in all cases be absolute, but which nevertheless should be a protection to many?—That was the position which was adopted by the early defenders of vaccination. They endeavoured to account for every single failure by inquiring into the special circumstances of each, and they did to their own satisfaction account for a great many failures on the plea of spurious lymph, and on one plea or another. But since that time the number of failures has become so enormous that it appears to me that the attempt to account for each individual case on its merits has been abandoned many years ago.

5452. That hardly touches the point to which I am referring. What I was asking, was this: do you suggest that it is an inconceivable idea that there should be a protection which should operate on a large number, or in the majority of cases which yet should not operate on a minority; and is that inconceivability your ground for rejecting it?—I should not say that it is inconceivable, but it is a balance of probabilities. The whole of this is a matter of probability.

5453. Must not the side on which the balance of probability is be determined by an investigation of the results?—No doubt, but there may be so many other factors in the case besides vaccination determining the incidence of small-pox and the type of small-pox that one has really to deal with the whole question as an epidemiological question.

5454. (*Mr. Meadows White.*) It is a matter to which Sir William Savory has perhaps sufficiently called attention, but you stated in answer to Question 4828, "The disease "whenever it has been seen by anyone capable of "describing it has been described as an ulcerous "affection of paps for the most part covered by large "crusts," and so on; and then I think you stated that it never was seen by any person capable of observing it before it reached an ulcerous stage?—Yes.

5455. You remember the instance of Woodville in page 104 of your book on "Jenner and Vaccination;" it is also in Woodville's statement that he visited this dairy in the Gray's Inn Road, and I think that was at a time when only two cows had taken the infection?—Yes, that is so; two or three.

5456. Then he called again two days after and he found two or three of the milkers with the beginning of cow-pox on their hands; and afterwards the whole herd of some 200 animals became infected. Do you not think it probable that while it was spreading through this herd of cows Woodville was examining into the matter?—It would be very hard to say how much he inquired into the circumstances of the cow-pox as it occurred in the Gray's Inn Lane dairy. He gives us no description of it; he confines himself entirely to the effects of the lymph as used at the Inoculation Hospital. Woodville is an excellent authority upon all that part of the subject, but not upon the natural characters of cow-pox.

5457. But do you not think it probable that if Woodville was informed of this outbreak when only two cows were infected and it afterwards spread through 200 he would not take opportunities of observing the progress of the disease in the cow from the very earliest stage?—He was occupied with the practical application of it.

5458. It does not strike you in that way?—No, it does not.

5459. I find that there is another instance, I think in your book, of Clayton in Gloucester; does he not give some statement as to the earliest stage of it, saying—"That cow-pox begins with white specks upon the "cow's teats which in process of time ulcerate, and "if not stopped extend over the whole surface of the "teats, giving the cow excruciating pain." Does not that look as if he observed the earliest stage of the disease?—But I would again draw a distinction between the first beginnings of cow-pox in a cowhouse, that is to say in the animal which starts it, and the cow-pox which is conveyed by the hands of the milkers to the rest of the animals. The whole difficulty about knowing the beginnings of cow-pox centres in the first case, because when it was conveyed to the other cows it was the same as being conveyed to the milkers' hands, of which we have full particulars.

5460. He is describing it as a disease of the cow; he is not describing it as a disease communicated by the milkers at all?—That is quite true, but he mixes it up the spontaneous disease and the communicated disease. I have dealt with that point in a passage in my other book.

5461. I wished to ask your opinion upon that, because it struck me that that was the best specimen of a description of the earliest stage of the disease, that it begins with white specks upon the teats of the cow?—That would certainly apply to the disease as conveyed by infection to the other cows.

5462. It does not say that at all: it says that the cow-pox begins with white specks upon the cow's teats, as if that was the earliest stage of the disease which he had observed?—I would beg to refer you to the fourth paragraph of Clayton's evidence: "That this disease "may arise from any cause irritating or excoriating "the teats: but that the teats are often chapped "without the cow-pox succeeding." That fourth paragraph appears to me rather to refer to the cow in which the disease has started, and the other paragraph to the cows infected from it, the general appearance of the white specks being the appearance of a communicated infection.

5463. I suppose it would be a natural result that if an eruptive disease were treated as those white specks would be treated by the milkers, it would result in severe ulceration?—No doubt, but that is all a part of what we may call cow-pox as a communicable infection to man. When the milkers got it upon their own fingers, and also upon their faces, the disease went through all those stages; it seldom or never stopped at a vesicle or pustule.

5464. Reference has been already made to the passage in which Ceely describes the early stages, and therefore I will not trouble you with that; but I observe in your book on Jenner the discussion which you have raised, or the observations which you have made, upon the name which he gave, variolæ vaccinæ. You use very hard words about that, but he is trying there, is he not, to translate "cow-pox" which was the common well-known name which was given by the common people among whom the disease had been observed?—It required no translation; it was better in the vernacular form.

5465. Is it not a common thing to give a Latin name in medical and scientific matters?—If the Latin name

used had been the right one, one would not have objected to it. The Latin name afterwards used by Moseley appears the most appropriate, namely, "Lues bovilla."

5466. That was the name applied to cattle murrain, was it not?—Yes, it was; and to that extent it would be incorrect for cow-pox; but "Lues" expresses the thing more accurately than variolæ.

5467. I observe that he uses the plural *variolæ*; that looks rather as if he intended not to denote by *variolæ* the small-pox, but as if he intended it, as I think you say some of his contemporaries suggested, as representing an eruption?—The plural was used interchangeably with the singular, but I hardly think that anything turns upon that.

5468. (*Mr. Picton.*) You have given us just now a decided opinion of your own that vaccination does not protect from small-pox; you were not always of that opinion, were you?—Until I began to look into the subject for the purpose of the article which I wrote in the Encyclopædia Britannica, I held the ordinary belief which I had been taught as a student without any question, and it took a good long time to change it.

5469. May I ask what were the facts which led you to doubt the efficacy of vaccination?—What made me suspicious at the outset was the nature of cow-pox. When I began to ask myself what is cow-pox, I was very much astonished at the state of the case, and it appeared to me that such a disease as cow-pox was, on the evidence of those who described it in Jenner's time and who have described it subsequently, could have antecedently no relation at all to small-pox. That was the suspicion from which I started, and from that suspicion I went on in the downward path of scepticism until I landed in total unbelief.

5470. You were not arrested in the downward path by the statistics that were continually afforded to you?—The statistics required a great deal of scrutiny, but I found nothing in the statistics which I could not put otherwise, so as to set aside any effect of vaccination in checking the prevalence of small-pox.

5471. Referring to the case of Sheffield, which would you regard as the more important fact; the general broad fact that a town vaccinated, to the extent of ninety-five per cent., was swept by a pestilence of small-pox, or the detailed little tables drawn up to show that special persons who were vaccinated were exempted from the disease?—I have always had a preference for concrete facts, and I think that the Sheffield epidemic is a concrete fact of the most striking kind.

5472. (*Chairman.*) A concrete fact showing what?—Showing the failure of vaccination to ward off small-pox.

5473. (*Mr. Picton.*) Do you think it possible to reconcile the Sheffield epidemic with the opinion that vaccination is protective to the community?—Certainly not.

5474. In your tables which you have drawn up for us you show a very great fall in small-pox (which of course is notorious) at the commencement of this century after the year 1800; do you think that that was owing in any degree to the beginning of the practice of vaccination?—In no degree.

5475. To what causes do you attribute it?—To the same causes that favoured the decline of typhus fever.

5476. What are those causes?—The very striking improvement in the dwellings, especially of the working classes, more airy streets, a better supply of water, and greater attention to personal cleanliness.

5477. (*Chairman.*) Of what date are you speaking?—Subsequent to 1800.

5478. (*Mr. Picton.*) For the first quarter of this century are you aware, from your investigations, of any town or community in this country that was vaccinated to the extent of 95 per cent. of the population?—No, I am safe to say that there was none. We know the facts for Norwich: as regards Norwich, I find that vaccination is stated by Mr. Cross to have extended in 1819 to about one-fourth of the population.

5479. That is the time when small-pox was failing: is it the case that after the beginning of this century no part of the community was so well vaccinated as Sheffield was previously to the epidemic?—I think there is no doubt about that.

5480. With regard to the statistics that give detailed returns of the individuals affected—Mr. Marson's, for instance, which have been repeatedly referred to—do they distinguish between conditions of health, social position, sanitation of dwellings, and age?—I think not. My recollection is that they refer to hospital patients, and that they treat them just as being in the hospital, and all on an equal footing inside the hospital.

5481. The susceptibility to small-pox depends upon a number of conditions as to health, feeding, and usual sanitary surroundings, does it not?—It does; and the best evidence of that is got from the 17th and 18th centuries. I have a quantity of it here showing that the writers of those centuries made out the same types of small-pox that we find now, and that they also gave reasons for small-pox being malignant or severe in some cases and not in others. Morton gives an enumeration of 14 such causes; Ruston enumerates another set of causes somewhat different from Morton's; but all of those writers in the 17th and 18th centuries set themselves to explain why small-pox should be severe in certain cases and not in others; and Morton in particular adopted the principle, that mild small-pox was the normal type—the *norma* as he called it—and that certain things caused the disease to be "deflected" from that *norma* in the direction of greater malignancy.

5482. Do you consider that statistics which gives no information as to age or usual conditions of life are satisfactory?—The age is most important, but I cannot say that the statistics overlook age.

5483. Do they give us information as to the social state in which the patients have lived; I mean as to the squalor of the dwelling?—Very likely not, but that of course hardly lends itself to statistical treatment, and that is why I myself prefer to deal with the subject in a more concrete way.

5484. (*Dr. Collins.*) Should I be right in saying that you approached the study of the matter before us chiefly from the point of view of the epidemiology of small-pox, and the natural history of cow-pox?—That is so.

5485. As regard the epidemiology of small-pox, with what disease or class of diseases do you think it is most fairly comparable in order to ascertain the effect of any particular cause upon its increase or decrease?—Typhus fever appears to me to be the closest analogy as regards causation or favouring circumstances.

5486. Do you think it would be statistically unfair to compare the death-rate or mortality from small-pox with the mortality from all causes other than small-pox, in order to ascertain the effect, for instance, of sanitary measures upon the decline of small-pox?—I should say that it would not be a very instructive comparison.

5487. Would you agree that it would be fairer to compare it with the zymotic death-rate?—Zymotic also I should think would be too wide.

5488. Dr. Ogle said in answer to Question 518: "Fever is the only one of these zymotic headings which "it is possible to subject to this kind of investigation, "and I have done it for that." Would you agree with Dr. Ogle in saying that of all diseases with which such a comparison could be made fever was the only zymotic one which it was possible to subject to this kind of investigation?—That appears to be very much the sort of line that I was taking last Wednesday.

5489. You would agree with that comparison?—So far as I understand it; but it is a little difficult to catch the meaning of the whole passage.

5490. Does the table, which you have laid before the Commission—although it of course gives us no idea of the rate of mortality from either of those diseases—show a general quantitative concomitance between the number of deaths from small-pox and the number of deaths from typhus on a large scale?—They were the two great epidemic contagious diseases in London during the period covered by this table subsequently to the cessation of the Plague, fever taking the lead.

5491. I observe in your table, broadly speaking, a tendency to decline, not of course as regards the rate, but as regards the total number of deaths from those two causes since about the year 1770?—That is so. The sanitary improvement began in London in 1760 and in Westminster in 1762; and the writers subsequently to that period are generally to be found congratulating themselves upon the improved state of the public health, which was indeed shown by the fact that at the end of the century the births in London, for the first time in

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the history of the vital statistics of London, exceeded the deaths within the bills of mortality.

5492. And there appears to have been an accentuated decline in both those diseases since 1800?—The period from 1801 to 1816 was peculiarly free from fever, and it was also freer from small-pox than say the 15 years preceding it. With reference to the improvement in the health of London after 1770 I have here an extract from Dr. John Moore, who was not only an eminent physician but also a well-known literary man, to this effect: "There is good reason to believe from history "and authentic records that malignant fevers were "formerly more frequent, more universal, and raged "with greater violence in Europe in general, and in "this island particularly, than they have done of late."

5493. (*Chairman.*) What is the date of that?—The date of that is 1786: "This is generally imputed to the "streets and houses of most of the cities, and of London "in particular, being more spacious, dry, and airy, "from their being infinitely more cleanly in "consequence of the new method of paving, from the "inhabitants not being so much crowded together, from "their being more cleanly in their houses and persons, "from the poor in particular being more commodiously "lodged, more salubriously nourished, and better "taken care of in all respects."

5494. (*Sir James Paget.*) May I ask whether that was previous to the quotation which you gave from Willan?—Yes, about 15 years earlier.

5495. But Willan was not content?—Not by any means, but we can compare what Willan saw with the state of matters now.

5496. But Moore was speaking before the end of the last century, and after that Willan reports what you read as an example of 14 or 15 years later?—That I had clearly in my mind at the time and I see nothing irreconcilable.

5497. (*Dr. Collins.*) Although Willan stated the case in the early part of the century to be bad, I gather that at the end of the previous century it was worse?—Yes, and in the beginning of the previous century it was worse still.

5498–9. (*Dr. Bristowe.*) Was it possible for anything to be worse than the condition of things which Willan describes?

(*Chairman.*) Do not these descriptions depend very much upon the idiosyncrasy of the individual; might not some man describe the present condition of the worst parts of London very much as Willan described them?—I would admit that; but we know that there has been a progressive destruction of those old rookeries which were the natural seats of typhus fever and small-pox: they have been cleared away to make room for railway stations and many other things.

5500. (*Dr. Collins.*) Coming now to an authority who apparently commands universal respect, do you think that it would be a fair summary of Dr. Farr's to say that "Small-pox attained its maximum after inoculation "was introduced; this disease began to grow less fatal "before vaccination was discovered, indicating, "together with the diminution in fever, a general "improvement in health then taking place?"—I entirely agree with that, and the best test of the improvement as regards London is that the births began to exceed the deaths.

5501. Can you tell us whether it was generally regarded by Sydenham, for instance, and other writers of that stamp, that small-pox had been from time immemorial epidemic in Europe, or in this country?—Not from time immemorial. On the other hand there is evidence that the 16th century is probably the most correct date to assign for the rise of small-pox in Europe; and I should say that there was very little small-pox in England, and in London particularly, until the beginning of the 17th century. The whole subject is very curious, and has not been worked out with the research that it calls for. I have myself collected a good many facts which I hope to have published some time, but it is rather of antiquarian interest.

5502. Did not Sydenham speak of small-pox in his time as a comparatively new disease?—He has a passage about it which might bear that construction, and which I shall read. It relates to the epidemic of 1667–8. He says: "However, during the first "two years that this constitution prevailed small-pox "attacked more persons in London than ever I "remember it to have done either before or since. "Nevertheless as the disease of this period was "normal in character and of a mild sort it killed "but few compared with the enormous number of "sufferers from it;" and if reference is made to this table which I have put in it will be seen that that was the highest point which the small-pox curve had touched from the commencement of the table.

5503. (*Dr. Bristowe.*) That implies that it was a well-known disease?—No doubt it was familiar to them all.

5504. But was it not well known?—Yes, it was well known, and it was familiar even as early as 1593, as I find in a treatise on the Plague by one Simon Kellwaye.

5505. (*Dr. Collins.*) Do you happen to remember a passage in Sydenham where he says, speaking of small-pox: "There is no good reason why a new method "should not be applied to a new disease"?—I had not noticed it, but I cannot agree that it was a new disease at the time of Sydenham. At the same time, it was not a disease which they thought a very formidable one. The writers of that time treat small-pox with a certain amount of unconcern.

5506. Did not Sydenham also refer to a tendency or likelihood of small-pox to die out of itself?—That also I had overlooked; it is new to me.

5507. Agreeing now that to institute a comparison between small-pox and typhus is fair in order to ascertain the effect of improved sanitation upon either, how much do you think the criticism which has been passed upon it should detract from it to the effect that typhoid fever was probably lumped together with typhus under the same name in the period for which you have given the statistics?—A deduction on theoretical grounds appears to be called for on account of enteric or typhoid fever, just as a deduction is called for on more real grounds on account of pneumonia. But both together, it appears to me, would not bring the red line down more than half, perhaps, of one of these spaces in this diagram; and I should suppose that it might be brought down uniformly by that amount all over.

5508. Do you agree in the general opinion that while typhus fever may be propagated, if not generated, by unwholesome conditions, such as overcrowding and so forth, typhoid fever is largely propagated by water contamination from excreta?—I accept that in general terms.

5509. Accepting that, could you tell us to what extent water pollution, or the chances of water pollution, are likely to have been increased by the adoption of the sewer system as opposed to the former methods of disposing of refuse?—That is a point about which very much could be said, but I hardly think that it comes into the controversy.

5510. Is not the sewer system practically the growth of this century?—No doubt that is so; but one would not like to exclude the existence of typhoid even in the days before the sewer system.

5511. From your reading and knowledge of epidemiology, do you consider that typhoid was as common in the last century as it is now?—I should say that it was not nearly so common anywhere.

5512. You do not think that the adoption of the sewer system might have increased the propagation of it?—That is an opinion which is very commonly held, and I give my adherence to it provisionally until I know more about the conditions of typhoid in general.

5513. (*Chairman.*) What is your ground for saying that typhoid was not nearly as common in the last century as it is now?—Because we find no descriptions in the writers of the last century to imply that a fever of the character of typhoid was common.

5514. I may be wrong, but I thought that until comparatively recently there had been no discrimination between typhoid and typhus, but that people classed them both as if they were the same disease?—That is so, but a subsidiary question arises whether there was not an actual increase of typhoid coincident with its identification.

5515. (*Sir James Paget.*) Is there any evidence of that?—I think there is.

5516. Where?—It would be impossible to produce evidence upon that in any kind of succinct form.

5517. (*Dr. Collins.*) Do you remember Christison's writings upon that subject?—It is a strong presumption that although typhoid must be allowed to have existed in former times, yet the identification of typhoid about the year 1840 corresponded to a large increase in the amount of typhoid, and a considerable decrease in the amount of typhus.

5518. (*Sir James Paget.*) There is no evidence of that, is there?—There is just the evidence of probabilities, the convergence of evidence from a great many sides, which cannot be put into a numerical form or into a succinct form of any kind.

5519. (*Dr. Bristowe.*) Is it not well known that typhoid fever is more common in undrained villages in this country than it is in London and other large cities which are well drained?—That is just one of those epidemiological facts which I had in my mind when I was reluctant to commit myself fully to Dr. Collins's, position.

5520. (*Dr. Collins.*) Presuming that typhus, subject to some correction, may be reasonably compared with small-pox, would there not be, in addition to the causes which were common in your opinion to the decline of both, an additional cause in the cessation of inoculation, or at any rate in the cessation to a large extent of inoculation operating towards the decline of small-pox?—That would count for something, but, as a matter of fact, inoculation did not by any means cease; inoculation went on till the year 1840, and in some parts of the country inoculation revived quite to its 18th century form I should think, long after vaccination began to be practised; so that I think it cuts both ways.

5521. (*Chairman.*) But it did not revive to any great extent, I suppose?—I think to a very considerable extent.

5522. (*Dr. Collins.*) The figures in this table relate exclusively to London, do they not?—Yes.

5523. Can you tell us at what date the practice of inoculating out-patients at the Small-pox Hospital in London ceased?—About the year 1820.

5524. Previous to that, it had been the custom, had it not, to inoculate out-patients at the hospital?—Yes.

5525. Referring to the Suttonian method of inoculation, I do not know whether you happen in the course of your reading to have come across an old work entitled "Inoculation made Easy," which describes the process carried out in the county of Essex, published in the year 1766?—No, I have not seen that.

5526. In that work I see it stated that "In about "four or five days the inoculated part will grow a little "red; in a few days more, it will rise to a kind of "pustule having matter in it, after which it decreases "and goes away of itself. Several of my patients have "only had this eruption, and no other appearance of the "small-pox upon them, but it is as effectual as having a "large number of pustules"?—That is in general agreement with what we hear from all sides about the Suttonian method.

5527. It was their aim, if it was not invariably their success, to limit the manifestation of the inoculated small-pox to the local pustule?—It appears to me to have been their aim.

5528. (*Chairman*). But would you not read that as meaning that that was the exception rather than the rule? When he says "Several of my patients have only had this eruption," would not the inference be that the generality had had more, and that he was stating the extreme success in a limited number of cases?—Yes, I think the generality had more, but the surplus was not very much after all; they often referred to bastard pimples instead of full pocks. Since the question was discussed, on the first day that I gave evidence here, I have observed in a foot-note to one of the reprints in Professor Crookshanks's second volume, in an anonymous pamphlet of which the author appears from internal evidence to have been Mr. Nooth, of Bath, that in his opinion 19 out of 20 inoculated persons had no eruption. I think it is an exaggerated estimate, but that is his statement.

5529. (*Sir James Paget.*) Do you suppose that they were protected?—I am afraid not. I think one pustule would do no good.

5530. So that those cases of Sutton's, with one pustule, would not have been protected?—I think not.

(*Chairman.*) I see the title page of this work is "Inoculation made Easy; containing a full and true "discovery of the method practised in the county of "Essex, in which county alone upwards of 9,000 people "have been inoculated within these two last years "without the loss of one single patient or the least "dangerous circumstances being intended for the "benefit of Masters and Mistresses of Families, and "the public in general; the whole Art being laid down "in so clear and easy a method as to render anyone "capable of inoculating themselves and others with "the greatest ease and safety; with a true receipt "to make the preparative powders repellent pills and "the punch used in inoculation."

5531. (*Dr. Collins.*) Coming now to the experiments performed by Dr. Woodville at the Small-pox Hospital, apparently he obtained his first supply of lymph in January 1799?—Yes.

5532. And the publication of his work took place in the May of the same year, I think?—Yes, I think so.

5533. And during that time his first 200 cases had been inoculated and tested, had they not?—400, of which we have the particulars for 200.

5534. And the only statement respecting the testing of the 200 to be found apparently in his work is: "All the "above patients inoculated since the 6th of March sub-"sequently had variolous matter inserted in their arms "except the two Ariels, but it produced no disorder?" —That applies to a large batch of them, and similarly brief statements apply to other batches of them.

5535. He also—alluding to the fact that cow-pox disease, as he considers it to be, produced pustules and general symptoms—I see adds: "But it must be "acknowledged that in several instances the cow-pox "has proved a very severe disease; in three or four "cases out of 500 the patient has been in considerable "danger, and one child, as I have already observed, "actually died under the effects of the disease." He goes on to say, "Two instances of casual infection "occurred. In one the disease was severe and the "eruption confluent. In the other the disease was mild "and the pustules few." Does it appear from your perusal of Woodville that he was under the impression that the cow-pox disease in many cases produced a general eruption sometimes confluent and could be caught by infection?—Woodville was not clear about the relations between cow-pox and small-pox for some time; but before the year 1800 the whole of these ambiguous phenomena had been cleared up and I have here the passage in which Woodville himself acknowledges the ultimate conclusion that he came to about the co-existence of small-pox and cow-pox.

5536. Would you read that passage, if you please?—It is a long passage.

5537. (*Mr. Meadows White.*) Where is it taken from? It is from the Medical and Physical Journal of December 1800; it is a letter from Dr. Woodville. Perhaps I may read a sentence or two just to show the drift of it.

5538. (*Chairman.*) Yes, if you please; if you will give the reference to it so that it can afterwards be looked into by anyone who desires to read more of it?—It is in the Medical and Physical Journal of December 1800, volume 5: "If a person who has been exposed to the "contagion of small-pox for four or five days be then "inoculated for this disease the inoculation anticipates "or prevents the effects of the contagion and the "inoculated small-pox is produced; but if the vaccine "inoculation be employed in a case thus circumstanced "the small-pox is not prevented although the tumour "produced by the cow-pox inoculation advance to "maturation. It was not before the commencement "of the present year" (that is to say 1800) "that I "ascertained that the cow-pox had not the power of "superseding the small-pox, for though from the first "trials that I made of the new inoculation it appeared "that these diseases as produced in the same subject "from inoculation did not interrupt the progress of "each other, yet as the casual does not act in the same "manner as the inoculated small-pox, and may be "anticipated by the latter, I thought it still probable "that the cow-pock infection might have a similar "effect. Numerous facts have however proved this "opinion to be unfounded and that the variolous "effluvia, even after the vaccine inoculation has made "a considerable progress, have in several instances "occasioned an eruption resembling that of small-pox. "This latter effect of the small-pox I had not conceived "to be possible till after I had made repeated trials "of the new inoculation out of the hospital" (namely the Small-pox Hospital) "nor is the fact to be easily "explained when it is considered that the vaccine

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"inoculation imparts its effects to the constitution in a "shorter time than the latent period of variolous "infection." And besides that theoretical explanation we have also to bear in mind that these accidents of small-pox concurrent with vaccination ceased at Woodville's hospital; in about two or three months after the first trial of vaccine he got rid of the trouble which had happened at first.

5539. (*Dr. Collins.*) I see that Dr. Baron in his Life of Jenner, at page 310 says, "The result of the trials "mentioned in Dr. Woodville's letter and the others "performed under like circumstances had well nigh "proved fatal to the infant cause of vaccination,—," what is your opinion as to the influence which Woodville's publication had upon the acceptance of vaccination?—No doubt for a short time they supposed that cow-pox was not so very different from the old small-pox inoculation in the matter of eruptions; that is to say they did not trace the eruptions of Woodville's cases to their proper source, which was not cow-pox at all but the co-existent disease of small-pox generally taken in by the breath.

5540. On learning that eruptous occurred 'after the supposed vaccinations in London, Dr. Jenner came up to confer with Dr. Woodville, I think?—He did.

5541. And at that interview Dr. Woodville, according to Baron, mentioned to him that the cow-pox had been communicated by effluvia, and that our patient had it in the confluent way; whereon Dr. Jenner remarked, according to Baron, "Might not the disease have been "the confluent small-pox communicated by Dr. "Woodville, as *he* is always full of infection"—does that to your view represent what happened?—I think that I have sufficiently expressed my view of what happened. The passage appears to me to illustrate the confusion that really existed in Dr. Woodville's mind.

5542. Dr. Baron also apparently thinks that Woodville's lymph, which he speaks of as contaminated, was propagated very widely both on the continent and elsewhere. He says:—"It is impossible now to deny the fact that this impure matter was really disseminated over many parts of England, and also on the continent in place of that of the true variolæ vaccinæ;" does your reading confirm that?—There was no other source of vaccine matter but that, whatever Jenner and his friends may have said.

5543. In reply to Sir William Savory I understood you to say—perhaps you will correct me if I understood you wrongly—that there was some difference or distinction to be drawn between the vesicle of inoculated small-pox occurring in the ordinary way and inoculation which had been managed or cultivated in several removes. Is that a correct understanding of what you meant to say?—The question arose with reference to a sentence on page 95 of my book on Cow-pox and Vaccinal Syphilis, in which I say: "It is no small "testimony to the adaptability or manageableness of "morbid processes considered as species that from "sources on the whole so dissimilar as cow-pox, horse-"grease, and human variola an almost identical type "of vesicle should have been evolved on the infant's "arm," and the emphasis falls on "the adaptability or manageableness of morbid processes."

5544. In Plate 7, opposite page 288, in volume 1 of Crookshank's book cow-pox and small-pox are given in parallel columns; are you acquainted with that plate?—I am acquainted with the corresponding plate of Pearson, which is almost the same, and I have seen this plate before.

5545. Are you able to tell us whether you consider those plates as being fair representations of what they purport to be?—The four figures in the line representing cow-pox are obviously right, and the four figures representing small-pox are pictures of the old inoculation, which none of us, I suppose, have had an opportunity of seeing; but it is clear there that the appearance of a large area of pustulation is produced by the confluence of a number of small pustules, to which there is nothing corresponding in the cow-pox.

5546. Do I correctly gather your opinion to be that while there may be diversity in the ordinary inoculated small-pox from the vaccine results, yet by cultivation or by management, as you have expressed it, they may be made to approximate as regards local appearances only?—That is the only way in which I can explain the use in practice of small-pox matter.

5547. (*Sir William Savory.*) But you have no evidence of that?—I do not understand how you mean evidence.

5548. Upon what evidence do you make that statement?—I can give no evidence of a matter of belief in my own mind.

5549. Really?—I say that it is the only way in which I can explain it to myself.

5550. (*Chairman.*) Surely our beliefs are generally formed on some evidence that satisfies us, are they not?—But the evidence is, I think, very often probabilities which we deal with in so personal a way that one can hardly write it out in the form of a syllogism.

5551. (*Dr. Collins.*) Do I correctly understand you to be convinced that it is possible to obtain the local appearances known as vaccination from inoculation of horse-grease?—Yes.

5552. Would the same answer apply to sheep's small-pox?—That was only gone into in a remote part of Italy, and nobody ever confirmed or, indeed, ever saw it to describe it. I can say nothing about that.

5553. Was not it practised by Professor Symonds and Mr. Marson in this country?—Do you mean inoculation on a large scale?

5554. I mean sheep's small-pox; not on a large scale, but in a few instances?—I am not aware of it. I am speaking of the practice which was adopted in Sicily about the year 1806; that was the only attempt, I think, to use sheep-pox instead of cow-pox.

5555. In your opinion can the local phenomena, ordinarily known as vaccination, result from the inoculation of the virus of the cattle plague?—My knowledge of that is very casual. It turned up in the inquiry into the cattle plague in 1865, and I believe the facts are to be found in the Report.

5556. Do you think that amongst the various morbid fluids which may produce the appearances known as vaccination, the virus of the small-pox pustule at some stage may be one. I will put the question in this way: Is it your opinion that there are various morbid fluids—various, that is to say, as regards their origin, which would produce the same local phenomena that are ordinarily described as vaccination?—The only one to which I have directed my attention is horse grease; but I know that there have been statements made, which appear to me to be credible, to the effect that one or two other things have also been used to produce the same appearances.

5557. (*Chairman.*) You mean the only one, other than vaccine matter, taken from the cow?—I mean the only one other than vaccine matter taken from the cow that I myself have called attention to.

5558. (*Sir William Savory.*) Just to clear up that point, may I ask whether it is your opinion that inoculation with various morbid fluids, other than the vaccine fluid, will in your opinion produce a vesicle indistinguishable from the vaccine vesicle?—My published opinion, which I wish to adhere to strictly and not to go beyond here, is that horse-grease produces that vesicle.

5559. Indistinguishable?—Indistinguishable.

5560. And could any other fluids?—Others have been alleged.

5561. But you do not know that?—I say that it is a matter to which I have not given much attention.

5562. Upon what evidence do you assert that horse-grease will produce such a vesicle?—It would take an hour to go into the evidence; it has not been gone into in my evidence in chief, and I think I must decline to go into it now. You will find references to it in my writings.

5563. (*Dr. Bristowe.*) You have no personal knowledge of it?—None whatever; it has not been used in this country for the last 60 or 70 years.

5564. (*Sir James Paget.*) Is it not used in France?—Yes.

5565. And with the belief that it produces protection from small-pox?—I have no doubt that they have that belief.

5566. (*Dr. Bristowe.*) May I ask also whether Dr. Sanderson and others who investigated the cattle plague when it prevailed in England some years ago, did not show conclusively that the eruption of the cattle plague is altogether different from that of small-pox?—I am not able to speak as to the contents of the Cattle Plague Report.

5567. (*Dr. Collins.*) I think I must again put this question: Do you or do you not think that the fluid contained

in a small-pox pustule at some stage of its cycle may by inoculation upon the child's arm, and subsequent cultivation from arm to arm be so managed as to produce results which are indistinguishable from the ordinary vesicle of every day vaccination?—I think that I should be able to distingnish them if I ever had the opportunity of comparing them.

5568. Have you read the description of cow-pox in Dr. Baron's Life of Jenner?—There is a long chapter on the cattle plague, if that is what you mean.

5569. Does he describe it as cattle plague or cow-pox?—He is in a fog about it, and it is generally admitted that the chapter is entirely irrelevant to the whole thing, especially by Chonlant, who criticised the book in Germany. Dr. Baron's treatment of that question was set aside as being incorrect.

5570. Does Dr. Baron describe as cow-pox the outbreaks of an epizomotic which in your opinion are cattle plague?—I cannot express any opinion upon Dr. Baron's chapter; it is not worth the trouble.

5571. Should I be correct in interpreting your opinion as being that as regards the pathology of small-pox and cow-pox there is no relationship between the two?—In my opinion there is no relationship between the two.

5572. As regards their respective natural histories?—As regards their pathology and the whole circumstances of their occurrence, including the epidemiology of small-pox and the peculiarly local sporadic circumstances of cow-pox.

5573. To what, if any, disease of man do you think the cow-pox is analogous?—It is analogous, I think, to syphilis—to the great pox.

5574. (*Chairman.*) Should you say the same of small-pox?—By no means. But that is a very interesting historical point, namely, that when the great epidemic of syphilis appeared about the year 1494, there was great confusion in the minds of the medical men of that time, where to put this new epidemic, and it was put under the same class in which Avicenna included small-pox and measles; it was actually put by one writer, Peter Pinctor, physician to one of the Popes, under the same head as Avicenna had included measles and small-pox. That is interesting as tracing the etymology; but from our present pathological point of view it is antiquated.

5575. I should like to understand the sense in which you use the word "analogous" which I do not completely understand at present?—As parallel with, in its circumstances, in its type, and in its effects, the parallelism as regards the effects not going very far.

5576. (*Sir James Paget.*) Can you name any other two diseases in which you hold that there is a similar analogy?—Not on the spur of the moment. I should not like to express an opinion offhand.

5577. In the whole range of nosology?—I should require to think over it more deliberately than I can do here.

5578. (*Dr. Bristowe.*) In what respects do you mean that cow-pox and syphilis are analogous or parallel; what are the points connecting them in your mind?—Their anatomical character, their mode of evolution and communicability.

5579. (*Chairman.*) That analogy as regards their communicability would apply equally to small-pox, would it not?—Yes, as inoculated.

5580. When you say that they are analogous I suppose you mean that they have something in common which you do not find in common between them and anything else?—I would not put it so broadly as that. I think there may be other diseases which could be put into the same group, but I think that cow-pox and the great pox do come into the same part of the nosological classification, into the same bracket one might say; and there may be others in the same bracket too.

5581. (*Dr. Collins.*) Are you acquainted with the writings of M. Auzias-Turenne?—You will find a reference to M. Auzias-Turenne in my book on Vaccinal Syphilis at page 48, which shows that I had evidently consulted his book a number of years ago.

5582. To some degree he anticipated that position with regard to the analogy between the two diseases, did he not?—I gather from Professor Crookshank that he did, but it had escaped my own notice; and if he anticipated it, it was in a very brief and casual way.

5583. (*Mr. Bradlaugh.*) I do not know whether you have happened to mention the date at which you began to prepare for the article in the Encyclopædia Britannica?—In the summer of 1886.

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5584. Up to that time, if I have understood you rightly, you were an average pro-vaccinationist?—I was; I had no doubt about it; it never occurred to me to question the thing at all. I took it as one of the things that I had been taught as a student.

5585. So that the facts which you think tell against vaccination were rather forced upon you in your investigations?—They were.

5586. In the article on page 29 you make some reference to statistics which have been furnished as showing the excessive proportion of cases amongst the small residue of the unvaccinated which you say must have other associated circumstances besides non-vaccination to account for them; may I take it that on this as on the main points of your article subsequent criticism has left your view unshaken?—Yes, my view is unshaken.

5587. (*Dr. Bristowe.*) This table of mortality from different diseases from 1648 to 1848, which is on the table, was put in by you?—It was.

5588. Referring to the four years 1790, 1791, 1792, and 1793, and the four years 1828, 1829, 1830, and 1831, you will see that deaths from fevers in the first four years were 2,185, 2,013, 2,236, and 2,426 respectively; and in the last four years 931, 1,270, 996, and 1,331; is it not so?—Yes.

5589. You have not included in your table the deaths from inflammation which are given in the tables of burials from which you quote. I will supply them for these years. In the first four years the deaths from inflammation were 142, 220, 303, and 364; and in the last four years they were 2,399, 2,385, 2,196, and 2,812; how do you account for the discrepancy between the small number of deaths from inflammation in the earlier period and the large number in the later period?—I accounted for it when I was giving my evidence last Wednesday; at least I did not account for it, but I admitted it.

5590. Is it not certain that almost all the cases of inflammation differentiated in the latter years were included under the term "fever" in the former years?—Not the thousands that you have been reading out for the latter group of years; but I admitted, as everyone must admit, that inflammatory diseases were included under fevers.

5591. But I call your attention to the enormous disproportion between the mortalities under the heads of fever and inflammation at these two periods?—Then I leave you to solve your own problem; it is no business of mine to solve it.

5592. Still it is quite clear that the deaths from inflammatory diseases, as given in the tables of mortality, increased in a remarkable way between the first and second groups of years, and that inflammatory diseases which were separated in the later years and were included among fevers in the previous years. That would make a very great difference in the value of these statistics, would it not?—It would reduce the fever line all over, as I have already said more than once.

5593. It would reduce it very much in the latter period, would it not?—I do not think it would so very much. The inflammatory diseases for the years 1828 to 1831 are inflammatory diseases in an immensely greater population than those in the former century.

5594. Quite so, but that applies to the whole table?—And those inflammatory diseases are just the diseases that keep pace with the population, because inflammation is one of those incidents which are common to people, in all circumstances.

5595. You talk about spontaneous cow-pox in the sense of its being a primary case of the disease from which the other cows in a dairy derive it, never having been seen; is not cow-pox always a communicated disease?—I can only give the observations of those who have described it.

5596. But you say that it has not been described, and I ask you, do you regard cow-pox as a specific disease, or as one which originates *de novo* over and over again?—On the authority of Ceely and others, for instance, Clayton of Gloucester, a veterinary surgeon whom I have quoted, it originates *de novo*.

5597. Do you believe that?—I believe it.

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5598. You do not look upon it as a specific disease?—I look upon it as a disease which originates under certain circumstances in a particular animal, and gets communicated to other animals and the milkers.

5599. Do you take the same view with regard to syphilis?—That is a question about which an answer from me would be entirely gratuitous.

5600. (*Sir James Paget.*) Is there any other instance known in which casual local disease in an animal or man can be converted by any treatment into a disease communicable to others?—That, if you will allow me to say so, is an academic question, with which I am not competent to deal.

5601. But surely we have what you must call analogies amongst all diseases that we have to treat with; it is hardly right to assume that there is only one disease that can thus be made communicable?—We have to deal with the facts of cow-pox in one way or another, and if they are unique, so much the worse for the facts.

5602. May it not be that the disease is communicated to what you regard as the first cow by some means that you have overlooked?—If so, the evidence is entirely wanting.

5603. But in the one case it is more likely that the negative evidence will be missing than in the other case the positive evidence. We have local diseases of all kinds roughly treated as the teats of the cows are, but not changed so as to become communicable?—In my evidence on the first day I rested that entirely upon the experience of Clayton of Gloucester, which was published in 1799, and who had a very large practice among dairy farms; and he says that this disease may arise from any cause irritating or excoriating the teats, but the teats are often chapped without the cow-pox succeeding; that this disease first breaks out upon one cow, and is communicated by the milker to the whole herd, but that if one person was confined to strip the cow having this disease, it would go no further.

5604. But if any epidemic of which we have the history might be traced to the one person on whom it first appeared; would it be assumed that it was in him a new disease; take the case of cholera, small-pox, or any other disease?—I should say that there is no parallelism. Cholera is an epidemic on an immense scale; it is rather stretching the term epidemic to apply it to cow-pox.

5605. Take any epidemic that you like, measles or scarlet fever?—I think that all those considerations are such as one ought to weigh in the systematic handling of epidemic diseases. But here we have the facts about cow-pox, and I do not see how to get round them.

5606. But we have not the facts; we have merely negative evidence that the disease appeared in a cow and they did not trace it to any other cow similarly affected?—Not only which they did not trace to any other cow similarly affected, but they actually asserted that it arose in one cow in circumstances which excluded others.

5607. How excluded?—You will find that that is so.

5608. I quite admit that that may be their opinion; do you think that their opinion is completely justified by facts?—I think it is justified by the facts of that time, and it is justified by the facts of cow-pox in more recent outbreaks, of which I have not had myself direct experience, but with regard to which I have had information at first-hand from those upon whose farms they occurred.

5609. But they did not know from where it came to the first cow?—There was no new introduction of stock into the cow-house which would explain the cow-pox.

5610. (*Dr. Bristowe.*) Is not the same thing held frequently with regard to the sporadic appearance of scarlet fever, measles, and diseases of that kind?—It is.

5611. And on equally good grounds?—I cannot say on equally good grounds.

5612. I understood you to express the opinion that there was very little epidemic prevalence of small-pox in England before the sixteenth century?—I gather so.

5613. I want to know on what evidence you form that opinion?—The evidence as to that is largely confined at the present moment to my own note books. I hope to publish it some time, and when it is published it will be an original contribution to the study of epidemiology.

5614. You have no evidence to lay before us now on that point?—If I were to tell you what I have been finding in the British Museum I should have plenty of evidence; but there really is no time for that.

5615. (*Sir James Paget.*) I should like to ask you one question more regarding vaccination as a protection. If you hold that practically cow-pox is never a protection from small-pox, what would you say with regard to those who, before Jenner's time, among the milkers were believed to have been protected from small-pox by the cow-pox?—The evidence of protection in the case of the milkers was conflicting.

5616. But some were believed to be protected, and from that belief sprung, not only in Jenner's mind, but in the minds of his predecessors, a belief that cow-pox did protect from small-pox?—That is the case.

5617. You think that that was altogether fallacious?—I think it was fallacious.

5618. Quite fallacious?—Yes, I think so.

5619. Therefore there was no ground for even beginning the study of vaccination?—There was the belief, which was a practical ground, no doubt.

5620. You think that everything that has followed has proved its fallacy?—That is the conclusion to which I have reluctantly come.

5621. (*Chairman.*) There are just two or three questions that I want to put to you in reference to statements in your book which has been often referred to. At page 40 of your book on Jenner and vaccination, you say in regard to the early experiments, "Quite "elderly milkers were chosen, including worn-out "paupers, in order to prove that the lapse of time did "not weaken the resistance—as if advancing years did "not also weaken the susceptibility to the small-pox "virus." Are there any facts to which you can refer us which support the view that "advancing years weaken the susceptibility to the small-pox virus"?—As regards inoculation of small-pox, I think it was the general experience that adults were as a class less susceptible than children.

5622. We have had some statistics given to us which rather point to adults being now, I do not say by inoculation, but in catching the disease, as susceptible as children?—But this passage refers entirely to inoculation, and I would not extend it.

5623. You limit the statement that advancing years also weakens the susceptibility to susceptibility by inoculation?—I do.

5624. Again, on page 105, alluding to the case of Sarah Rice, on the question of the ulceration in the case of inoculation with vaccine virus you say, "None "of the vesicles were painful, and they all gradually "went off *without producing ulceration*. She had been "infected when the diseased process on the teats had "hardly gone beyond the cow which first started it, "and had presumably not yet acquired that type of "specificity which a longer duration and successive "reproductions would give to it." Is your meaning that if one only of the herd of cattle got the disease the disease would be of a less violent character than when others had caught it?—I would attribute the greater virulence of the disease both to its longer duration in the animal which started it, and also to its existence in a number of animals following that one.

5625. Do you mean that the latter ones would have it more violently than the first?—According to Cecly, towards the end of an outbreak it becomes milder; but I should think there was a maximum of virulence that might fall upon the middle of the period. That is only a conjecture.

5626. However, that was what you meant by the passage?—That was so.

5627. There is one other question dealing with the same subject of the early cases of the variolous test. You say at page 149, "A large proportion of the "variolous tests, especially abroad, were done upon "the inmates of orphanages and foundling hospitals, "who are notoriously subject to chronic swelling of "the lymphatic glands." What is your reason for saying that?—We find, as a matter of fact, that some of those public tests were done in orphanages.

5628. But what is your ground for saying that the inmates of orphanages are notoriously subject to

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chronic swelling of the lymphatic glands?—It is a generally admitted fact that scrofula in particular is common among those classes, and I will give your Lordship a reference to the book by Professor Hirsch upon Geographical and Historical Pathology (which was translated by myself). In the chapter upon Scrofula that point is specially dwelt upon, and I substitute for "scrofula" "chronic swelling of lymphatic glands" as being more general.

5629. (*Sir William Savory.*) But it is not notorious?—I should say that it was, but I defer to your greater experience.

5630. (*Dr. Bristowe.*) What percentage do you suppose of children in orphanages are affected with scrofula?—I should not like to say off-hand, but I know that Professor Hirsch makes a great point of it.

5631. (*Chairman.*) In your view does small-pox and does an outbreak of small-pox arise except by contagion; that is to say, by some person having been in contact with another who has been suffering from small-pox?—That is my view, that it requires contact.

5632. Do you say the same of typhus?—No, I should not put typhus and small-pox as being parallel in that respect; but the possibility of typhus arising *de novo* is one of those disputable matters about which I hold an opinion, although I would rather not bring the opinion into this evidence.

5633. If typhus differed from small-pox in that respect, would it not be more likely to be affected as regards its spread by sanitary conditions than small-pox would?—No doubt.

5634. I do not mean to say its spread when it at first broke out in the district, but its spread speaking generally?—I entirely agree.

5635. You said in answer to a question that was put to you that the facts about Sheffield were inconsistent with vaccination being a protection to the community. I want to understand the sense in which you use the word "protection." Supposing that in Sheffield none but unvaccinated persons had suffered from small-pox, should you have said that vaccination was not a protection to the community because some people had it?—That would have put an entirely different complexion upon the case. The reason why I answered Mr. Picton's question in that way was that some 5,000 persons, I think, in Sheffield who had been vaccinated did, as a matter of fact, take small-pox.

5636. But is that necessarily inconsistent with its being a protection? If it is possible (I am not saying that it is proved) that without vaccination it would have been 20,000 instead of 5,000, in what sense do you say that it would have been inconsistent with its being a protection; do you mean merely that the fact that there will be small-pox in spite of vaccination is proved by the Sheffield case? If that is all that you mean I understand it?—That would be the minimum of what I mean.

5637. What would you mean beyond that?—I would mean that it did not matter to those 5,000 whether they had been vaccinated or not.

5638. But supposing that the number would have been greater but for vaccination?—But that is just the assumption that I cannot make.

5639. I am not asking you to make it; but you say that the facts at Sheffield are inconsistent with its being a protection, and I want to know why they are inconsistent; how do they prove that it is no protection? You may say that they are consistent with its being no protection, but you say they are inconsistent with its being no protection. That is what I want to understand?—I think I said that it was a failure on a large scale. Perhaps I may have used the word "inconsistent;" if so I must have laid myself open to your Lordship's criticism.

(*Mr. Picton.*) It was I who used the term.

(*Chairman.*) And I understood the witness to adopt it.

5640. (*Sir James Paget.*) Let me put it in this way: supposing that of all the vaccinated population in Sheffield one in fifty incurred small-pox, and of all the unvaccinated one in ten?—Then I should inquire into the respective circumstances of the two classes.

5641. Circumstances over and above vaccination?—Yes.

5642. Supposing that they were persons of the same family, living in the same house, or in the same part of the town, and at the same work, and in all other things apparently completely alike?—But that is a supposition which I rather think the facts would not bear out.

5643. (*Chairman.*) That of course will be a matter of discussion which we shall have to consider. I only wanted to gather in what sense you said that the evidence at Sheffield showed that vaccination was not a protection?—Only in a broad and general way.

5644. That is to say, that a place may be visited with a considerable outbreak of small-pox, notwithstanding that vaccination has been carefully attended to?—Yes.

The witness withdrew.

Mr. Joseph Abel.

Mr. Joseph Abel examined.

5645. (*Chairman.*) You are a watchmaker at Faringdon, in Berkshire?—I am.

5646. You have had a fine imposed upon you on various occasions under the Vaccination Acts?—Yes.

5647. Can you give us the number of times?—34 times.

5648. Were those in respect of the same children, or of different children?—They were in respect of different children, three children in all.

5649. Then the 34 occasions were in respect of three children?—They were in respect of three children. All but the last were in respect of two; two cases were in respect of the third child; the 32 cases were in respect of the two first children.

5650. I believe they range over a period from the 7th of March 1876 to the 12th of April 1881?—That is so.

5651. What was the total amount in fines and costs that you had to pay?—43*l.* 6*s.* 9*d.*

5652. Can you tell us how much of that was fines and how much was costs?—Fines, 16*l.* 0*s.* 6*d.*; prosecuting solicitor, 10*l.* 10*s.* 0*d.*; costs, 16*l.* 16*s.* 3*d.*

5653. Is Faringdon the name of the union?—Faringdon is the name of the union.

5654. (*Mr. Meadows White.*) Do you know under which section of the Act you were prosecuted?—Under both sections, the 29th and the 31st.

5655. (*Mr. Picton.*) You have not been asked how many children you have?—I have six children, three boys and three girls.

5656. You have not told us, I think, why you came to object to have your children vaccinated?—I have objected to vaccination ever since I was vaccinated myself, between the age of four and five, but of course that was simply a childish objection, I suppose because it hurt me. But as I came to grow older and thought over the question, I felt it was a thing that was altogether wrong, and upon conscientious grounds, feeling that my children as given me from the hands of God were perfect and needed nothing done to them beyond, I objected on that ground. Then I considered as a parent that it interfered with my rights as a citizen, and on that ground also I objected. I should like to allude to the case of June the 23rd, 1876, which is on my list, if I may do so. In that case the costs were 9*s.* 9*d.*, and extra costs, it says here for distress warrant, 5*s.*, making 14*s.* 9*d.* The goods taken on that occasion were a marble striking clock, which had been presented to me by the teachers and scholars of the Sunday school of which I had been superintendent about six years, and of which I am still superintendent.

5657. How long ago was that?—It will be 14 years next June.

5658. You have been for 20 years superintendent of the Sunday school?—I have, come this next March.

5659. (*Mr. Meadows White.*) Under what section was that prosecution?—That was under the 31st section. The clock was given to me on the occasion of my marriage, about two years before that. Then on the 5th of November 1878, a little more than two years after, I had fines, 40*s.*, that was for two children; costs,

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19*s.*; prosecuting solicitor's costs, two guineas; and costs of two commitment summonses, 3*s.*

5660. (*Chairman.*) I do not quite understand why you were subjected to the distress; you might have avoided it by paying the 9*s.* in the first instance?—It was only this, that I thought it would possibly be more likely to put an end to the prosecution rather than pay the money; that was my only reason. In these cases the commitment summonses were issued for six weeks consecutively, with hard labour in each case, and that amount was paid to the policeman by my brother, to prevent my going to gaol from November the 5th until the three months had expired, because, just on the same grounds as I objected to pay the costs about the clock, so I was prepared to go to gaol rather than pay this 5*l.* 4*s.*; but my brother paid the money, and thus I was released from the policeman's hands.

5660*a*. (*Mr. Picton.*) Did you find that your repeated convictions, fines, and threatened imprisonments, at all lowered your reputation with the christian people amongst whom you were working?—Not a bit whatever; they would not have unanimously elected me yearly to the office of superintendent had they done that; that is the standing evidence, I think, against that.

5661. (*Dr. Collins.*) When you were before the magistrate, did you plead that you had a reasonable excuse by way of a conscientious conviction against vaccination?—Each time, and I also objected on one or two occasions to the magistrate sitting on the bench as the chairman of the board of guardians, that is as exercising the dual capacity of both prosecutor and judge; and ultimately he retired from the bench when the prosecution had nearly come to an end.

5662. The prosecution is set in motion by the board of guardians?—Yes.

5663. And a member of the board of guardians sat upon the bench as magistrate?—Yes.

5664. On more than one occasion?—Yes.

5665. (*Chairman.*) However, as the law stands, you did not dispute that you had failed to comply with the law?—No.

5666. You objected to the law, but there was no question about any option to decide whether you had broken the law or not?—Not at all. I simply said in answer to the question, guilty or not guilty, if it meant was I guilty of breaking the law, of course in that sense I was guilty; and if it meant was I guilty of putting the vaccine matter into my child, which I considered blood poisoning, in that sense I was not guilty. I have here a short account of my last conviction, if you will allow me to go into it.

(*Chairman.*) I do not think it is necessary to go into details.

5667. (*Sir Edwin Galsworthy.*) What is the date of that?—The 16th of April 1881; it is a reprint from the local paper.

5668. (*Mr. Picton.*) And you have not been prosecuted since?—I have not been prosecuted since April the 12th; that was the date of the last prosecution. This reprint from the local paper came out on April the 16th.

5669. (*Mr. Bradlaugh.*) Is there much objection to vaccination, do you know, in the district in which you reside?—There are a great many quiet objectors, but there are none who have openly resisted the law.

5670. Do you know of any cases in which persons have been prosecuted, say once, and then not prosecuted again?—I do, but I have no particulars of the dates with me.

5671. As a matter of fact you only know that there are persons in the Faringdon union who have disobeyed the law, and have been prosecuted once, and then have not been prosecuted again?—Yes, in one or two cases, but they have left the neighbourhood now, otherwise I cannot say whether they would have been prosecuted again or not.

5672. (*Mr. Picton.*) Had the prosecution anything to do with their leaving the neighbourhood?—In one case it had that was the case of the Congregational minister at Langford; I forget his name now, but I could furnish it; he left the neighbourhood soon after a prosecution had taken place; Langford being in the Faringdon union.

5673. (*Mr. Bradlaugh.*) Do you happen to know whether, in the limits of the Faringdon union, there have been persons who have been prosecuted, and who have resided there for some time since, without obeying the law, and without being re-prosecuted?—No, not one, except myself.

5674. (*Sir Edwin Galsworthy.*) You have been summoned, you say, in regard to three children out of six?—Yes.

5675. Have you never been summoned with regard to the other three?—No.

5676. Were they all born since the date of the last prosecution?—Yes.

5677. (*Mr. Dugdale.*) Have there been any outbreaks of small-pox in the neighbourhood of Faringdon during the time that you speak of?—Yes, one.

5678. Did any of your children get the small-pox?—None of them.

5679. (*Mr. Bradlaugh.*) And they are all unvaccinated?—Yes. We had an epidemic of small-pox at one time, which is mentioned in this paper, to which I wish to refer, when there were ten cases of small-pox, and five of them died out of the ten; they had all been vaccinated or re-vaccinated. This I stated in public court, and it has never been refuted.

5680. What is the source of your information; how do you know that?—From the relatives of the persons who had the disease.

5681. Do you mean that you went and inquired of all of them?—I inquired of the friends of the different persons who had suffered.

5682. When was that?—I am not quite sure of the date, but when we had small-pox in Faringdon some time since; I think it was in the preceding year; it was during the time of my prosecution.

5683. About what year would that be?—I should say that it was about 1877 or 1878.

5684. You live in Faringdon?—Yes.

5685. Is Faringdon a town or a village?—Faringdon is a small market town of a little over three thousand in population.

5686. It is in the town that you live?—Yes.

5687. And you made your inquiries at the time?—Yes.

5688. (*Chairman.*) At the time of the epidemic of small-pox, when there were ten cases, of whom five died, do you know whether they were adults or children?—No, but most of them, so far as my memory will serve, were adults; there were two or three children, but most of them were adults.

5689. (*Mr. Dugdale.*) Is the same gentleman Medical Officer of Health now who was Medical Officer of Health then?—Yes.

5690. What is his name?—F. C. Spackman.

The witness withdrew.

Mr. William Thurlow.

Mr. William Thurlow examined.

5691. (*Chairman.*) You are a draper at Sudbury in Suffolk?—Yes.

5692. Have you been subjected to fines for breaches of the vaccination laws?—Yes.

5693. How many times?—I have had twelve summonses.

5694. And twelve convictions?—No, not twelve convictions.

5695. How many convictions have you had?—Several; I could not say exactly how many on the spur of the moment.

5696. What was the total amount of fines inflicted?—About 20*l.*

5697. Does that include the costs?—Yes.

5698. (*Mr. Picton.*) Do you remember the date of your first being fined?—1869.

5699. And from that time the prosecutions have been renewed until this present year?—Up to October of last year.

5700. Have you been fined eleven or twelve times altogether?—I have had twelve summonses.

5701. In each case was a fine imposed?—There were orders made, and for non-fulfilment of the orders fines and costs were imposed.

5702. Have you ever refused to pay?—Yes.

5703. How was the money obtained?—In one case the money was taken from the till.

5704. Have you had any goods taken?—At another time for four summonses there were 14*l.* worth of goods taken from the shop and sold by public auction on the Market Hill for seven guineas.

5705. What was the amount to be paid on this occasion?—Four vaccination warrants, 5*l.* 3*s.* 6*d.*; goods seized, 14*l.* 3*s.* 10½*d.*, sold by public auction for seven guineas.

5706. How many children have you?—At the present time I have seven.

5707. How many have you had?—Eleven; three died in infancy.

5708. How many have been vaccinated?—One only.

5709. Can you tell us why you refused to have the others vaccinated; was it the first child that was vaccinated; I want to know why you gave up the practice?—No, it was not the first child that was vaccinated, because one child was in bad health and died when it was very young; then there were two others.

5710. You had one child vaccinated, however, and you refused to have any more vaccinated. Why did you do that?—Because I believe it is a very dangerous and wicked law.

5711. Then it was from a belief that the operation was dangerous to your children that you refused to have them vaccinated?—Just so.

5712. Do you find any opinion on the subject amongst your poorer neighbours?—Oh, dear, yes. Our medical man said to me years ago, "Thurlow, you have converted "half the people of Sudbury." I said, "No, I have not; "it is not me: it is the truth which I have endeavoured "to promulgate."

5713. (*Chairman.*) Then have you lectured or given addresses on the subject of vaccination?—Yes, in several places, in different parts of England, simply at my own expense, not as a paid lecturer.

5714. (*Sir Guyer Hunter.*) In the case of the child that you had vaccinated were there any unpleasant symptoms connected with vaccination?—Nothing particular.

5715. It went through the ordinary stages in the ordinary way?—Yes.

5716. Then what made you consider that vaccination was a wicked and dangerous thing?—Simply because I think it is a dangerous thing to take the diseased matter from a brute and put it into the tender flesh of a child, man, or woman.

5717. But in the case of your own child you had evidence that no untoward circumstances arose?—That I cannot say

5718. I thought I understood you just now that you could say so?—No; what I say is that if this diseased matter is put into a child there is not a medical man in the kingdom that can guarantee what the result will be; it may or may not result in mischievous effects as anyone can see. I have seen numbers of children who have suffered most fearfully from it and are suffering at the present time.

5719. Have you seen much larger numbers who have not suffered anything from it?—Well, of course; because I need not say to you, that if a child is healthy and strong, that child will be able to throw off this poisonous matter that is inserted, just the same as if a person takes an irritant, we will say, a healthy person would be able to throw it off much better than a weakly one.

5720. (*Dr. Collins.*) Do you find that you have suffered in the estimation of your neighbours from your disobedience to the law?—Undoubtedly I have, and I consider that it has been a very great injury to me in my trade. I am a draper.

5721. Does the suffering affect your character, or only the fact of your having been the object of repeated prosecutions; do you find that it has affected your character in that sense of your reputation?—It has simply affected my character in this way, that people say an anti-vaccinator is a rum sort of man; why does not he do as his neighbours do. But I do not see it.

5722. Except in that way, do you find that you have suffered in character?—No.

5723. Do your neighbours regard you as a criminal, or as a person who sets himself up in opposition to the law?—Certainly they do not; they cannot regard an honest man as carries out his convictions as anything but what he is.

5724. (*Sir Edwin Galsworthy.*) Have you many anti-vaccinationists in your neighbourhood?—Yes, the poor people are dead against it in Sudbury and those parts. I have conversed in omnibuses, railways, and trams with hundreds and hundreds of people I should think, and I find that the people are against it.

5725. Have any of your children ever had small-pox?—No.

5726. What did the others die of?—Three died when they were young, and before the proceedings were taken. The mother was not strong. I have been married three times. I have lost two wives, unfortunately, from consumption.

5727. (*Mr. Dugdale.*) Have you had any experience of an outbreak of small-pox in Sudbury?—Yes.

5728. Did many people suffer?—No, not many.

5729. When was that?—About 20 years since.

5730. And you have not had an outbreak since?—I beg your pardon, there was one since, and the magistrate before whom I appeared—his house is nearly opposite mine—went down the street one day, and stopped all at once and said, "We have not had small-"pox, as we have all been vaccinated;" and I said, "We have not had small-pox, and we have not been "re-vaccinated or my children vaccinated," and he walked off.

5731. Was it a serious outbreak of small-pox in Sudbury; were there many cases or only just a few?—It would not be called so very serious; nothing like Sheffield in proportion.

5732. (*Chairman.*) How long ago was this?—One outbreak was about 20 years ago, and one, I should think, about 12 years ago.

5733. (*Mr. Bradlaugh.*) The effect of these prosecutions has not been to induce you to have any of your children vaccinated?—Oh, dear, no; I would part with every penny I have got before I would have them done.

5734. Do you happen to know whether there are any persons resident in your district who have children unvaccinated, and who have either not been prosecuted at all, or have only been prosecuted once?—Yes, there are some; there are people who have not been prosecuted.

5735. How do you account for the guardians specially prosecuting you?—By the fact that they regard me as a ringleader. I was guardian of the poor and returned on this very question some 15 years since.

5736. And in your capacity as guardian are you able to say of your own knowledge that there were persons with unvaccinated children who were either only prosecuted once, or not prosecuted at all?—We had a very singular case.

5737. Will you kindly say yes or no?—I do not think there were any. I think that in the case of this individual I refer to the child was not vaccinated.

5738. (*Chairman.*) Was he prosecuted?—No; the prosecution was entered in the wrong name and the case was withdrawn, and I believe it was not proceeded with.

The witness withdrew.

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Mr. FREDERICK PEARSE examined.

5739. (*Chairman.*) You are a photographer at Basingstoke?—Yes.

5740. And you formerly resided at Andover?—Yes.

5741. You have been fined several times for breaches of the vaccination laws?—I have.

5742. Was that at Basingstoke, or at Andover?—At Andover.

5743. Can you give us the dates of those prosecutions?—They commenced in August 1872, and the last one was at the close of 1887.

5744. How many children were they in respect of?—I have been fined in respect of nine children. I have eleven children, but for the last two I have had no prosecution.

5745. What was the total number of prosecutions?—60.

5746. (*Mr. Picton.*) You have been sixty times prosecuted?—Yes.

5747–50. (*Chairman.*) What did the total fines amount to?—The total amount of fines was 17*l.* 5*s.*, of costs 23*l.* 7*s.* 6*d.*—in all, 40*l.* 12*s.* 6*d.*

5751. (*Mr. Meadows White.*) Did they proceed to distrain in any of your cases?—On two occasions. On one occasion it was simply a question of a few shillings costs,—I may say I stood out on principle; and on the second occasion they distrained for a matter of 3*l.* or 4*l.* and entirely emptied one of my rooms of furniture; the policeman even took the chair my wife was sitting on; she had only been confined about three weeks and it was a great shock to her; it was the first or second day of her coming down-stairs. They took everything out of the room; they took about 20*l.* worth of goods for a sum of about 3*l.*

5752. (*Mr. Picton.*) Why did you remove from Andover to Basingstoke?—For business purposes.

5753. Was there any less prosecution in Basingstoke?—I did not move on that account, because the prosecutions the last two or three years have not been so very severe.

5754. Do you find that the law is administered in precisely the same way in Basingstoke as it is in Andover?—I do not think it is quite so severe. I should like to say that it was a well-known fact that I was removing to this other town, and the Vaccination Officer at Andover sent the fullest particulars, the ages of my children, the number of times that I had been prosecuted, and every particular to the Vaccination officer at Basingstoke, which I thought was rather an uncalled-for proceeding. I saw the letter, so I know it is a fact. The Vaccination Officer at Basingstoke called upon me and asked me whether I intended to have my children vaccinated. I said, "Certainly not." He said, "I have had a letter from the Vaccination Officer at "Andover giving me all the particulars of your case," and he said, "Do not you intend to have them vaccinated"? I said, "Certainly not." He said, "How many times have you been summoned?" I said, "Sixty." He said, "You must be fonder of paying "money than I am." I said, "That of course is a matter "of opinion."

5755. How many times were you summoned for one child?—Twenty-two times for the oldest child.

5756. Has there been small-pox in the neighbourhood?—They have had a few cases, perhaps a dozen, during the time that I lived in Andover.

5757. Were there any deaths?—I cannot say.

5758. Have you personal knowledge of the case of Mr. Harvey, who I think is deceased?—I have.

5759. Can you tell us how many times he was prosecuted?—I should think probably 40 times.

5760. Do you know the amount of fines that he paid?—Yes, we worked together. I should say roughly that he has paid 20*l.* or 25*l.*

5761. Was this in Andover or in Basingstoke?—In Andover; all this occurred in Andover, both with Mr. Harvey and myself.

5762. Did it injure his business?—No.

5763. Has the fact of your repeated prosecutions injured your reputation in the neighbourhood?—Not at all; quite the other way about.

5764. (*Dr. Collins.*) So far as you know, were other persons with unvaccinated children prosecuted as frequently as Mr. Harvey and yourself?—No, because we were the pioneers in the movement. There are a great many anti-vaccinationists in Andover now; there is a very strong league there and we were the founders of it. At the close of 1887, some short time before I left Andover, there were no less than 32 parents prosecuted within three weeks; where there used to be only two of us there were 32; and to my knowledge there were 60 or more others not prosecuted.

5765. Did you allege any excuse which in your opinion was a reasonable excuse when you appeared before the magistrate?—I alleged of course my conscientious objections to vaccination. From the intelligent observation I have been able to give to the subject I could never see any possible good that could accrue from vaccination, but probably evil. I have never yet been able to discover what vaccination is. I remember a very shocking death that occurred from vaccination in Andover in my early days; there is no question about it that the child was killed by vaccination; I shall never alter my opinion upon that. The child died something like six weeks after it was vaccinated thoroughly rotten; it was previously a healthy child, born of healthy parents. I believe the parents would give evidence before this Commission now, because they have never varied in their opinion about the death of that child. I have known many other cases, but that was the most distressing case. I saw the child myself; it suffered horribly, and died simply rotten.

5766. (*Chairman.*) Had you been an opponent of vaccination before that?—Yes, my views were strongly opposed to vaccination all through my experience; but this occurred almost simultaneously with my first prosecution.

5767. (*Mr. Bradlaugh.*) And the effect of the 60 prosecutions has not been to induce you to have any of your children vaccinated?—I never have had, neither shall I have.

5768. With regard to other cases that you have spoken of, in which there were prosecutions within your own knowledge, do you happen to know whether some of them have stopped at the first prosecution?—Whether they have given in, do you mean?

5769. No; I mean that where the person prosecuted has not had his child or her child vaccinated the prosecution has in some cases not been repeated?—There have been one or two cases in Andover where prosecutions have only been instituted perhaps once or twice; but as a rule the Andover authorities are very severe, much more than they are in most towns. Myself and the late Mr. Harvey were certainly more severely punished than anyone else in Andover.

5770. Have any of those who have been prosecuted stood out as you have done, that is to say, refused to have their children vaccinated?—I have known two or three give in.

5771. But the great majority have stood out?—The great majority have stood out.

5772. And although the great majority have stood out, do you know any cases of as numerous prosecutions as yourself and the late Mr. Harvey have undergone?—No, nothing approaching to it.

5773. (*Sir Edwin Galsworthy.*) Have you ever been prosecuted in Basingstoke?—I have only lived there six months.

5774. (*Mr. Meadows White.*) What is the population of Andover?—About 6,000 in the town itself.

5775. What is the population in the Andover union?—That would embrace about 20 villages round.

5776. Can you tell me at all what the population would be?—I should think 20,000, speaking roughly.

5777. And how many prosecutions have taken place in the Andover union since you have known it; I suppose you keep a record of these things?—I have not kept any complete record.

5778. Do you know how many prosecutions a year there have been?—For a few years past until recently there have not been a great many parents that have withstood the vaccination; they have generally given in and had their children vaccinated.

5779. (*Chairman.*) I suppose they would be people who did not entertain very strong views about it?—Yes, they did. If you were to canvass Andover throughout you would find that nine out of ten would be against it, but only one or two here and there so constituted that they really care to defy the law.

5780. But a man may be against it without at the same time entertaining the very vehement views that you and some others do?—Yes.

5781. (*Mr. Meadows White.*) I suppose you have done your very best to disseminate your views in the matter?—I have.

5782. (*Mr. Bradlaugh.*) I suppose on some of these poorer people the imposition of fines and costs, even without distraint, would be a very serious burden?—It would; some of them only earn 12*s.* or 14*s.* a week.

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5783. And some of those were of the class that were prosecuted?—Not a great many; the prosecutions have mainly been amongst tradesmen and people of that stamp, people who could pay these fines without any serious loss or privation.

5784. (*Sir Edwin Galsworthy.*) Has there been any small-pox in Andover of recent years to your knowledge?—There have been a few cases, but not many.

5785. (*Mr. Meadows White.*) There has been no epidemic?—No, nothing in the nature of an epidemic. I know there have been some cases, but nothing serious.

The witness withdrew,

Adjourned till Wednesday next at 1 o'clock.

Twenty-fourth Day.

Wednesday, 5th February 1890.

PRESENT:

THE RIGHT HON. THE LORD HERSCHELL IN THE CHAIR.

Sir JAMES PAGET, Bart.
Sir W. GUYER HUNTER, K.C.M.G., M.P.
Sir WILLIAM SAVORY, Bart.
Mr. CHARLES BRADLAUGH, M.P.
Dr. JOHN SYER BRISTOWE.
Dr. WILLIAM JOB COLLINS.
Mr. JOHN STRATFORD DUGDALE, Q.C., M.P.
Professor MICHAEL FOSTER.
Mr. JONATHAN HUTCHINSON.
Mr. J. ALLANSON PICTON, M.P.
Mr. F. MEADOWS WHITE, Q.C.

Mr. BRET INCE, *Secretary.*

Mr. H. N. MACLAURIN, M.D., examined.

Mr. H. N. MacLaurin, M.D.

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5786. (*Chairman.*) You were for some years President of the Board of Health in New South Wales?—Yes.

5787. During what period was that?—From September 1885 to last March.

5788. That Board was charged, amongst other things, with the prevention of small-pox, was it not?—Yes.

5789. What powers are possessed by the Government of New South Wales with regard to persons and things infected with disease?—By the Act of Parliament the 3rd of William IV., No. 1, the Government of New South Wales have power to isolate persons and things infected or exposed to infection by disease from over sea, and to proclaim and set apart places within the Colony in which isolation can be carried out for the requisite time in each particular case. It is the second section of the Act which gives them this power.

5790. This applies to quarantine, does it not?—It is a Quarantine Act. As the Government read it there are certain diseases which cannot occur spontaneously in the Colony, and therefore when they do occur they must have come from without, although we may not be able to discover the exact channel through which they have come.

5791. So that they do not limit the operation of the Act to quarantine proper, but apply it also in cases where the disease has not immediately arisen from the arrival of a vessel with infectious disease on board?—Precisely so. It is practically confined now-a-days to small-pox. The Government hold that every case of small-pox must have come from outside the Colony, and is therefore indirectly the object of the quarantine legislation.

5792. By a subsequent statute were the powers of that Act extended?—There are subsequent statutes which extended the power of the Government and gave them facilities for carrying it into effect. These Acts were the 5th of Victoria, No. 12, the 13th of Victoria, No. 35, and the 17th of Victoria, No. 29. There is another Act, the 45th of Victoria, No. 25, known as the Infectious Diseases Supervision Act, which compels all medical men and householders to report to the specified authority every case of disease which may be reasonably supposed to be small-pox, under a penalty of not less than 10*l.* or more than 50*l.* for each case.

5793. I believe delay in reporting has been held to constitute a breach of the Act?—Yes, and has been punished by fine; for they held that in order to be useful the reporting of a case of small-pox must be immediate.

5794. Cases of small-pox have sometimes been mistaken for measles, have they not?—I dare say they have, but there is as little room as possible given for mistake in diagnosis, because if the case is one which might reasonably be supposed to be small-pox, the medical man and the householder are bound to report it under the penalty; so that many cases of chicken-pox, for example, are reported.

5795. That Act came into operation in 1882, did it not?—Either at the end of 1881 or the beginning of 1882; I forget the exact date.

5796. There was an epidemic of small-pox about that time in New South Wales, was there not?—There was an outbreak of small-pox in New South Wales extending from 1881 to 1882.

5797. Was it that which led to the legislation of the 45th of Victoria?—Yes.

5798. By the same Act was a Board of Health established?—A Board of Health was established by that Act to execute, amongst other things, all the powers of isolation conferred by the 3rd of William IV., No. 1; that is to say, before the Board of Health was established there were different officers who could carry out these powers of legislation, but they were then handed over to the Board of Health, who became the responsible authority, and the president of the Board is the responsible member with authority

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over all the officers of the Board, and he receives and acts upon such reports as may be sent in as to the outbreak of any disease. He is the responsible member of the Board and the head of the Health Department of New South Wales.

5799. So that the Board of Health came into existence for the first time after the passing of that Act?—Yes.

5800. What steps are taken when a case of disease is reported?—When a case is reported, in the manner provided by the Act, an inspector is at once sent to examine the case, and to ascertain exactly its nature. If he finds it to be small-pox, he is instructed forthwith to declare the house to be in quarantine and to forbid any person who may be within it leaving the house, and to give orders that no one is to be allowed to enter it without permission; and he is immediately thereafter to proceed to the nearest police station and to request the officer in charge to detach a sufficient force of police to maintain the quarantine which he has declared, and to take such means of notifying the public of what has taken place that no one shall be compromised by mi-adventure; that is to say, that no one shall go into the house not knowing what is the case. If there are any members of the family who have temporarily left the house they are taken charge of by the police and sent into the quarantined house. That is the first step which the inspector takes. After he has done that he goes to the Health Office and reports his action to the president, who then takes such further steps as may be required by the circumstances of each particular case, calling the Board together as soon after as possible, and reporting his action to the Executive Council.

5801. How long is the house kept in quarantine in that way?—The house is not kept long in quarantine, because, as I shall go on to show, in Sydney or within a reasonable distance of Sydney, the patients and all persons who may have been in the house with them are removed to the quarantine station at North Head; that is to say, as soon as arrangements can be made, which probably takes about a couple of hours, every person who has been in the house and every person who has been exposed to the contagion of the sick person, is at once removed to the quarantine station at North Head, where provision is made for them. This quarantine station is a peninsula at the mouth of the harbour, which is proclaimed with the water around it within 400 yards of the shore under the Act of William IV. The area of land is about 670 acres, and it contains quarters for persons who are detained there according to their requirements, as well as the means of isolation of suspected cases, and a hospital ship for the treatment of the sick. This station is distant about seven miles from the Health Office in Sydney and is communicated with by telephone and telegraph.

5802. But that would be a long way, would it not for sick persons to be taken?—We do not find any difficulty on that score. We have a steamboat fitted up expressly for the purpose, with a comfortable cabin in which any sick person may be taken. By the operation of the Infectious Diseases Supervision Act, which is administered very stringently, we get reports of cases within a day or two of their sickening, before they become so bad that it is difficult to remove them. Therefore we have not found any difficulty in removing a patient that distance. So that the first thing that is done is to isolate the house as a temporary measure; the second step is to remove every person from the house to the quarantine station where they may be dealt with at a distance from the town, and that generally occurs within a very few hours; after that the house in town is disinfected.

5803. Has that practice been going on since 1882?—That practice was established in the course of the epidemic of 1881-82. It was by carrying out that practice that they were able to suppress the epidemic, and it has been carried on ever since. In 1882 they used a different place, called the Coast Hospital, at Little Bay, which was built especially for the purpose. That was, however, nine miles from the town, and it was found too large in subsequent cases, and therefore we went back to the use of the quarantine station.

5804. There was a very great amount of vaccination, was there not, during, and in consequence of, the outbreak of 1882?—A very great deal.

5805. How long are the persons who are not afflicted with disease detained in the quarantine station?—They are detained for 21 days from the date of the last possible contagion; that is to say, when they are removed to the quarantine station the sick person is placed in a hospital ship, and the others are distributed all over the ground. If no further case appears amongst them, the healthy persons are allowed to leave the quarantine station at the end of 21 days.

5806. But supposing that one case of disease breaks out amongst those who were healthy when they arrived what course do you pursue?—You will notice that we have them distributed in different parts of the ground; there are the first-class quarters, the second-class quarters, and the inclosure, and so forth. The persons in the particular part of the ground in which the case appeared would be detained for 21 days from that date; but the others might be released if the Board thought it could be done with safety.

5807. When they are so detained, are they not allowed to have any communication with the outside world?—They are allowed to receive letters or parcels or anything that is sent down to them; and there is a telegraph operator employed, and whose special business it is to work the telegraph at their request. All their communications with the outside public are by telegraph, and the telegraph wire is put at their disposal free of charge. They are not allowed to write letters, but they can telegraph as much as they please.

5808. Do they receive compensation for any loss which they may have sustained owing to their being quarantined?—Reasonable compensation is given by the Government for loss.

5809. Are there penalties for escaping or attempting to escape from quarantine, or communicating with persons outside?—There are very heavy penalties under the original Quarantine Act.

5810. Since the epidemic to which you have alluded ceased, can you give us an idea how many cases would be brought in a year to the quarantine hospital?—The number varies. The commonest source of small-pox in Sydney was from the China ships. It was not an uncommon thing to find that when a ship came from China with no appearance of small-pox on board a case developed itself on shore a day or two afterwards, and of course would have been the source of an outbreak if it had not been dealt with at once; so that when the passenger trade with China was brisk, as it was some years ago, we were obliged to be exceedingly careful with respect to ships from China, as it frequently happened that small-pox was introduced by them. Moreover, there were several instances in which the disease broke out in the town without our being able to trace in the slightest degree the source from which it came. There was one outbreak in an hotel, called the "Orient Hotel"; there was another outbreak at a place Randwick; there was another outbreak in Darlinghurst; there was another outbreak in Manly; and there was one in a place called Canterbury. We could trace the last to a China ship; the former outbreaks we were not able to trace at all. There was another outbreak in the town of Sydney itself.

5811. Were they isolated cases, or did the disease become epidemic?—It has never become epidemic since the plan described has been adopted.

5812. But you have told us there was an epidemic in 1881-82, before you adopted this plan; when was the last epidemic before that?—There was an outbreak in 1878, which was dealt with by quarantining, the place in which it occurred, and in that way they succeeded in stopping it. There have been from time to time cases of small-pox within the last 20 years at least which have appeared in the town.

5813. I suppose you may have isolated cases of small-pox without its being what is called epidemic?—I am perfectly certain that if there was an isolated case of small-pox in Sydney, and if the authorities did not take steps to deal with that case in the way they have done, it would spread all over the town.

5814. Have you not before these quarantine arrangements had small-pox in Sydney, without its becoming what is called epidemic?—The former cases, the cases in which it occurred before, were in isolated parts of the town where it was easy to separate them, and to keep them apart and prevent people from coming to them. But the outbreak in 1881 occurred in a house in George Street, one of the business streets, where of course the houses are all contiguous. The authorities quarantined that particular house leaving the people in it. Still the disease spread from that centre of infec-

tion all over the town, and that was what led the authorities to see that it was necessary in dealing with cases in a crowded town to remove the people altogether.

5815. What I meant was whether certain atmospheric conditions, or at all events conditions which do not seem to be very well understood, are not necessary to the disease becoming what is called epidemic; whether at one time it may not spread to an extent, and in a manner which it does not at others?—I do not believe that. I believe that it would at all times spread in New South Wales, if they did not take pains. They have always taken pains ever since the William IV. Act was passed to prevent its spreading. Up to 1881-2, the disease not having occurred in crowded parts of the town, a less stringent mode of isolation was sufficient; it was not necessary to remove the people from the place in which they lived; but when the disease occurred in a house in a crowded street, then the mere quarantining of that house was not a sufficient amount of isolation to prevent its spreading throughout the town.

5816. Do you mean that always since the Act of William IV. there has been a quarantining of the house?—I believe so.

5817. Supposing that a person has been vaccinated and re-vaccinated, would he be equally compelled to remain in quarantine?—Every one is removed.

5818. You would not make any exemption in his favour?—No, as a rule I do not think we should. I do not think we ever did make an exemption in favour of such a person. It was at one time suggested that if people submitted to be re-vaccinated they should be allowed to leave the station after the vaccination had declared itself completely; that is to say, after the eighth day, when they were certain that the vaccination had taken. But I did not carry it out; there were many reasons which induced me to decline to accede to that suggestion.

5819. By whom was it proposed?—Various persons suggested it.

5820. Is there any unwillingness to remain this considerable length of time in the quarantine station?—People do not like it, but I have never seen any particular unwillingness on their part. It is one of those inevitable misfortunes that a man must put up with. It is a pleasant place to stay in; everything is done that can be done to make the people comfortable; they have nothing whatever to do, and are free from all care, and they can spend the day pleasantly enough; but they do not like it.

5821. As regards many of them it would probably be pleasanter than their own homes?—I daresay it would.

5822. Can you give us any idea of the number that would be quarantined there in a year?—The number varies so much that it is difficult to give you an exact idea.

5823. (*Professor Michael Foster.*) Are there no returns?—I did not know till quite recently that I should be examined here, and I have had no time to get any returns, which can only be procured in Sydney.

5824. (*Chairman.*) I suppose there is a record of the number of persons?—A careful record is kept in the Health Office of every outbreak that has occurred since it was established, including the name of every person who has been quarantined, and an account of everything that has been done.

5825. Perhaps on your return you would be able to send us the numbers (it will not be necessary to have the names) in each year in the quarantine station?—Yes. If the Secretary will let me know what the Commission would like, I will endeavour to get it supplied.

5826. (*Professor Michael Foster.*) What was the extent of the epidemic in 1881-82; how many cases or how many deaths were there in Sydney?—I cannot tell you the actual figures, because I was not at that time in charge of the department. I merely remember it from a general knowledge of it.

5827. Were there many hundreds of deaths?—No, nothing like it; because the Government was endeavouring to control the outbreak from the very beginning.

5828. Were there any deaths?—Yes, there were a number of deaths. I cannot recollect the exact figures, but I will get them for you when I get to Sydney. There was a report published of the means of dealing with that epidemic, which I believe is still in print, and I will see that it is sent to the Commission.

5829. (*Sir William Savory.*) What is the population of Sydney?—The population of Sydney is between 300,000 and 400,000.

5830. (*Chairman.*) Is vaccination largely practised or not in New South Wales?—Very little, I am sorry to say.

5831. There is no Compulsory Vaccination Act?—No. We have a central vaccine station with a principal public vaccinator; and we have also public vaccinators in every district of the Colony, but the public do not seem to care for it. We urged it as much as possible, and did everything in our power to get them to vaccinate, but they would not do it.

5832. In 1884 there was a sanitary conference of the different Australian Colonies, was there not?—Yes. The principal medical officers of the different Colonies met in Sydney. I was not a member of that conference; it was before I took charge. Dr. Mackellar was my predecessor, and he was in charge at that time.

5833. That conference passed a resolution in favour of compulsory vaccination in all the Australian Colonies, did it not?—I believe so; I think they were unanimous. There is no doubt whatever that the feeling of the whole profession in New South Wales is in favour of vaccination, and would probably be in favour of compulsory vaccination; but from what I know of public opinion there I do not think that it would be possible to pass a compulsory vaccination law in New South Wales.

5834. In which of the Colonies does a compulsory vaccination law exist?—In Victoria I believe it exists.

5835. And in any of the others?—In New Zealand I think, but I am not quite certain. I do not care to speak of the legislation of the other Colonies, because I have been away for 12 months, and I do not know what they may have passed; but it certainly exists in Victoria.

5836. I think it appears to exist in Tasmania. I see that the delegate of Tasmania said: "Although we "have compulsory vaccination, it is found to be in- "operative because we have no person appointed to "conduct the prosecutions"?—Yes.

5837. Is the power of detention for the length of time that you have mentioned conferred by the Act of William IV.?—There is no particular time named under the Act of William IV.; it is left to the discretion of the authority carrying out the power of isolation.

5838. In some cases, as I understand, the detention would extend beyond that time if there were any case of small-pox in the place of detention?—Then the 21 days would begin to run again.

5839. I think it would be well that you should give us, if you will be good enough to do so, the length of time during which persons were detained; where any were detained in excess of the 21 days would that be recorded?—It would be recorded, but I think it would be inadvisable to take that further back than 1882. In the case of the "Preussen," what you suggest happened, and it was under the same rule. The ship was quarantined on the 20th of December, the sickness began to show itself on the 27th, and it continued to show itself every day until the 7th and 9th of January; that is to say, it was on the 9th of January that the rash of the last case of small-pox developed itself. There was no further case, and so the 21 days began to run from the 9th of January and on the 30th of January, that is to say, 21 days after the 9th, the ship's crew and passengers who had not been attacked by small-pox were released from quarantine.

5840. I was speaking rather of the cases of persons removed from their houses to the quarantine station than of the quarantine of a ship?—The principle is exactly the same, but it is not often that a fresh case of small-pox shows itself in the quarantine station after they have gone down, because the reporting is generally early and the isolation is sufficient.

5841. If that were so, would it not seem to show that the detention of those persons was unnecessary?—I say that it is not often, but not that it does not occur, because in a case that occurred a few months before I gave up office, there were two more persons in the same family attacked by small-pox, and therefore the family had to be detained for longer than the original 21 days.

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5842. Has the practice of vaccination been decreasing of late years?—I think it has on the whole.

5843. (*Sir James Paget.*) Can you tell me what number of cases of small-pox there have been in Sydney since 1882, since this regulation has been completely enforced?—I was not health officer in 1883-84, and I cannot tell you exactly.

5844. But during your time from 1885 to 1887, what number of cases have there been?—I can recall to memory at least six cases just now, that is to say, about two cases a year exclusive of those from ships. There may have been more which have slipped my memory, because, as I have said, I have not had time to obtain detailed returns from Sydney; but as soon as I am able I shall furnish the Commission with exact information. There was a case at Randwick, immediately that I took office. I had to remove them.

5845. (*Professor Michael Foster.*) One case?—One case in a family; we removed the whole family at once.

5846. But there was only one actual case?—There may have been two, but we look upon it as a case of small-pox. I am speaking of a case for removal. There were two cases reported in an establishment in Darlinghurst.

5847. (*Chairman.*) Is that in Syndey?—Darlinghurst is a suburb of Sydney. The places I mentioned just now are all of them suburbs of Sydney. There was a case in the Sailors' Home. There were at least six cases that I can recall to memory just now, that is to say, as I have already stated, about two cases a year.

5848. (*Sir James Paget.*) So far as you know, there was no extension of the disease from those several cases?—I am perfectly certain that there was no extension of the disease. Never in my time or in the time of my predecessor has what one may call a second generation of cases of small-pox shown itself in Sydney. When we get a case and remove it, we feel tolerably confident that whatever happens at the quarantine station, there will be no more cases in the city. That is my experience.

5849. Have you any facts relating to the different prevalence of small-pox in Australian cities, where the same rule of isolation is not maintained?—The rule is maintained in all the Australian cities.

5850. As strictly?—As strictly.

5851. With the same result?—With the same result, that there is no small-pox in Australia now. I believe that at the present moment there is not a case of small-pox in Australia or Tasmania.

5852. (*Chairman.*) Was not there in 1886 or 1887 a considerable outbreak in Tasmania?—There was a considerable outbreak of small-pox in Tasmania, but they succeeded ultimately, by carrying out the same principle that we adopt in stamping it out altogether.

5853. But had they quarantine arrangements when it broke out first?—They were not so ready as we were. Tasmania of course is a small colony and not so directly in communication with the outside world as the larger colonies are, and therefore they were not ready at first; but as soon as possible they carried out this plan, and were able to deal with the disease and stamp it out.

5854. (*Dr. Bristowe.*) Do you know how long the epidemic lasted?—The outbreak lasted a few weeks.

5855. (*Sir James Paget.*) Have you any facts that will show the contrast between the prevalence of small-pox under the strict regulations that you have now and under the regulations which were less severe?—That will be shown by the report of the outbreak of 1881-2 which I have promised to send to the Commission.

5856. (*Chairman.*) As I understand, you do not regard the circumstance that atmospheric or other conditions may be at one time favourable to the spread of the disease and at another time not so favourable, so that although at one time you did not isolate cases in this way, you might have individual cases without what is called an epidemic?—I do not believe it.

5857. Then how would you account for this, that in London at times we have a great number of cases of small-pox—in fact until recently we were hardly ever without a few cases,—and yet it did not spread and become epidemic, there being no system of isolation at all?—I am speaking of New South Wales where an immense number of people are unvaccinated. I am merely giving my opinion with respect to Sydney and New South Wales, and I say that if we failed to isolate a case of small-pox there, I am perfectly certain that it would spread, because there are so many unvaccinated persons.

5858. But so there are in London, because at times it does spread when you have what is called an epidemic, when it spreads greatly, and at other times the individual cases remain individual cases without its spreading, the state of vaccination being the same; how do you account for that?—I do not say that small-pox is not more likely to spread at some times than at others; but I mean that it is never so little likely to spread that we could afford in New South Wales to dispense with our system of isolation.

5859. (*Dr. Bristowe.*) In the epidemic of 1881-2, do you recollect how many were treated on the principle of isolation?—There were a large number of people isolated from time to time, and many were isolated who had been exposed to infection, but the isolation was sometimes in the houses in town, and that was insufficient.

5860. It was not carried out quite strictly then?—It was not carried out quite so strictly as now, and therefore only controlled the disease without altogether stamping it out. When the authorities began to carry the isolation out strictly they stamped the disease out in a very short time.

5861. (*Chairman.*) Do you know what the cost was in 1881-2?—Including the cost of the hospital and sanatorium, which was built specially for the purpose, it came, I think, to 96,000*l.*

5862. (*Sir William Savory.*) How many cases to the best of your belief have occurred in Sydney since the enactment of 1882?—Since the Act for the reporting of cases, I could not say how many cases have occurred, because I was not health officer at the time; but during my time I should say that six or seven cases occurred in the city, or perhaps more.

5863. Was the origin of each of those cases satisfactorily accounted for?—No; in many of the cases we were unable to satisfactorily account for them.

5864. You cannot state, then, that all these cases were imported?—I cannot prove that they were imported; but we maintain that they were. That is the principle upon which we go, and it is only upon that principle that we can bring them under the operation of the special Act.

5865. But you have not proof of it?—We have no proof of it.

5866. When a ship comes to Sydney with small-pox on board, all the people in the ship are placed in quarantine?—Everyone.

5867. That is to say, they are kept on the ship or removed from the ship to this place of yours?—The ship is ordered at once into the anchorage of the quarantine station. Then all the passengers are taken on shore, with a sufficient number of stewards and attendants to wait upon them, and all the sick persons are taken to a hospital ship where the necessary attendance is provided. Then we generally say to the agents, "If you like to let your crew remain with us we will "disinfect the ship and hand her over to you, and you "can put a fresh crew and fresh officers into her and "take her away about your business if you please." They very often take advantage of that offer, but if they decline to do so, we keep the crew on board, or as many as are necessary for the safety of the ship, and the remainder—all other persons not required on board for the safety of the ship—are dealt with on shore. If the owners accept the offer which we make to them we then disinfect the ship thoroughly for them, which takes about 24 hours, and hand her over to them, and they can send her away.

5868. You told us, I think, that this rule not only applies to actual cases of developed small-pox, but even to cases where there is a reasonable suspicion of small-pox?—Every case must be reported which might reasonably be suspected or supposed to be small-pox.

5869. Who decides whether it is a reasonable suspicion of small-pox?—The doctor in attendance must decide that for himself. If it turned out that there was a reasonable suspicion, but that he had not entertained it, he would of course be liable to be prosecuted. What it means is that if it is a case which a reasonable person would suspect was small-pox, it is the duty both of the medical man attending and of the householder to report that case, in order that further assistance may be

obtained in deciding whether it is or whether it is not small-pox.

5870. This plan, if fairly carried out, might supersede vaccination altogether?—You would require to carry it out all over the world, and I think that would be very difficult.

5871. But as you are at present advised would you, if you had the power, in addition to the efficient carrying out of this plan, enforce vaccination too?—Personally I should, certainly; but I do not think that it would be possible to pass a Compulsory Vaccination Act in New South Wales.

5872. You told us that there were several objections against vaccinating people who had been in proximity with small-pox after they were isolated and then discharging them; what would be the objection to the removal of a person at once from the infected house, vaccinating him, letting the process pass through the whole of its stages, and then letting him go sooner than the 21 days?—We always gave the persons who were detained the opportunity of being vaccinated, and even urged them to avail themselves of it; but I did not release them the earlier on that account, because those who were left behind, and who might perhaps have been re-vaccinated not very long before, would feel that they had been unjustly treated.

5873. But you might give them the option?—Yes; I always gave them the option of being vaccinated. Another thing which weighed with me was the following remarkable case which was reported to me. On one occasion when the station was in quarantine there being a China ship there, the master of the China ship had a patient on board who was sick of small-pox, and superintended the landing of that patient. He got vaccinated directly after. The vaccination ran its course and after the eighth day of the vaccination (on the ninth day or the tenth I think it was, I do not remember exactly) he got an eruption which presented all the appearances of very mild small-pox, and he was removed to the hospital ship.

5874. (*Chairman.*) That is to say, it might have been incubating whilst the vaccination was going on?—I would not like to say what it was, but it was a case in which a man who had been vaccinated, and upon whom the vaccination had run its course, immediately afterwards developed a complaint which was probably very mild small-pox. If he had been released and this case had occurred outside, we should have had all the trouble of isolating him again, and we should have had to take the people of the house in which he might happen to be living.

5875. (*Sir James Paget.*) You are not quite sure as to the number of days after vaccination?—I was informed that the vaccination had established itself.

5876. You could not say whether it was six days or ten days?—I believe it was after the eighth day.

5877. (*Sir William Savory.*) You did not see the eruption yourself?—I did not, but the medical man in charge of the station regarded it as small-pox, and the man himself regarded it as small-pox.

5878. Can you give the name of the medical man?—I do not remember it just now.

5879. Did he pronounce positively, or did he say it was probably small-pox?—He considered it so much small-pox that he put the man into the hospital ship.

5880. He acted on the safe side?—He did.

5881. Then you would say that supposing a person exposed to the infection of small-pox is immediately vaccinated, and the vaccination passes through its stages properly, still, in your opinion, that person would not be absolutely safe from small-pox?—I think he would not be so absolutely safe from developing small-pox as he would be if 21 days had elapsed from the date of his exposure to infection.

5882. You would not say that he was absolutely safe?—So far as the man himself was concerned you might say that he was practically safe, but when you look at it from the point of view of completely eradicating the disease, I say that he is not absolutely safe.

5883. Did you fix upon the 21 days?—The board fixed upon the 21 days after careful discussion.

5884. Upon what grounds were 21 days chosen?—From the cases that occurred in the ships they came to the conclusion that once or twice they had had a case in which the incubation they thought was over 18 days, and in my report on the "Preussen" I said, "I would "further note, as a matter of interest to this board, "that from the 20th of December, on which date "Pryce's corpse was taken out of the ship, to the 9th "of January, when the eruption showed itself in the "last case, a period of 20 days elapsed"; and this person who showed his eruption on the 9th was taken ill on the 7th, that is 18 days. I go on to say, "This confirms the old standing regulation of the "board 'that no body of persons in quarantine for "'small-pox should be considered perfectly safe from "'a possible outbreak of the disease until at least 21 "'days have elapsed since the last case of disease was "'removed from among them.'" Cases of that kind had occurred before.

5885. I understand you to say that there are instances in which after isolation subsequent to exposure to infection small-pox has happened?—Yes.

5886. Could you get at the dates at which the small-pox happened after exposure to infection in those cases?—You find them all very carefully given in the case of the "Preussen," for instance, which is a very typical case. There is a long table in the "Preussen" report giving the names and dates upon which each person was taken ill.

5887. (*Chairman.*) That is only the case of one particular ship?—But it is as definite as any.

5888. (*Mr. Bradlaugh.*) Is that report an official paper?—Yes.

5889. Could you let the Commission have a copy of it?—It could be easily had in New South Wales.

5890. (*Professor Michael Foster.*) Does this arrangement refer to Sydney only or to the whole of the colony?—To the whole of the colony, but from the distant parts of the colony we should not dream of taking a person, say, 500 miles down to the quarantine station. We then make such arrangements as may be required from time to time. But Sydney is the most populous part of the colony and the centre of almost all the foreign trade, and therefore, practically speaking, it is rarely that a case occurs outside Sydney, although it has occurred occasionally.

5891. You have quarantine arrangements with regard to your seaboard; have you any similar arrangements with regard to your frontier with Victoria or Queensland?—If an epidemic of small-pox were to break out in Victoria we should take the necessary steps, but as soon as we found that the Victorian authorities had got it under control and isolated the people we should leave it to them.

5892. You have power to do that in the eventuality of their not doing it?—Yes.

5893. I understood you to say, I think, that the members of the family or the inhabitants of the house in which a case of small-pox occurred are quarantined?—All the inhabitants of the house.

5894. Do you take any action with regard to the persons who are known to have visited the house?—Yes, we quarantine them too, if we think it necessary.

5895. I mean the persons who have stayed a certain time in the house or who have been there a certain number of days?—If we knew that people had been habitually coming into the house while the person was sick we should most likely quarantine them.

5896. (*Chairman.*) Would you quarantine the tradespeople who supplied the house, for example, the man who brought the bread or the milk?—He does not go inside the house. Unless there was evidence that he had been near the sick person we should not likely quarantine him; but if we knew that people were habitually going into the house, we should consider ourselves quite justified in quarantining them.

5897. Do you quarantine the doctor who attends the patient?—No.

5898. (*Professor Michael Foster.*) Who determines whether they shall be quarantined or not?—The Board of Health is the ultimate authority, but generally it is the president and the inspector who determine who shall be quarantined, and the Board usually confirms their action.

5899. (*Chairman.*) The inspector goes to see whether it is a case of small-pox, but you do not quarantine him?—We cannot quarantine him. There must be limits. We take as much precaution as possible to prevent his being a source of infection to others.

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5900. (*Professor Michael Foster.*) You say that the medical profession you think are wholly in favour of compulsory vaccination?—I believe they are with one or two exceptions.

5901. That I suppose is in addition to your quarantine system and not in substitution for it?—That is in addition to it, I should say.

5902. That question has not been put before them?—It has not. The system at present used is, in my opinion, more the outcome of the public demand than of the desire of the medical profession.

5903. You have had, I think, six quarantine cases since you have been in office?—I should think about six, from the land.

5904. That is since 1884?—In 1885, 1886, 1887, and 1888.

5905. What is about the annual cost of the whole establishment?—It is small. Many of the persons are only temporarily employed, the doctors for instance; and the officials of the Health Department have also other duties which they perform at other times.

5906. Does it cost 300*l.* or 400*l.* a year?—More than that.

5907. Does it cost 1,000*l.* a year?—I think the expense of the quarantine establishment and of the health office and so forth is about 5,000*l.* a year to the best of my recollection; but that includes all the expense of the quarantining ships.

5908. Most of the six persons that you have quarantined have belonged, you say, to the working classes?—Many of them do, but not all.

5909. Have you quarantined any number of active merchants or professional men or members of the Houses?—One case was in the family of a member of Parliament; but nobody ever raises any objection; people are all very sensible about it.

5910. (*Chairman.*) Do you do the same in the case of scarlet fever?—No. The Government have not at any time considered scarlet fever as a disease which was so absolutely extinguished in the Colony that when it occurred it must have been imported from outside, and therefore they do not feel justified in applying the Quarantine Act to cases of scarlet fever occurring within the Colony. But when cases of scarlet fever are reported to the health officer, every effort is made to induce the parents to allow their children to be taken to another establishment a certain distance out of the town, where they are kept isolated until all risk of infection is at an end.

5911. However, you do not enforce complete isolation of all the people in the house?—No, nothing of that kind; it is only with respect to small-pox that we do that.

5912. Have you a considerable number of deaths from scarlet fever?—There are almost always cases of scarlet fever, sometimes more severely epidemic, and sometimes less so. It presents very much the same character as it does in this country, most of the cases being mild, and some terribly severe and fatal.

5913. (*Sir James Paget.*) If you had a house in Sydney occupied by many families, would you apply the rule of isolation to all in the house whether they were members of the same family or not?—Yes, to every person within the house.

5914. Supposing that it was a large hotel, how would you treat it?—We should isolate it.

5915. And all the people in it?—Every person.

5916. Guests, servants, and all?—Yes; guests, servants, and all, every person in it, as was done in the case of the Sailors' Home, for example.

5917. (*Professor Michael Foster.*) The compensation would be considerable, I presume, in the case of a large hotel?—The compensation is reasonable.

5918. (*Chairman.*) Is it so reasonable that it does not compensate?—No. It is no use going into particular cases, but the Government have been very liberal where liberality was evidently required, and they have never desired to act oppressively on any one; but they understand that they are the custodians of the public money, and they would not allow fanciful compensation.

5919. In the remarks made by the President of this Sanitary Congress, the President being the New South Wales representative, he states that "over 200,000*l.* "was spent by our Government on that occasion"; that is the occasion of the epidemic of 1881; I thought you named a smaller sum; would that be likely to be correct?—I think you may take my sum as correct to the best of my knowledge and belief.

5920. In 1881?—In 1881-2 for the whole of the epidemic.

5921. This was only very shortly afterwards, in 1884. Was Dr. Mackellar the health officer then?—No, another gentleman was in charge in 1881-2. There may have been other things that he included in his estimate, and he was more near the time of the outbreak than I am; but I believe that the cost in money of that outbreak in 1881-2 was 96,000*l.*, with some hundreds I daresay; and of that I think about 33,000*l.* or 34,000*l.* was spent in establishing a hospital and sanatorium at Little Bay.

5922. (*Mr. Meadows White.*) You spoke of one case in which the penalties had been enforced for not notifying a case of illness?—Yes, there have been several cases.

5923. Were those against medical men or against householders?—Against medical men.

5924. Have you ever known an instance of the penalty being enforced against a householder for not notifying that there was a "reasonable suspicion of small-pox," or whatever the words are?—As a matter of fact, they have not often been prosecuted. There have been, so far as I remember, three or four prosecutions altogether under that Act, and in those cases it was clear that the householder was not responsible.

5925. Might not that reasonably be held to be negligence in a medical man which would not be negligence in a householder?—Yes. The Board of Health is the prosecuting authority, and they believed that the householder was not in a position to have formed any opinion about it at all and was not to blame.

5926. Is there any publication in which these Quarantine Acts and others are gathered together in a convenient form?—They are published in a separate form in New South Wales, and I have no doubt they could be readily procured.

5927. You say that you have only jurisdiction in a case which has been reported; do you know the words of the Act?—I cannot remember the exact words of it, but it is a general Act which was framed by the Secretary of State for the Colonies in London about the year 1832 or 1833, and I believe it was sent out to all the Colonies in consequence of the alarm which at that time arose with regard to the cholera.

5928. It only deals with imported cases?—It only deals with imported cases, that is to say, cases imported or presumed to be imported.

5929. In those cases in which there have been outbreaks of small-pox was there anything special to note as to the sanitation of the houses or of the neighbourhoods in which it originated?—No, nothing particular. You find small-pox in houses of all descriptions. Of course there is a very much larger number of poor people than of wealthy people in every part of the world, and therefore you are more likely to find small-pox in a poor man's house than in a rich man's house. Still you find it in rich men's houses also.

5930. Do you find in regard to vaccination an active hostility or is it only neglect?—Neglect. There was a little active hostility on the part of a few people but practically it is neglect.

5931. (*Mr. Bradlaugh.*) As there is no compulsion there would be no necessity for active hostility, I presume?—There are some people who have strong views and strong opinions, and who like to air them.

5932. (*Mr. Picton.*) You mentioned one case of a patient from quarantine who developed small-pox after vaccination; is that the only case that you know of small-pox in a re-vaccinated person?—This was not simply a case of small-pox in a re-vaccinated person; this was the case of a person who had been exposed to the infection of small-pox, and thereupon was immediately re-vaccinated, and although his vaccination ran its full course, the original infection had not been killed by it, but showed itself. That is the way in which it was reported to me; I did not see it.

5933. There are, I suppose, a good many people vaccinated in Sydney?—Yes.

5934. Are the cases of small-pox confined to unvaccinated persons?—No.

5935. But would you kindly tell me whether the cases of small-pox which you have had are confined to the unvaccinated?—Not altogether.

5936. Could you tell us at all approximately in what proportion they have been cases of vaccinated and unvaccinated people, including of course infantile vaccination?—We have fortunately succeeded in keeping it down to a small number, and it is difficult for me to say exactly without the figures before me; but the numbers are so small that they are useless for the purpose of striking an average. If you look you will see it very carefully put down in this report with respect to the "Preussen" people. Of the passengers detained at the station 19 had never been vaccinated; of those 15 took small-pox, nine of whom died, and one lost her eyesight. There were 55 passengers said to have been vaccinated and re-vaccinated; of those four were attacked, but none of them died. Thirteen persons had had small-pox before, three of them had small-pox now, but none of them died. One hundred and fifty persons had good or fairly good vaccination marks; of those 29 were attacked, but there were on deaths. Fifty-nine had deficient vaccination marks, and of those sixteen were attacked and three died.

5937. A former medical witness, in reply to a question of mine, "Is vaccination absolutely protective up to "any age whatever"? replied, "My table shows that "it is not, because I think there are some cases under "two years of age"; would you agree with that?—I will say that I never considered vaccination an absolute protection from my point of view. As President of the Board of Health of New South Wales my business was to produce extinction of the disease, and I never considered vaccination as an absolute protection against it. I look upon it as a very great protection, but not an absolute one.

5938. (*Dr. Collins.*) Is vaccination provided out of public money in New South Wales?—For those who choose to go to the public vaccinator a fee is paid by the Government. They have 2*s.* 6*d.* for each case up to a certain distance, and 3*s.* 6*d.* beyond that distance.

5939. Are the numbers of those who are vaccinated at the public expense increasing or decreasing?—I think they are decreasing if anything; they are decreasing in Sydney.

5940. Are you able to form any estimate as to the proportion of the population of Sydney which is vaccinated?—It is very difficult to form an estimate. Approximate estimates have sometimes been made, but you cannot give an exact amount, because you do not know how many people are vaccinated by their own doctors. A great many persons in Sydney and in different parts of the country do not care to go to the public vaccinator and they are vaccinated by their own medical men; so that it is difficult to give an exact estimate; but there is no doubt whatever that the proportion of young persons in New South Wales who are not vaccinated is very large.

5941. (*Professor Michael Foster.*) Do you think it would be much more than half?—I should think much more than half of persons under 10 years of age.

5942. (*Dr. Collins.*) Could you tell us the total number of cases of small-pox which arose in connexion with that outbreak on the "Preussen" that came under your immediate notice?—I think we had 79 cases in all, and 13 of those died.

5943. Are we to understand that no infection from that outbreak occurred in Sydney?—None whatever; there was never the slightest spreading of the disease at all.

5944. We were told by a former witness in reference to the "Preussen" that the people on that boat were living under "the same sanitary circumstances," et cetera; could you tell us what were the sanitary circumstances under which the persons were living on board that steamer?—They were ordinary steerage passengers brought out by one of the North German Lloyd's ships. We were not quite satisfied with the condition in which they were kept on board, but still it is a very fine ship. They were very much crowded in the steamer.

5945. Do you happen to know that Dr. Ashburton Thompson reported upon that ship, that it was "the "filthiest vessel that they had ever had to deal with in "the quarantine"?—I think if I remember rightly it was not Dr. Ashburton Thompson, but one of the quarantine officers who made that report.

5946. Was Mr. Nickels the disinfection officer?—Yes. Here is what I said myself about it: "After "careful consideration of all the evidence both in the "Chief Inspector's report and in the Consul-General's "letter, I cannot but come to the conclusion that on "her arrival at Sydney the ship was far from being in "that state of cleanliness which we have been accustomed to find in vessels arriving at this port under "the control of the Passengers Act. The excuse "offered for this by the master that it was owing to "the dust from Australian coal affecting injuriously "the light-coloured paint of the vessel is to my mind "quite insufficient. I am also satisfied that the "discipline on board during the voyage, especially "with respect to sanitary matters, was by no means "what it ought to have been. It would seem that the "steerage passengers were allowed to remain in their "bunks during the daytime; that they were allowed "to take their beds on deck to sleep; that they were "not made to air their bedding on deck or to assist in "keeping their quarters clean; and that barrels of "provisions were stowed for some time at least under "the bottom berths in the single men's quarters "forward."

5947. (*Sir William Savory.*) But that does not answer Dr. Collins' question; his quotation went far beyond that?—Yes, but there was a report made upon the ship by Dr. Ashburton Thompson, and there was a letter to me on the matter from Mr. Travers, the Consul-General of Germany, and after studying both of them I had to form my opinion, and I think that what I say here is the fair result of the inquiry into all the evidence.

5948. You think that the other was an exaggerated statement?—I do not wish to say so; my opinion is expressed in the extract just read.

5949. (*Mr. Meadows White.*) Did you personally inspect the ship?—After she came out of the station I inspected the ship, but not whilst she was in quarantine

5950. (*Mr. Bradlaugh.*) The mere fact of allowing the steerage passengers to remain in their bunks during the daytime and of having provisions stowed in them in the way described would indicate a state far removed from cleanliness?—Quite so.

5951. (*Dr. Collins.*) Had Mr. Nickels, the disinfector, been employed in that capacity since 1883, and had he been called upon to disinfect 46 ships prior to the time of his disinfecting the "Preussen"?—Yes.

5952. And did he state that she was "in a most filthy "condition in all the compartments with the exception of the saloon"; that "the smell was abominable"; and that she was "without exception the "dirtiest ship that he had ever done"?—Yes.

5953. Is Mr. Nickels a reliable officer?—Yes.

5954. (*Sir James Paget.*) Was there any report of sickness on board?—Nothing of any very great consequence.

5955. (*Dr. Collins.*) Was it not stated that diarrhœa and dysentery prevailed on board after leaving Aden?—Yes, and that was attributed to the water, I think. That of course came out with respect to the number of closets on board the ship. The number was too small, and I said: "This deficiency, especially considering "the outbreak of diarrhœa which took place after "leaving Aden, must have been a source of great "discomfort to the persons on board."

5956. Can you tell us anything with regard to the cubic space that was allowed in the berths per head?—You will find that in Mr. Travers' report.

5957. As a matter of fact was there not only a little over 100 cubic feet per head of space?—So far as I can gather from Consul-General Travers' report there were about 114 cubic feet allowed for each calculated adult.

5958. (*Sir William Savory.*) What is the average cubic space for steerage passengers?—In the navy the average cubic space in an old line of battle ship on the lower deck, as far as I could calculate it, used to be 120 to 130 feet. That was a very crowded ship.

5959. (*Dr. Collins.*) Had the crew and the passengers been re-vaccinated when they touched at Melbourne?—You will find the full particulars in Dr. Thompson's report.

5960. At the bottom of page 7 I find this: "The ship "arrived at Melbourne on December the 22nd where "all the crew were vaccinated"?—Yes.

5961. (*Mr. Meadows White.*) Were any of the crew amongst the patients or amongst those who died?—Yes,

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there were 14 of the crew amongst the patients, and the assistant engineer died.

5962. (*Chairman.*) What was the date of her arrival at Sydney?—She arrived at Sydney on the 26th of December.

5963. What was the date of her being at Melbourne?—She arrived at Melbourne on the 22nd of December and she arrived at Adelaide on the 20th.

5964. She would arrive at Sydney very shortly after the vaccination had been effected?—Yes.

5965. (*Dr. Collins.*) Did cases of small-pox up to the number of 14 occur in the crew almost daily up to the 7th of January 1887?—Yes.

5966. (*Sir James Paget.*) What was the date of the vaccination?—The exact details as to the vaccination which took place, so far as it was reported to us, will be found in Dr. Thompson's report.

5967. According to those dates they might have been infected by small-pox before they had been vaccinated?—I believe so.

5968. (*Dr. Collins.*) Had all the 14 members of the crew who were attacked with small-pox been vaccinated?—Yes. Four of those who had been vaccinated and re-vaccinated were attacked, and of the 150 who had good or fairly good marks, 29 were attacked.

5969. (*Chairman.*) But that is dealing with the passengers and the crew?—Yes.

5970. (*Dr. Collins.*) It would be the passengers and not the crew, I think?—That is dealing with the passengers.

5971. If you refer to Table VI., on page 17 you observe that all the 14 of the crew who took the infection had been primarily vaccinated?—They had all been vaccinated and some of them re-vaccinated.

5972. Had six of the 14 of the crew who took small-pox been re-vaccinated prior to the re-vaccination at Melbourne?—Apparently.

5973. Did four of those show scars of re-vaccination prior to the re-vaccination at Melbourne?—Yes.

5974. Did one of the crew die?—Yes, he died on the 25th day of his illness; it was a severe case.

5975. Did the doctor's attendant with good foveated marks have a severe attack?—Yes.

5976. Could you tell me anything with regard to the ages of those who died unvaccinated?—You will see them all carefully tabulated. There were three under 1, two from 5 to 10, one from 15 to 20, one from 20 to 30, and two from 30 to 40.

5977. How many of the nine fatal unvaccinated cases in Table I. on page 12 were under one year of age?—Three apparently.

5978. And two more were between 5 and 10?—Yes, and one between 15 and 20, one between 20 and 30, and two between 30 and 40.

5979. Were none of the passengers re-vaccinated as well as the crew?—I would again refer to Dr. Thompson's report for accurate statements on this matter. There was a considerable scarcity of vaccine lymph on board the ship.

5980. That term applies to being re-vaccinated before embarkation, does it not?—That is so undoubtedly.

5981. Can you tell me whether any of them were re-vaccinated during the voyage?—Dr. Jens operated on about 250 persons, but only four or five may have been successful.

5982. The re-vaccination was exclusively confined to the crew?—Apparently at Melbourne. 197 persons were re-vaccinated in quarantine.

5983. Amongst those who were re-vaccinated in quarantine were there no cases of small-pox?—I believe not.

5984. Is that stated in the report? The term "re-vaccination" in the report applies to re-vaccination prior to embarkation?—That is of the persons who became sick, but of those who were re-vaccinated at the quarantine station, as far as I remember, I believe none were attacked afterwards.

5985. Can you tell me with regard to the first case that occurred on board; was he vaccinated or not?—I do not know.

5986. Was there any report from the medical officer of the ship?—Not so far as I know.

5987. Was not there some lymph obtained at Port Said and re-vaccination practised with it?—Yes; I believe three tubes.

5988. Is Dr. Günst, of New South Wales, known to you at all?—No.

5989. Apparently he gave evidence before a Select Committee on the Vaccination Law in Victoria in 1880–81?—I have no acquaintance with him.

5990. Are you not aware that he has experience in the territory between the Richmond and the Clarence rivers?—He would have very little experience of small-pox there. I should think there had not been a single case of small-pox there since the Colony was established.

5991. Were you aware of his experience of vaccination?—No, I have not seen any report of his, and I do not know whether he was in the territory of New South Wales. I do not know whether he was a public vaccinator. I do not remember his name occurring in the list of public vaccinators; he certainly did very little vaccination when I was in charge of the office. I do not remember any report of his on vaccination.

5992. He states, "I was for seven years the only "doctor for 120 miles at the Richmond and Clarence "rivers, New South Wales, and I had the best "opportunity to watch the effect of vaccination; I was "not like a public vaccinator who takes the vaccine, "and sees no more of the children, but I had to follow "up the children, and see if they became ill, and if "they were ill they came to me." He goes on to say that he has seen eczema, skin diseases and scrofula, in his opinion resulting from vaccination?—I know nothing about him. I do not remember hearing his name before. I may have heard it, but he is not a person known to me, and what the value of his opinion or experience is I would not like to say. He may be a very accurate observer, but as to that I cannot say.

5993. Are you acquainted with that Report of the Select Committee upon the Vaccination Law in Victoria in 1881?—I read it at the time, but I have not read it recently.

5994. Are you aware that it was then stated that "Greater unanimity prevailed on the question of the "communication of extraneous diseases, such as syphilis "and scrofula, by vaccination, although some of the "witnesses maintained that there would be no liability "to such transmission unless blood were drawn during "the operation." I want to ask you whether there was any opinion of repute which held that disease could be communicated by vaccination?—I think there is no doubt that the risk of communicating syphilis by vaccination from a syphilitic child would be extremely great. I think a person who vaccinates from a syphilitic child would be guilty of great misconduct.

5995. Do you think that that opinion has been at all operative in the opposition which has existed, although not of a very hostile character, to vaccination in New South Wales?—I have no doubt whatever that the feeling on the part of the public of the risk of its communicating some disease has had a great weight with them in preventing vaccination. There is another consideration which weighs with them also; a mother naturally does not like to expose her child to anything that will make it sick even for a short time, and some children do not thrive so well afterwards as they did before; and again there are many who are averse to doing anything of that sort; and in very hot weather if a child is feverish it suffers much more. Then again they feel that there is no great danger of their getting small-pox, so that the incentive to vaccination is not so strong, that is so long as they live in New South Wales; but what you suggest does undoubtedly weigh with them, that is to say, the risk or the possibility of their getting such a disease as syphilis conveyed in the lymph.

5996. Could you tell us at all how the Colony of Victoria compares with that of New South Wales as regards the amount of small-pox?—I believe we have had more outbreaks in New South Wales than they have had in Victoria, and the reason of that I believe to be that we are more directly in communication with China. The China vessels, which are the most frequent carriers of small-pox, as far as Australia is concerned, generally go down the east coast, and call at Sydney before they come to Melbourne, so that so far as there is any danger we are exposed to it in Sydney to a larger extent than they are in Melbourne. Therefore I think on the whole we get more cases than they do.

5997. (*Chairman.*) Some of their authorities attribute the diminished number of cases in Melbourne as compared to New South Wales to vaccination, do they not?—That may be the case; but I confess I fancy that the other is quite as good an explanation.

5998. (*Dr. Collins.*) Do you, however, consider that your system of quarantine is perfectly successful in protecting the community from small-pox?—Perfectly successful. I think the risk of a person dying from small-pox in New South Wales or Australia generally (I take New South Wales as a type of Australia) is smaller than it is in any other part of the world.

5999. You do not attribute that to any geographical or other conditions, do you?—No; because when people in Australia get the small-pox badly they often die. The fact of our being surrounded by an immense ocean makes it easier to carry out a system of isolation than in a place like London; but I do not think that geographical position has any effect upon the spread of the disease when once you have the infection set up.

6000. Do you happen to be familiar with Professor Crookshank's writings?—I have read some of them.

6001. Do you agree with him in the opinion he appears to express that in future resort must be had to similar methods to those proposed by Haygarth, which were measures of isolation, for stamping out such diseases as small-pox?—I am fully of opinion that the only way in which you can bring to an end an outbreak of small-pox, that is to say, to bring it under control, and not leave it to wear itself out, is by notification and isolation. Of course in any small community if you let the disease in it will work itself out in time, because all the susceptible people will have had it, but the only way in which you can absolutely control an epidemic of small-pox is by a system of notification and isolation.

6002. (*Sir William Savory.*) But I thought you stated in answer to an earlier question put to you that you would supplement the isolation by vaccination?—Certainly I would.

6003. But you have now stated that isolation is a perfect means of stamping the disease out?—I do consider that isolation is a perfect means of stamping out small-pox, but I would supplement it by vaccination, because nobody knows who may be attacked, and the probability is that very few persons having been re-vaccinated would be attacked, and that they would have less severe attacks.

6004. (*Chairman.*) And the burden of the system would be less if vaccination is at all a protection?—It would, because if vaccination is a protection the chances are that the disease would not spread so much.

6005. Therefore those who have not the disease would not be likely to catch it, and the burden of keeping all those people in isolation would be diminished. Supposing vaccination to be to any extent a protection, that is to say, to put it in another form, supposing you had your system of isolation, if a number of cases of small-pox occurred it would put a considerable number of people to great inconvenience and would be a very great expense to the State, would it not?—Yes.

6006. Then if it be the fact that general vaccination diminishes the probability of people taking the disease, that would be calculated to diminish both the pressure of the burden of looking after these people and keeping them in isolation, and the expense to the State of doing so?—The chances are that there would be fewer appearances of the disease, but the entourage of each patient you moved would be equally large.

6007. But the fewer the cases of disease the smaller the number included in the entourage of the patient; that is why I understand your view to be that, however good isolation is, a system of isolation supplemented by vaccination would be better?—That is my view.

6008. (*Sir Guyer Hunter.*) Do you consider that isolation would be applicable to a place like London?—It could be done if you took the trouble. If all the nations of the world could combine and set to work we could stamp it out no doubt. There would, however, be a perpetual source of it in Africa and China, still I believe you could stamp it out from any civilized city by taking the trouble; it would be only a matter of trouble.

6009. (*Mr. Dugdale.*) And expense?—Yes, necessarily.

6010. (*Sir James Paget.*) Take the case of a very large shop with 300 or 400 persons living in the same house; under your plan you would remove the whole of them?—Yes, I would remove the whole of them.

6011. Leaving the shop for 21 days unoccupied?—I would disinfect the shop, but in Australia that would not be likely to occur.

6012. (*Mr. Meadows White.*) Have such cases occurred?—First of all in large shops in Sydney it is not likely to happen, because they do not live at the shops.

6013. (*Professor Michael Foster.*) What is about the maximum number you have quarantined?—In the Sailors' Home I quarantined about 70 people, including the master and all.

6014. (*Sir James Paget.*) You would disinfect the shop besides removing the whole of those who had been working in the business?—Yes.

6015. Therefore after the disinfection the business would have to be carried on by 300 or 400 new persons?—That is one of those practical difficulties which could only be solved as it arose.

6016. Could it be solved in any other way?—It could be solved by keeping the shop closed till the people came back. But I would prefer to give the following general answer. In a case of extreme inconvenience, like that suggested, the authorities in Sydney would probably be satisfied with removing the patient, and inspecting the persons who had been exposed to infection, every day for 21 days.

6017. (*Sir Guyer Hunter.*) Do you think that closing the shop would be at all practicable?—I think it is not likely to arise, because the owner of a shop of that kind would take very great care that any risk of a calamity of that description was reduced to a minimum, and would either see that they did not live in the neighbourhood of the shop, or that they did not go to any place where the small-pox was likely to be caught. And, moreover, by the system of isolation which prevails in New South Wales, the greatest care is taken now by the authorities that every one shall know where a case of small-pox has been found if it has not been possible to remove it, so that no one shall run into danger unawares—therefore the risk is exceedingly small.

6018. (*Chairman.*) Do you limit your isolation to the house where people sleep; supposing a person having small-pox had been employed in an establishment where he merely spent his days; would you disinfect the establishment?—If he had been working about in the establishment with the small-pox upon him we should deal with the establishment.

6019. (*Mr. Meadows White.*) Supposing it occurred that children with small-pox upon them had been in the habit of going to a large school, and then the small-pox broke out, what do you do then?—When such a case has happened the child has not gone back to the school with the small-pox upon it, it has been left at home; but what we do is this, we have the school inspected every morning by a medical man, and if any person in the school is taken ill he is inspected at his home, and if any of them have left the district instructions are sent to the police to have them inspected daily, to see what has taken place.

6020. You have never had small-pox break out in a gaol, have you?—I never had small-pox in a gaol.

6021. Nor in a workhouse?—Nor in a workhouse either. Great precaution was taken, however, upon the admission of a prisoner into a gaol when there was any small-pox about that he should not carry the infection in.

6022. (*Chairman.*) Were you a party to the document which was issued by the Board of Health of New South Wales upon the 27th of June last year on the subject of compulsory vaccination?—If that was in 1889, I was not there, having left the colony in the March of that year; that is signed, I presume, by Dr. Manning?

6023. By Edmund Sager, Secretary?—I was not there; I have seen it.

6024. Were you the medical adviser to the Government on vaccination for 1888?—I was.

6025. I see the report is in these terms: "The Board "having considered the report of the Medical Adviser "to the Government on vaccination for the year 1888, "desire to place on record the expression of their re- "gret that nothing has yet been done in New South "Wales towards the establishment of a system of "compulsory vaccination, the only known method of "successfully avoiding the ravages of small-pox. While "prepared to exercise to the full the powers vested in

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"them by the Act relating to outbreaks of small-pox, "the Board consider it their duty to make it known "that in their opinion the powers thus conferred of "placing in quarantine infected persons will be in- "sufficient to enable them to cope with this disease, "should it be introduced into the Colony at any time "when the atmospheric and other conditions favour its "spread; and further, that in such event it will be "impossible, unless vaccination be practically uni- "versal, as it would be under a compulsory system, "for them to meet the large demand for lymph which "would be at once experienced, as that obtainable in "the other Colonies would be needed for re-vaccination "there, and while lymph was being imported from "England there would be a rapid development of the "disease. The Board desire to invite special attention "to the statistics published in the Medical Adviser's "report, from which it appears that during an out- "break of small-pox in the year 1881, 58,962 persons "were vaccinated, whilst the number vaccinated in "1888 was only 2,069. The Board would point out that "compulsory vaccination is the law in the large ma- "jority of English speaking communities and Colonies, "including the whole of the Australasian Colonies, "except New South Wales, and that wherever an Act "has been passed, its working has been so generally "satisfactory, and the danger of infection, the severity "of the malady, and the mortality, have been so greatly "diminished, that in no instance has the Act been re- "pealed. The Board, though sensible of the enormous "money loss and personal inconvenience which would "arise from the stoppage of trade, and from the "enforcement of a rigid quarantine consequent on "an epidemic of small-pox in this Colony, deem "these matters of but small moment when com- "pared with the great suffering and high mortality "which must follow such an outbreak in an unvacci- "nated population, and they trust that the extreme "gravity and urgency of the danger will be recognised, "and that a Bill for establishing compulsory vaccina- "tion will forthwith be introduced." You were not personally acquainted with it, perhaps?—I was not personally acquainted with it. It is the report of 1888 that he refers to, I suppose. I have repeatedly recommended the Government to introduce a Compulsory Vaccination Act into New South Wales; I believe it would be a most admirable thing to do. I strongly support the institution of vaccination as a protection against small-pox. But what I want to make clear is this, that the only means, in my belief, of controlling an outbreak with certainty, are notification and isolation. It may be impossible to do it in many cases, no doubt. In the case that Sir James Paget suggests it would be impracticable, and then we should have to fall back upon a system of repeated inspections; but I am speaking of where it can be done, and I say that to stop an outbreak the only thing that you can be sure of is notification and isolation. I firmly believe that vaccination is of the greatest possible use, that it diminishes the number of persons in the area infected who are liable to be attacked, but I do not know of any case in which vaccination has, in any considerable community, absolutely prevented an outbreak of small-pox. I do not know of any considerable city in which small-pox has not from time to time run its course, possibly not very severe, except where there was isolation and notification.

6026. (*Dr. Collins.*) Do you think that New South Wales would be better off as regards exemption from small-pox if you had a compulsory Vaccination Act without your system of isolation than it is now with your system of isolation and without compulsory vaccination?—I do not know that it would be, but we were always living in fear lest something should arise to make it impossible for us to carry out our isolation. Suppose, for instance, the case that was just mentioned, that the disease appeared in some institution which we could not quarantine; suppose, for example, the disease appeared in the House of Assembly, we could not quarantine that, and we should have great difficulty in dealing with the matter.

6027. (*Sir James Paget.*) Say it appeared in the Post Office?—The Post Office we could manage by a system of isolation and constant inspection; but it is because we felt that a case might arise where we were not able to control it that we would recommend that vaccination should exist in order that its spread should be lessened.

6028. Your letter carriers would have to go into the Post Office and come out again?—Yes, they would have to go into the building of the Post Office; but if a person had the small-pox there, the chances are that it would be confined to one room; he would be easily removed, and the room could be immediately disinfected.

6029. In that case would you remove all persons who had been in the house with the infected person?—I would say, in order to give an illustration, supposing the housekeeper at the top of the Post Office in Sydney got small-pox, we should not consider it necessary to remove all the Post Office officials, because we look upon the housekeeper's rooms as a separate house; that is to say, they are sufficiently isolated from the rest. When I said that everyone must be removed I was speaking of ordinary houses in which people have the usual communication with each other. I was only laying down a general principle.

6030. (*Dr. Collins.*) Do I understand from your report upon the "Preussen" outbreak that a stringent application of quarantine in that case might have prevented that outbreak?—I am sure of it. When the ship first arrived at Albany the health office telegraphed advising the immediate removal of the men from the ship. I say in my report on page 4, "If the patient "had then been removed from the ship without delay "it is in the highest degree probable that the spread "of disease would have been restricted within very "narrow limits. But the patient was not removed, as "was suggested by this Board, and he consequently "continued to be a source of danger until the 20th of "December, on which date his corpse was taken out of "the ship for burial. A further consideration of the "dates of the various attacks convinces me that all the "persons who suffered at our quarantine station owed "their illness to infection direct from Pryce, and that "the rigorous system of inspection and isolation which "we adopted was successful in preventing the disease "being communicated to healthy people from any of "those who sickened under our charge." It seemed to me, in fact, as I say elsewhere, that there were very few persons who had probably been infected by the time the ship came to Albany, judging by the dates. If Pryce had been removed from the ship then he would have only left very few persons on board in whom the seeds of infection existed, and they would have gone to the quarantine stations at the different ports. As soon as ever the disease made its appearance it would have been noticed at once, and the patients would have been isolated, and would not have had an opportunity of infecting the other persons who suffered as it was from the disease.

6031. Do you think that the conditions under which the steerage passagers were living had any relation to the spread of the epidemic amongst them?—There can be no doubt that they were living very closely crowded together, and that if they had been living on shore they would not have been attacked to so large an extent.

6032. Then you think that the lesson of that case is the prompt application of quarantine?—As soon as ever small-pox appears on board a ship she ought to be regarded as a ship in distress, and she ought to receive the assistance of the port authorities by having any cases she has immediately removed.

6033. (*Mr. Bradlaugh.*) With reference to a question put to you by my Lord as to the Colony of Victoria, I do not know whether you are acquainted with the report of the Central Board of Health of Victoria to the 31st of May 1888?—I have no doubt read it.

6034. Let me remind you that in referring to that outbreak in Tasmania the Board reported "There "cannot be any doubt that if communication between "Launceston and Melbourne had not been temporarily "stopped, small-pox would have reached Victoria"?—I think it quite possible. We did not act in quite the same way as the Melbourne Board; we thought they were a little severe.

6035. But their very severity would show, would it not, that they relied upon quarantine rather than upon compulsory vaccination?—They relied upon quarantine, and I think they were severe more than was necessary. I did not myself consider it was necessary to advise the Government to stop the steam communication. After we were satisfied that the Tasmanian authorities were acting vigorously, we contented ourselves with inspection of the ships on arrival.

6036. You told the Commission earlier in your evidence that it had been proposed or suggested that

persons re-vaccinated should be permitted to leave the quarantine depôt at an earlier date than the 21 days, and that for various reasons you withheld your consent to the suggestion, one of those reasons being the possibility of the re-vaccination having been performed after the small-pox had been already incubated in the patient, and I understood one of your other reasons to be that you did not consider that re-vaccinated people would be sufficiently protected against a fresh attack of small-pox?—I gave this case which I spoke of in which a man, although he had been re-vaccinated after exposure to infection, did not apparently fail to become infected; therefore I said that, although it was exceedingly improbable that such a thing should happen in our experience, still as I was compelled to have absolute security I felt that the bare possibility of such a thing happening was sufficient to justify me in safeguarding the public to that extent.

6037. Am I right in gathering that you did not consider that re-vaccinated persons were so thoroughly protected against an attack of small-pox that you would allow them to go out before the 21 days?—I think that although the protection given by re-vaccination is extremely great, it was not sufficiently great for the purpose, and therefore I was bound to require their detention. Again it would have produced a great deal of discontent if I had allowed some persons to get away earlier than others; one man might say I was re-vaccinated last year and do not care to be re-vaccinated now.

6038. You have expressed a strong opinion that where the cases are reported early isolation is sufficient for the purpose of stamping out the disease?—Yes.

6039. You have been asked in reference to Professor Crookshank's opinion. I do not know whether you are aware that he says there can be no doubt that ere long a system of compulsory isolation will replace vaccination, and that it will be sufficient to stay an outbreak if carefully carried out?—I do not think it will take the place of vaccination. I have a very high opinion of vaccination, and think that it would be a very foolish thing to give it up; but I think the only means of absolutely arresting and putting a stop to an outbreak of small-pox is thorough and complete notification and isolation after the manner that we have adopted in New South Wales.

6039*a*. Would you agree in the statement, that where isolation and vaccination have been carried out in the face of an epidemic, it is the isolation which has been instrumental in staying the outbreak, although the vaccination has received the credit?—I am not prepared to say that; I should say that no doubt isolation had had a great deal to do with it.

6040. (*Sir Guyer Hunter.*) And you would, in all probability, be in as good a position to form an opinion as Dr. Crookshank; what is your opinion candidly upon the point?—I cannot state it more clearly than I have done before. I have stated that the protection given by vaccination is, in my opinion, very great. I consider that the protection given by isolation is absolute. Therefore, if you are anxious to stamp out an outbreak before it has run its course, and taken every person who is liable to be affected by it, you can only do that by absolute isolation, because, from time to time a person who has been protected by vaccination has been attacked by the disease, and a source of infection to others. I respect vaccination highly. I think vaccination with good lymph is of very great value, but I think the other is the only means by which you can be absolutely certain of stamping out an outbreak.

6041. Suppose a person is attacked with small-pox in an upper flat of the Post Office at Sydney, and that there are a dozen or twenty other members of the staff living upon that flat, what would be the system that you would adopt to make isolation absolute?—Supposing the room in which this person lived was perfectly isolated from all the other rooms, as it might be, I should of course have all access to it stopped, and have everyone removed from the upper floor of the Post Office while the person was there. I should then take care to make all necessary preparation at the station.

6042. All the others you say you would have removed; where to?—I would have them removed from that floor. I am supposing the case occurred in a room which was reasonably separated from the rest of the building. My first act would be to quarantine that room, and to send all the other persons off that floor. We should know perfectly well who they were, and I should have all preparations made at the quarantine station for the reception of the patient. I should then get a sufficient body of police who had been vaccinated, and I should take one of the staircases in the Post Office and turn the public and all officials out of that for the time being. I would have the ambulance brought up to the door and would take care to keep the public away from it by proper precautions. I would have the person suffering brought downstairs, and I should look upon all the persons in that wing as one family. I should disinfect that staircase and I should take down the names of all the persons upon that floor of the Post Office and of all the other officials in the Post Office and have them inspected regularly every morning by a medical man to see that there was no small-pox occurring amongst them. That is the plan which I would carry out where it is impossible to stop the action of the establishment altogether. You could not stop the action of the Post Office altogether.

6043. Supposing the occupants of two or three rooms in the upper flat became affected with the disease what would you do?—I would remove them to the quarantine station.

6044. Supposing they had lived with their families and had been merely engaged there?—I should remove their families also, but we do not practically require to do that, because we seldom or never have a second generation of small-pox. Our notification in Sydney is so early that a second generation very seldom takes place. We have practically found that those who have been associated with a person affected would not have conveyed any infection further, because the medical man would see these men every morning for 21 days, and if there were the slightest suspicion of the disease being small-pox we should detect it at once. Supposing there is one sick person who and whose immediate *entourage* had been removed, and supposing there had been 20 people who had been in the establishment, we should inspect those 20 people for three weeks

6045. (*Dr. Bristowe.*) With regard to that exceptional case to which Mr. Bradlaugh has just recalled your attention, do you not know that it is not uncommon for persons who have been vaccinated after having received infection from small-pox to suffer from the symptoms of small-pox in due course?—The common theory is that it depends upon the distance of time which elapses between exposure to infection and the date of vaccination.

6046. Have you any experience to adduce illustrative of this point?—I have seen a great number of cases which were re-vaccinated immediately after exposure where they did not get small-pox, that is all I can say No one can tell for certain, but this is the theory upon which most people act, that the influence of vaccination is or antagonistic to the influence of small-pox, and if you expose a man to infection in the morning and vaccinate him in the afternoon there is practically a race between the two, and that the vaccination maturates first and therefore gets the victory. I should not like to be setting forth pathological theories in such presence, but I think that is what we used to be taught.

6047. I was anxious to know what your personal experience was upon that point?—It is a matter upon which I should not like to offer a definite opinion.

6048. But if you have seen cases, in which upon re-vaccination after exposure small-pox has come out, you must admit the vaccination was not fully protective?—It was not sufficient for my purpose, though extremely good; that was the only case I knew of, and I mentioned that case not of my own knowledge as having seen it, but as a case which was reported to me when occupying my office, and I was bound to take notice of it.

6049. (*Sir William Savory.*) You say that of re-vaccination after exposure to infection, but how about re-vaccination previously to exposure to infection?—That is an affair of averages. All one can say about that is, so many persons have been vaccinated, and of those so many have not had small-pox. I fancy that nobody maintains that a person who has been once re-vaccinated will never get small-pox I should hardly think so. It is possible, I should think, for a person to get small-pox after having been re-vaccinated.

6050. (*Mr. Meadows White.*) How would you deal

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with a person certified to you as having recently had small-pox?—I should regard him as having been recently re-vaccinated.

6051. (*Sir William Savory.*) You would put recent re-vaccination on a level with a previous attack of small-pox?—I think the re-vaccination is rather better.

The witness withdrew.

Mr. George William Sibly, M.A.

Mr. George William Sibly, M.A., examined.

6052. (*Chairman.*) You are a Master of Arts of Oxford and a schoolmaster of Stonehouse in Gloucestershire?—Yes.

6053. You have been fined, I believe, for breaches of the vaccination laws?—I have been fined and had to pay costs in connexion with orders for one child seven times, and for younger children in one case twice, and in another three times.

6054. What was the total amount you were fined?—8*l.* 12*s.* 1*d.*

6055. That was in Gloucestershire?—Yes; we belong to the district of the Stroud Board of Guardians, but I was prosecuted at the Petty Sessional Court at Whitminster, which is near Stonehouse.

6056. You have, I believe, a relative in Yorkshire who has seven children none of whom have been vaccinated, and he has never been fined?—Yes, my brother-in-law.

6057. (*Mr. Bradlaugh.*) Why have you objected to your children being vaccinated?—Simply upon a general consideration of the question. I was first biased against vaccination after the correspondence between, or rather articles by, Dr. Carpenter and Mr. Peter Taylor which appeared in the "Nineteenth Century"; then I examined the question further, and was more and more convinced of the injury that might be done, and of the fact that no good was likely to result.

6058. Is there a growing feeling against vaccination in the district in which you reside?—Yes; it is growing rapidly. I believe I was the first to be summoned at all, though there was a feeling existing at the time. I have only been in the neighbourhood about seven and a half years, and I found when I was first summoned that a number of persons spoke to me of their own accord, and mentioned their own objection to the law, but there were no prosecutions before mine. Now I think there is, on the average, about one prosecution a fortnight.

6059. Can you in any way account for the inequality in the administration of the law which you stated to my Lord as between you and your brother-in-law; why you are frequently prosecuted and summoned, and he not at all?—It is because of the different action of the local authorities. I do not think there is any ill-feeling against me. Some of the magistrates are friendly to me, but at the same time the board continues to convict.

6060. (*Mr. Dugdale.*) Would you tell us the reason why you object to vaccination?—Because, upon a general consideration of the question, I have come to the conclusion that there is no good in the practice, and that much evil may result.

6061. Do you think that small-pox would be preferable to vaccination?—I am hardly able to answer that question offhand. I think the chance of small-pox would be preferable to the certainty of vaccination.

6062. Have you made yourself acquainted with any of the statistics with regard to any of the epidemics which have taken place?—I have the Registrar-General's reports for many past years, and have studied them, and I have also read Mr. Hart's pamphlet upon the subject, in fact all the information which I have been able to get which is worth anything on both sides.

6063. Have you seen the report upon the Sheffield outbreak?—I have not read it.

6064. Are you aware that that shows that of the population of Sheffield vaccinated about 15 per thousand were attacked, while of those who were unvaccinated about 97 per thousand were attacked?—No.

6065. Do you know that in that case in the invaded houses 23 out of every 100 were attacked, and that 1 in every 100 —— ?—I have not seen the Sheffield Report itself.

6066. I suppose you are of opinion that every possible effort ought to be made to prevent small-pox?—Certainly. I think there ought to be strict isolation.

The witness withdrew.

Mr. Thomas Hutchinson.

Mr. Thomas Hutchinson examined.

6067. (*Chairman.*) You are a builder's clerk at Sleaford, in Lincolnshire?—Yes, at Ruskinton, near Sleaford.

6068. Have you been summoned for a breach of the vaccination law?—Yes.

6069. On how many occasions?—Twice.

6070. What were you fined?—I was ordered to have the child vaccinated within 14 days and to pay 11*s.* costs the first time. Then I was fined 5*s.* and 13*s.* costs the second time.

6071. Were those two summonses in respect to the same child?—Yes.

6072. (*Mr. Bradlaugh.*) Do you happen to know that the magistrates in your district hold it to be a reasonable excuse for not vaccinating a child if a previous child has in the opinion of the parent suffered from vaccination?—Yes, there were two cases dismissed upon that ground.

The witness withdrew.

Mr. James Gower.

Mr. James Gower examined.

6073. (*Chairman.*) You are a machinist at Ashford, in Kent?—Yes.

6074. And you have been summoned several times for breaches of the vaccination laws?—Yes.

6075. How many times have you been summoned in all?—42 times.

6076. Between what dates were those?—From February 1886 to September 1889.

6077. And what was the total amount of the fines?—19*l.*

6078. And the costs?—28*l.* 16*s.* 6*d.*

6079. (*Mr. Meadows White.*) In respect of how many children?—Two.

6080. (*Mr. Bradlaugh.*) Did you plead to the magistrate as a reasonable excuse for not having these children vaccinated that you had a boy who was perfectly healthy before vaccination, but had always been ill after it, and a girl who had been vaccinated with calf lymph still suffering, though now seven years old?—Yes.

6081. Did the magistrates consider that a reasonable excuse?—They did not consider it; they heard it, but they convicted me notwithstanding. I also drew up a rough statement of the medical expenses to which I had been subjected.

6082. (*Mr. Dugdale.*) Did you call your doctor before the magistrate to give evidence with regard to the state of that child?—No.

6083. (*Mr. Bradlaugh.*) Is your little girl still ill?—She is not ill, but she has still this irritating skin disease, as it appears to me to be.

6084. (*Mr. Meadows White.*) Were your children attended by a doctor?—Yes.

6085. Who is the doctor?—The vaccinating doctor is Dr. Atkinson.

6086. (*Chairman.*) Has anybody seen your little girl for the skin disease?—I have called in three doctors, Dr. Atkinson, Dr. Muggeridge, and Dr. Rix.

Mr. James Gower.

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The witness withdrew.

Mr. Henry Curtis examined.

Mr. Henry Curtis.

6087. (*Chairman.*) Are you a miller at Beaminster, in Dorsetshire?—Yes.

6088. Have you been several times summoned for a breach of the vaccination laws?—Ten times.

6089. Were those ten summonses in respect of one child?—Yes.

6090. Between what dates?—Between June 6th, 1887, and November 18th, 1889.

6091. What did the fines amount to?—3*l.* 13*s.*

6092. And the costs?—The costs amounted to 5*l.* 18*s.*, making a total of 9*l.* 11*s.*

6093. (*Mr. Bradlaugh.*) Did you plead to the magistrates as a reasonable excuse for not having your child vaccinated that you had seen bad arms, which you believed to be the result of vaccination?—Yes; I have seen very bad arms, and I have known parents who have lost their children through vaccination, or who believed so.

6094. Did you tell the magistrates that?—Yes.

6095. Did they refuse to consider that a reasonable excuse?—Yes, they did.

6096. I believe the magistrates sit alternately at Bridport and Beaminster?—Yes.

6097. Which is the nearest to you?—Beaminster—I live there.

6098. Do you sometimes have to attend at Bridport?—Yes.

6099. I need hardly say that the distance and the journey increases the cost to you personally?—Yes, the vaccination officer's expenses which are 2*s.* 6*d.* at Beaminster are raised to 6*s.* at Bridport; besides extra loss of time, the expense of a journey, and other inconveniences.

6100. Is there any reason why you should be summoned to Bridport?—I see none whatever.

6101. (*Professor Michael Foster.*) Have you had any children vaccinated?—No, I have only one child.

6102. (*Mr. Meadows White.*) Was the only reason you gave that which you have stated as the ground for not complying with the order?—I gave as the reason that I believed vaccination was ineffectual in the prevention of small-pox, and that the operation was dangerous; that was the only reason I gave.

The witness withdrew.

Mr. Peter Rabson examined.

Mr. Peter Rabson.

6103. (*Chairman.*) You are a draper at Ashford, in Kent?—Yes.

6104. And you have been fined several times for breaches of the vaccination laws?—Yes.

6105. The first time, I believe, was in 1886?—Yes.

6106. And the total fines were how much?—The total fines and costs amounted to 12*l.* 6*s.* 0*d.*, that is including the costs that I have incurred in respect to distress warrants which have been issued against me.

6107. Of that amount do I understand that the fines were 5*l.* and that the rest was costs?—Yes.

6108. Was that in respect of one child?—In respect of one child.

6109. (*Mr. Bradlaugh.*) And you have had nine children vaccinated, have you not?—Yes. I kept the law in respect to the nine children, but the ninth child died before the age at which vaccination is thought necessary, namely, one day.

6110. Was your objection as to the child for which you have been summoned, provoked by the repeated prosecution of Charles Hayward in your district?—Most decidedly it was.

6111. (*Professor Michael Foster.*) Your own children did not suffer from the vaccination?—26 years ago I had the most implicit faith in the doctors, and when my eldest son suffered from a humiliating complaint in both his legs, so that my poor wife was ashamed to take the child out, they said she gave it too much heating food, and I believed that at the time; but since then I have been shaken in my belief.

6112. Is it true that a man you know in your district has been summoned, and has only been fined 1*s.*, and 5*s.* costs?—Yes.

6113. (*Mr. Meadows White.*) I suppose these proceedings against you were under the 31st section of the Act under which the penalty is 20*s.*; how much were you fined each time?—I was fined 20*s.* five times.

6114. Did you give the magistrates as a reasonable ground for non-compliance that somebody had been prosecuted in your parish?—I considered that it was a great injustice that I who had kept the law nine times should be brought up time after time, whereas a gentleman living 12 or 13 miles from the town had been only brought up once in respect to four children, and fined the nominal sum of 1*s.*

6115. Did you give that to the magistrates as a reasonable ground for refusing to have your child vaccinated?—I did. I think it was upon the third occasion.

The witness withdrew.

Mr. Philip Luck examined.

Mr. Philip Luck.

6116. (*Chairman.*) You are a tea dealer at Eastbourne?—I am.

6117. Between 1877 and 1884 have you been fined several times for breaches of the vaccination laws?—I have.

6118. What were the total fines?—The total amount was fines 13*l.* 5*s.* 0*d.*

6119. And the costs?—12*l.* 4*s.* 6*d.*

6120. Could you tell me how many times you were fined?—I had 13 fines. I have had about 40 summonses.

6121. (*Mr. Meadows White.*) How many children was this in respect of?—Two.

6122. (*Chairman.*) Had you had children vaccinated before?—Yes, I have had eight vaccinated, and two remain unvaccinated.

6123. You became opposed to vaccination at a later period?—Yes, from the evil results I saw in my own family, and in the families of my neighbours.

6124. In what form do you mean—do you mean in respect to health?—Yes; after my first children had been vaccinated a few days they were taken ill, the two first with inflammation of the lungs, another one with a large abscess at the back of the head, another one with a large abscess under the jaw; another one had bronchitis directly; my wife had twins upon one occasion,

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and they were both very bad with inflammation and eruption, whereas the two that remained unvaccinated have never cost me anything for medical attendance; they never required a doctor at all.

6125. (*Chairman.*) I have notes of other cases of fines; what do you know of them?—I have been present when they have been prosecuted at the same sessions, and I have appeared for some of them.

6126. (*Mr. Bradlaugh.*) You appeared as their agent under the statute—as authorised by them?—Yes.

6127. (*Chairman.*) Are these the cases: In the case of E. Bradford the fines were 4*l.* 5*s.* 0*d.* and the costs 3*l.* 11*s.* 0*d.*; in the case of O. Bradford the fines were 2*l.* 17*s.* 6*d.* and the costs 2*l.* 10*s.* 0*d.*; in the case of E. Cornwell the fines were 4*l.* 2*s.* 6*d.* and the costs 3*l.* 6*s.* 0*d.*; in the case of F. Curtis the fines were 3*l.* 7*s.* 6*d.* and the costs 2*l.* 4*s.* 0*d.*; in the case of E. Field the fines were 5*l.* 2*s.* 6*d.* and the costs 3*l.* 15*s.* 6*d.*; in the case of J. Ford the fines were 3*l.* 7*s.* 6*d.* and the costs 2*l.* 4*s.* 0*d.*; in the case of Thomas Hookham the fines were 2*l.* and the costs 2*l.* 4*s.* 0*d.*; in the case of Jos. Huggett the fines were 1*l.* 7*s.* 6*d.* and the costs 1*l.* 2*s.* 0*d.*; in the case of John Stubberfield the fines were 2*l.* 10*s.* 0*d.* and the costs 1*l.* 13*s.* 0*d.*; in the case of Samuel Luck the fines were 4*l.* 12*s.* 6*d.* and the costs 3*l.* 9*s.* 0*d.*; in the case of J. S. Lewis the fines were 6*l.* 17*s.* 6*d.* and the costs 3*l.* 11*s.* 0*d.*; and in the case of George Potter the fines were 4*l.* 5*s.* 0*d.* and the costs 3*l.* 6*s.* 0*d.*?—That is quite right.

6128. In one case, that of Mrs. Jarvis, there was a fine of 7*s.* and 10*s.* costs, and for nonpayment she was sent to Lewes gaol for seven days?—Yes.

6129. Then Stephen Shoesmith?—Yes, he has been fined on two occasions.

6130. The fine was 12*s.* 6*d.* and 21*s.* costs; he went to prison?—He went to prison on one occasion.

6131. James Wood was fined 4*l.* 2*s.* 6*d.* and 3*l.* 7*s.* 0*d.* costs?—Yes.

6132. In the case of Stephen Shoesmith, were you present when he was fined?—Yes.

6133. Did he set up as a defence that he had lost one child by vaccination?—Yes.

6134. Was any medical man called to speak as to the fact?—No, there was no medical man called to give evidence at the police court, but Dr. Mundie, who attended the child during its illness, said it was the result of bad lymph, and the defendant mentioned this at the hearing of the case, but no notice was taken thereat.

6135. It was only his statement?—It was only his statement; but I saw his child. As soon as it was vaccinated the child was taken ill, and it broke out into a mass of sores—at one time I saw a mass of sores covering its head like a cap almost in a mass; the child inoculated the mother's breast from suckling, and she had a terrible breast from it; the child went on for 18 months and then died.

6136. At what age was it vaccinated?—At or about three months old.

6137. Could you give us the date when that child died?—The child (Joseph Shoesmith) was born on the 11th of August 1876, was vaccinated when about three months old, and died on the 8th of May 1878.

6138. Where did he live?—He lived at Eastbourne.

6139. At the time the child died?—Yes, his wife is a native of Eastbourne. Then there is the case of Aaron Tanner who was fined 20*s.* and 12*s.* costs for one child; his goods were distrained on. Then in September of the same year, 1883, he was fined 3*l.* and 41*s.* costs in respect of three children; he never paid the money, and the authorities never interfered.

6140. (*Dr. Collins.*) Have you always paid the fines, or have you suffered distress?—I have suffered distress several times; on one occasion they seized an article from my house, and it was not what they expected, and when they had kept it for seven or eight days they advertised it for sale; and when they opened it they found instead of its being tea it was sawdust, so they told me; I never saw the contents myself, and then they came to my house and seized another chest of tea, but that which they said was sawdust they never offered to the public, nor returned to me, and they would have sold the tea, but we raised a strong objection, and showed that it was contrary to law to sell it on the day it was seized. They then withdrew it, and sold it eight days later.

6141. As far as you know, is the opposition to the Vaccination Acts increasing in Eastbourne?—The opposition to the Vaccination Acts there is increasing fast.

6142. Are prosecutions taking place now?—No, for the reason that we are becoming too numerous.

6143. What was the date of the last prosecution?—January the 7th, 1884.

6144. (*Mr. Meadows White.*) Was the reason you gave to the magistrates for refusing to have your children vaccinated that your previous children had been made ill by it?—Yes; another reason is that I am the guardian of my child, and I think it is the duty of the law to protect me—that I have the right to decide what is best for my child, and if I do not comply with vaccination, if vaccination is good, I shall be the sufferer, not my neighbours. To consider a healthy child a dangerous nuisance, is, to my mind, a most ridiculous absurdity.

6145. (*Mr. Bradlaugh.*) Did the magistrate tell you that if you kept quiet and did not advocate anti-vaccination you would not be prosecuted?—Mr. Reginald Graham, the chairman of the magistrates, on one occasion told me I had made myself an apostle of anti-vaccination, and went about the country preaching it, and that if I were a person who stayed in my house and kept myself quiet they could let me alone.

6146. (*Mr. Meadows White.*) Were your children who were vaccinated vaccinated by the public vaccinator?—Yes, all of them.

6147. What was his name?—Robert Colegate, the public vaccinator for Eastbourne.

6148. Did he see the children afterwards?—Yes, he attended them, and ran me up a bill of from 3*l.* to 5*l.* afterwards; so that it is a very good game for them to implant disease first, and then gain by it afterwards.

The witness withdrew.

SIR GUYER HUNTER TOOK THE CHAIR.

Mr. ALFRED COOK examined.

Mr. Alfred Cook.

6149. (*Chairman.*) You are a carpenter at Ashford, in Kent?—Yes.

6150. You have had fines inflicted upon you for not complying with the vaccination law?—Yes, I have.

6151. What was the amount of the fines?—The fines amounted to 3*l.* 10*s.* 0*d.*, and the costs were 3*l.* 4*s.* 0*d.*, making a total of 6*l.* 14*s.* 0*d.*

6152. During what time were the fines and costs inflicted upon you?—From September the 13th, 1887, to October 1889; the first fine was 10*s.* and 12*s.* 6*d.* costs.

6153. (*Mr. Bradlaugh.*) In respect of two children?—No, one child.

6154. Did your sister-in-law have a child die, as you believe, from vaccination?—Yes.

6155. Did you allege that as an excuse before the magistrates for not having your child vaccinated?—No, that came afterwards.

6156. What reason did you give to the magistrates?—Because my first child I had vaccinated, and since it has been vaccinated in the spring time it always breaks out round the mouth.

6157. Did you give that to the magistrates as an excuse?—Yes.

6158. And they did not hold that to be a reasonable excuse?—No.

6159. (*Mr. Meadows White.*) Who was the doctor?—Dr. Shonn, of Bridge, near Canterbury.

6160. Is he a vaccination doctor?—Yes.

The witness withdrew.

Mr. Charles Hayward examined.

Mr. Charles Hayward.

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6161. (*Chairman.*) What are you?—A turner.

6162. Do you live at Ashford, in Kent?—Yes.

6163. And you have been fined for not complying with the vaccination laws?—Yes.

6164. Do you remember what has been the amount of the fines?—37*l.* 10*s.* 0*d.*

6165. And what have been the costs?—37*l.* 15*s.* 0*d.*

6166. Between what periods were those fines inflicted?—From April the 28th, 1885, to September the 24th, 1889.

6167. (*Mr. Meadows White.*) How many children have you?—I have three, but I have never been summoned except for two; one is only six months old.

6168. But how many prosecutions were there?—There were 79 summonses.

6169. Will you state the reason you gave the magistrates for not having the children vaccinated?—I stated a conscientious objection.

6170. You stated that you had a conscientious objection to vaccination?—Yes.

6171. Is that all the reason you gave?—Yes.

6172. Have your children been ill?—No, I have not had any of them done.

6173. (*Mr. Bradlaugh.*) Have those 79 prosecutions made you rather more disposed to have your children vaccinated?—No, otherwise. I am more determined than ever I was.

6174. Have you been distrained on all or any of those fines?—No.

6175. Or sent to prison?—No.

6176. It is alleged that all these fines have been paid for you by other people; is that true?—It is not true.

6177. (*Chairman.*) Have any of them been paid for you?—Some of them have.

6178. (*Mr. Meadows White.*) Is there an anti-vaccination society in Ashford?—Just lately a few of us amongst ourselves have formed an anti-vaccination society.

6179. (*Mr. Bradlaugh.*) Am I right in saying that, after the numerous prosecutions which have been taken against you were mentioned in the House some subscriptions have been made you by persons who were desirous of assisting you?—Yes.

6180. Prior to that had you paid your own fines?—I did join a London society after I had paid I think it was the first four or six fines.

6181. That would be about 8*l.* or 9*l.*?—Yes, and since then I have paid what I could.

The witness withdrew.

Mr. Frederick Marshall examined.

Mr. Frederick Marshall.

6182. (*Chairman.*) You are a grocer at Ashford, in Kent?—Yes.

6183. What amount of fines have you had to pay for non-compliance with the vaccination laws?—The amount of the fines was 4*l.* 5*s.* 0*d.*

6184. And the costs?—5*l.* 1*s.* 6*d.*

6185. How many summonses have you had taken out against you?—I have had 13.

6186. Between what periods?—Between January 31st, 1888, and September 25th, 1888.

6187. (*Mr. Bradlaugh.*) Have you had a cousin die of blood-poisoning as you believe resulting from vaccination?—Yes.

6188. Did you allege that as an excuse before the magistrate for not having your child vaccinated?—I do not remember whether I quoted that to him.

6189. Was that the reason that you have not had your child vaccinated?—Yes, that was the chief reason.

6190. (*Mr. Meadows White.*) What did you tell the magistrate?—That I had seen the bad results of arm-to-arm vaccination, and that I could not conscientiously have my child vaccinated.

6191. Had you in your mind this particular case of your cousin?—Yes; it occurred before I was married.

6192. You have had no child vaccinated?—No.

The witness withdrew.

Mr. Joseph Harrison examined.

Mr. Joseph Harrison.

6193. (*Chairman.*) You are a carpenter residing at Wotton, near Dorking?—Yes. I have recently removed to Crossways, Abinger.

6194. You have been summoned for not having two children of yours vaccinated?—Yes.

6195. You have been fined, how much?—I have been fined 5*l.* in all for the two children.

6196. What were the costs?—2*l.* 3*s.* 0*d.*

6197. Between what periods was this?—4th December 1886 was the first date I was summoned, and last September I was committed to Wandsworth.

6198. That was a period of nearly three years?—Yes.

6199. For disobedience to the order of the court of the 4th of May 1889 a distress warrant was issued?—Yes, or rather for refusing to pay fines of 1*l.* and 11*s.* 6*d.* costs, for two children respectively, imposed in July.

6200. Was anything realised by it?—No.

6201. What happened to you upon the 7th of September 1889?—I was again summoned to the Dorking bench and committed to Wandsworth for 14 days, one of the magistrates dissenting from the decision, Mr. Evelyn, the late M.P. for Deptford.

6202. What happened; did you get 14 days?—Yes; I was conducted to Wandsworth and treated as a criminal on the Saturday. I was placed in a cell on Saturday night and kept there on Sunday, and on the Monday morning I was called out by order of the governor, removed to the debtors' ward, where I was kept till Wednesday week following, when the governor again called me out and told me on seeing my committal order he concluded that my treatment should be that of a debtor, so that he had ordered my removal to the debtors' ward, while he communicated with the Home Office. On the Wednesday morning the reply came from the Home Office that I was to be treated as a criminal, and I was returned to the cell for the remainder of my term.

6203. Have any other cases occurred at Dorking?—Several of my friends have been prosecuted, and in one case I think a great injustice has been done him. I refer to friend Sawyer, whom I met at the Dorking bench last May; an order was made against him and on being again summoned, he procured a doctor's certificate that the child was unfit for vaccination, and the case was ordered to stand over until after the public vaccination. On the first Saturday in November, being the bench day after the public vaccinations, he was informed by a policeman, verbally, at 10.30 a.m., that his case would be brought on at 11 o'clock that day, so that he had no opportunity to make any defence. He was fined. I wrote to the Home Office, and the reply came back to say that it was a case in which they could not interfere.

6204. Have you any other case in which you have a personal grievance?—In my own case when I have attempted to give a reason or plead an excuse for not having my child vaccinated, the magistrate will not allow me to state my case.

6205. But I refer more especially to some personal friend or accuaintance of yours?—Friend Holland has

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been prosecuted too; he has a child about four, or a little over, which has always been very delicate from birth; he has several times procured certificates from the doctor, and upon the last occasion the certificate was not returned by the vaccinating officer; he was summoned; an order was made; he stated in the court that the child was not in a fit state. The magistrates made the order; he asked the vaccination officer to return the form and he would get it filled in; the vaccination officer refused to do so. He had asked me to appear for him and present a certificate which he had procured, but through losing the train I did not get in time to present it and a fine of 1*l.* was imposed with 11*s.* 6*d.* costs; that is to say, 1*l.* in the case of each child; there were two children.

6206. (*Mr. Meadows White.*) Did you afterwards explain to the magistrate that you had missed your train; that you had been for a certificate and produce it?—Not to the magistrate, but I did to the superintendent of police.

6207. (*Dr. Collins.*) When you say you were treated as a criminal, were you compelled to wear the prison dress and sleep upon a plank bed?—Yes, and pick oakum.

6208. When you came back did you find that you were not looked upon with the same respect by your neighbours?—Not in the least, because my friends had organised a public meeting in the town hall, and as many had to go away as were admitted, so I was informed, owing to the room being overcrowded.

6209. (*Chairman.*) Is there any other case that you can remember; a case at Abinger?—The Reverend Mr. Hammond has been summoned, and he pleaded, as an excuse why he should not be prosecuted, that he had already suffered by one child's death, and he produced a copy of the death certificate, certifying vaccination as primary cause. The magistrates said that they could not help that, that they were there to put the law into force, but that seeing that he had suffered they would make a difference of 10*s.* in the fine; so they fined him 10*s.* only.

6210. Has he been fined more than once?—He has been fined since, 1*l.* and 11*s.* 6*d.* costs, for the same child.

6211. (*Mr. Bradlaugh.*) Is there a very strong feeling in and around Dorking against vaccination?—It is growing tremendously.

6212. Has your imprisonment made you more ready to have your children vaccinated?—Rather the other way. I rather glory in having suffered in the cause against vaccination.

6213. (*Mr. Dugdale.*) Have you had any experience of small-pox?—None.

6214. (*Mr. Meadows White.*) What were the reasons that you gave to the magistrate why you objected to vaccination?—The magistrates have never asked me why I have objected; they simply say, Have you a doctor's certificate? I say no, and they say, Then we cannot hear you.

6215. Did you give them any reasons?—I gave them the reason that I saw so many children suffering around me, and the number of parents who tell me they have got no rest for weeks together after the vaccination of their children owing to their children's suffering; and that was what induced me to think that it was not a proper thing for the law to compel me to submit my child to.

The witness withdrew.

Mr. Joseph Andrew Graham examined.

Mr. Joseph Andrew Graham.

6216. (*Chairman.*) You are a surveyor residing in St. James' Road, Sutton?—Yes, I have removed from Plaistow lately.

6217. How often have you been fined on account of two children of yours at the West Ham Police Court?—I have been nine times before the police magistrates for one child and twice for the other.

6218. What have the fines amounted to?—3*l.* 11*s.* 6*d.* I think they are fairly lenient there.

6219. And how much the costs?—1*l.* 19*s.*; they have stopped second prosecutions in the West Ham Police Court now.

6220. For how long?—Since 1888.

6221. (*Mr. Bradlaugh.*) That is to say the guardians consider that when a man has been prosecuted twice he has given evidence of having a conscientious objection?—Yes; that further prosecution provokes opposition.

6222. Do you object to vaccination because as you believe you have seen ill effects resulting from it?—Yes, in several cases.

6223. (*Chairman.*) In the case of your own children?—Not in the case of my own children, but from one case in my own family, and others in families of my friends.

6224. But the magistrates said they could not listen to that?—They said they could not deal with that under the Act.

6225. (*Mr. Meadows White.*) This was not a case in which you had had children previously vaccinated in your own family?—No, not in my own family.

The witness withdrew.

Mr. Alfred King examined.

Mr. Alfred King.

6226. (*Chairman.*) You are a builder and undertaker at Burstow, in Surrey?—Yes.

6227. How often have you been fined and charged costs?—Seven times since December 1887.

6228. What has been the total amount paid?—6*l.* 9*s.* 0*d.*

6229. When did they begin; when were you first fined?—December the 15th, 1887.

6230. And when was the last occasion?—January the 4th, last month.

6231. Was this on account of one or more children?—It was on account of one child.

6232. What grounds did you give to the magistrates for refusing to have your child vaccinated?—The serious evils that came from it. One of my own children was very well before it was vaccinated, as well as the others, and ever since that it has been in a weakly state and grown rather worse; now it is about 10 years old.

6233. (*Mr. Bradlaugh.*) In consequence of the effects upon the first and second children, did you and your wife agree that the third child should not be vaccinated?—Yes.

6234. (*Mr. Meadows White.*) What doctor did you have to vaccinate your children?—The public vaccinator.

6235. Did he attend the child afterwards?—He did from time to time.

6236. What was his name?—Chessall was his name, but he is dead now. I had a second one vaccinated, and that was also very well until it was vaccinated, and then it kept failing from time to time until it had bronchitis, and then it died.

6237. How long after it was vaccinated?—The child was a year and ten months old when it died; it was vaccinated at the ordinary time.

6238. (*Mr. Bradlaugh.*) Did you give to the magistrates, as a reasonable excuse for not having your child vaccinated, your belief that those evils resulted from vaccination?—Yes.

6239. And the magistrates refused to receive that?—Yes.

6240. (*Mr. Meadows White.*) Did you call any medical man before the magistrates?—No, not any medical man; but the third child, which has not been vaccinated, is very healthy and strong, whereas the one 10 years old you would not think was of the same family.

The witness withdrew.

Adjourned till Wednesday next at 1 o'clock.

Twenty-fifth Day.

Wednesday, 12th February 1890.

PRESENT:

THE RIGHT HON. THE LORD HERSCHELL IN THE CHAIR.

Sir JAMES PAGET, Bart.
Sir CHARLES DALRYMPLE, Bart., M.P.
Sir EDWIN HENRY GALSWORTHY.
Sir WILLIAM SAVORY, Bart.
Mr. CHARLES BRADLAUGH, M.P.
Dr. JOHN SYER BRISTOWE.
Dr. WILLIAM JOB COLLINS.
Mr. JOHN STRATFORD DUGDALE, Q.C., M.P.
Professor MICHAEL FOSTER.
Mr. J. ALLANSON PICTON, M.P.
Mr. SAMUEL WHITBREAD, M.P.
Mr. F. MEADOWS WHITE, Q.C.

Mr. BRET INCE, *Secretary.*

Mr. HENRY PITMAN examined.

Mr. Henry Pitman.

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6241. (*Chairman.*) You are a reporter and teacher of phonography at Manchester, are you not?—Yes.

6242. Have you been fined for breach of the vaccination laws?—I have.

6243. I believe in the year 1870 you were fined 20*s.* and 10*s.* costs?—I was.

6244. And again in 1877 you were fined 20*s.* and 10*s.* costs?—I was.

6245. And in the same year you were again fined and committed to Knutsford gaol for 14 days?—I was.

6246. That was in default of payment of the fine, was it not?—It was.

6247. Was that a new fine, or were you committed for not paying the fine that you have already mentioned as having been imposed in that year?—That was the second time of my being summoned and fined for one child; and instead of taking my goods and distraining them they took me.

6248. Was the fine in 1870 in respect of one child, and was the fine in 1877 in respect of another?—It was.

6249. Are those the only children in respect of whom you have been fined?—Yes.

6250. Have you any other children who since then have not been vaccinated, and in respect of whom no fine has been imposed?—Yes.

6251. How many?—I think three.

6252. (*Mr. Meadows White.*) Did you give the magistrates any reason as an excuse for not having had your child vaccinated?—I did.

6253. What did you say?—I said that my first child was, I thought, injured by it, and then I examined the matter. Before that I had never thought about it.

6254. What did you state to the magistrate as a reasonable ground for your omission to have the child vaccinated?—I stated that one child was, I thought, injured by it. It had a bad abscess under the right eye, which was attributed to vaccination. Then I examined the subject, and I found there was a doubt about it. I read books like Miss Florence Nightingale's "Notes on Nursing," and many others, and corresponded with medical men, and studied the question.

6255. I asked you what did you state to the magistrates as a reasonable ground for your omission?—That the parents were healthy, and the children were healthy; that small-pox was not a disease but simply a constitutional crisis, and that, as Miss Nightingale says in her book, it is a dirt disease; and that therefore I did not fear small-pox, and would not run any risk from vaccination. I thought that was a reasonable excuse.

6255A. (*Mr. Picton.*) On any occasion when you were imprisoned in default of payment, why did they not distrain?—I say that it was illegal that they did not. I did not plead that I had no goods. In the first instance, they took my goods; they took my best suite of furniture for a small, paltry fine, and sold it. The second time they ought to have distrained again, but instead of that they issued a warrant.

6256. You offered no hindrance at all, I presume, to the distraint?—Not the least. I simply mention that to show you that the Act is differently administered in different places, and very often illegally.

6257. In what prison were you confined?—In the Knutsford House of Correction.

6258. How were you treated?—It seemed very hard at first, but I found friends there.

6259. Was any difference made between your treatment and that of ordinary criminals?—Not the least at first, but the doctor said that I was in a delicate state, and he ordered me into the infirmary.

6260. Had you to wear the prison clothes?—I had not.

6261. But you had the prison diet, had you not?—I had the prison diet, but no hard labour. I made no complaint. I had no handcuffs, and it was before the plank bed invention, but still it was bad enough.

6262. (*Dr. Collins.*) What was the date of your first prosecution?—1870.

6263. (*Mr. Bradlaugh.*) In 1877 there were two cases, as I understand by your answer, and in the first case a distraint was levied?—It was.

6264. Was the second case heard before the same magistrates?—Yes, in the same town.

6265. There was a second independent prosecution for the same child after you had paid the fine and costs by distraint in the first case?—Yes.

6266. Was any question put to you as to whether you had goods to be distrained upon?—Not a word; they knew that I had goods, because they had taken them before and I had recovered them through the kindness of friends.

6267. And the committal order was made without any attempt to enforce a distraint?—Yes.

6268. (*Sir Charles Dalrymple.*) Is there any feeling similar to that which you entertain prevalent in the quarters of Manchester from which you come?—There is a very strong feeling, and perhaps I am partly the cause of it because I made it public, and the Bishop of Manchester and all the men of the day took the matter up, and I have their correspondence here and the statements that they made, even those who believe in vaccination. It is very desirable, I think, that you should hear them to lessen the objection to the operation, if I might be permitted to read them. The Bishop of Manchester, the late Dr. Fraser, when he presided at the annual meeting of the Children's Hospital, said: "The strong feeling against vaccination which exists "and even seems to grow is due in a great measure to "removable causes. It commends itself to one's com- "mon sense that limiting the period within which "vaccination is compulsory to 12 weeks from the birth "of the infant is putting a most injudicious and in "many cases what may be a most mischievous limit "upon what otherwise might be a beneficial opera- "tion"; because in other countries the law allows a very much longer time than in England. The medical officer of the hospital in that report said: "The exci- "table glandular system of a child so young may be

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" and sometimes is so affected by the irritation and " the effects of the operation of vaccination as to leave " results which are, to say the least, undesirable, and " which might be avoided if a longer period were " allowed."

6269. (*Mr Picton.*) Would you give a reference to the report, so that those passages can be found?—You will find them in the report (1871) of the Children's Hospital for Manchester.

6270. (*Mr. Whitbread.*) Would it remove your objections if a longer time were allowed to elapse between the birth of the child and the vaccination?—I do not think it would.

6271. (*Sir Charles Dalrymple.*) Then why did you quote that extract from the Bishop of Manchester's speech?—As I understand this is a tribunal to get at the truth for the good of the public, and not for one side or the other, I prefaced the quotation by saying that in the interests of vaccination, even if the compulsory part of the law is not repealed it is desirable to have the law amended, and that is one point on which the doctors would all be with you, to allow a longer time.

The witness withdrew.

Mr. John Savage.

Mr. JOHN SAVAGE examined.

6272. (*Chairman.*) You are a shopkeeper at Kinsale?—Yes.

6273. How many times have you been fined for breaches of the vaccination law?—I got 29 summonses, and I was 32 times before the court in consequence of three adjournments out of the 29.

6274. What was the total amount of the fines?—The total amount of the fines was 10*l.* 5*s.*, and the costs 1*l.* 0*s.* 6*d.* Then I had three appeals to the Chairman of Quarter Sessions, in which the previous convictions were confirmed. As to the costs, I did not exactly keep a correct account of my expenses of lawyers and so on, but I put them down roughly at 30*l.*

6275. On what ground did you appeal to the Chairman of Quarter Sessions?—In consequence of the suffering of one of my children. She was born on the 11th of November 1873, was vaccinated about three months after, and on about the sixth day after she was vaccinated my wife noticed the arm unusually sore. I must say that we had had a few children vaccinated before, and my wife noticed something not like the rest in this case. A neighbour woman was waiting to have her child vaccinated out of mine, and on the sixth day after my wife told her she would not recommend her having anything to do with it. However, the child was bad and suffering for several weeks, and I and my wife hardly had a night's sleep during that time, and we had to send her away to an institution in Cork called the Children's Hospital. Before she went there, in the morning her very skin would be clinging, parts of it, to the sheets; she was all a mass of sores. During the time she was in the hospital I went in about eight days or so after to see her, and I did not know her in consequence of the way the doctor had to treat her. Dr. Curtis told my wife that he had to give her arsenic, and reduce the whole system down.

6276. Was he a doctor at the hospital?—Yes.

6277. Was your appeal in the case of that child, or in the case of another child afterwards?—That child I was not summoned about at all. It was what this child suffered that made me take the stand against it.

6278. And that was your objection to having your child vaccinated in the next case?—Yes; she recovered gradually, but she has never been healthy since; she is now in her seventeenth year, and she is quite delicate—pale, and as white as a sheet of paper—and has never been strong since. However, with my next child I took the objection. I said that I would suffer death sooner than have the next child suffer the same. My next child was born on the 17th of December 1876, and I was first summoned on the 14th of July 1877 for her. I have here a list from the petty sessions book of the prosecutions that followed. It was not alone what I had seen my own children suffer, but what I had seen others suffering around me. I heard a report of a child having died from the effects of vaccination about four miles from me. I went out and saw the child, and the father and mother weeping by its side, and the people collecting for the funeral. I told them I was the anti-vaccinator from Kinsale, and I wanted to ask a few questions with reference to the death of the child. I said to the mother. " Do you think it died from the effects of vaccination?" She said, " Yes." Then I asked, " How " long after it had been vaccinated did the child get " bad?" She said that in about three weeks time after the arm got very sore, unusually sore she said, and then the sore disappeared from the arm, and the body all came out in lumps. " And what after the lumps?" says I. She said, " All the lumps turned into running holes." " How many holes?" says I. " Oh, " Sir," she said, " the whole body was holes, and you " could not sit in the house for the smell of the matter " that was coming from those holes; and it lingered " for nine weeks, and died."

6279. Do you know how old that child was?—I think between five and six months old.

6280. Do you know who was the medical man who attended the child?—Yes; Dr. Dorman.

6281. What was he?—He was dispensary doctor of the Kinsale Union at that time; he is superannuated now. When my child was suffering he was passing by my door, and my wife asked him to look at the child, and she said, " You have destroyed my child from " vaccination; can you do anything for me?" " I can " do nothing for you," he said in a very rough manner.

6282. Had he vaccinated the child?—Yes, the same doctor. Then there was another man, master of the same union, and he told me (I have his own words for it) about 10 years ago, when my prosecutions were going on, that his son was vaccinated from the child of irregularly-living parents. This child died at a certain age, and he told me that his son who was vaccinated from this child was then 14 years old, and that he believed the longest day he lives he will never be rid of the effects of the vaccination. He has since left the country, and gone to America. Another man, convenient to Kinsale, too, Daniel Kelly, told me that his child's arm mortified, and you could see into the little body under the arm where it became mortified. So, under all the circumstances that I have suffered with my own, I determined that whatever children the Lord might give me I would never have one go through the same operation again. I told them I would suffer death first. I objected to paying some of the fines, and, of course, they seized my goods by the police. The first seizure was in 1879. There was a big frost that year, the biggest we have had since in Ireland. They took two feather beds from me on that occasion. The second seizure they took two pigs; the third seizure they took a chest of tea; the fourth seizure they took a horse-trap for driving; the fifth, a sack of flour; and the sixth, a sack of flour. Then there was, I think, some little stop put upon the prosecutions for a while. From 1882 to 1885 I had appeals pending. The appeals were adjourned from quarter sessions, I think, three times. However, the convictions were confirmed afterwards by the Recorder.

6283. (*Mr. Whitbread.*) I think it would be desirable to have on record the dates of those summonses?—I should say the first prosecution was under what we call the Vaccination Act. I maintained in court that I could not be fined secondly under the Vaccination Act, and therefore I told them that they should consult their law advisers; but I was fined secondly under the Vaccination Act, which I protested strongly against.

6284. (*Mr. Meadows White.*) Is that the Vaccination Act of 1858?—I cannot say. However, I protested against this decision of the magistrates on that occasion.

6285. (*Mr. Whitbread.*) I want you to give me the dates of those different summonses one after the other?—I will do that.

6286. (*Mr. Bradlaugh.*) Was the first one before the 14th of July 1877?—Yes; that was for neglecting to vaccinate. The dates of the summonses were August 18th, 1877; November 3rd, 1877; December 8th, 1877; January 19th, 1878; February 2nd, 1878; May 4th, 1878; May 25th, 1878; August 24th, 1878; October 19th, 1878; February 22nd, 1879; March 8th, 1879; April 19th, 1879; April 26th, 1879; May 24th, 1879; June 14th, 1879; November 15th, 1879; February 14th, 1880; May 22nd, 1880; June 19th, 1880; April 23rd,

1881; June 4th, 1881; August 27th, 1881; October 22nd, 1881; August 12th, 1882; September 23rd, 1882; September 12th, 1885; October 10th, 1885. That is the last.

6287. (*Mr. Whitbread.*) Were all those summonses in respect of the same child, or in respect of different children?—I was summoned for two of them together.

6288. Were all those repeated summonses for the same offence of not having had two children vaccinated?—There was only one child until 1881. They were all for the one child up to 1881, and then I had two.

6289. After 1881, were the summonses in respect of the two children unvaccinated?—Yes, after 1881. At that time I sent the eldest child out of the union or district away to the north of Ireland, where the law could not catch her.

6290. Up to 1881 the summonses were all in respect of one child?—Up to the 14th of June 1881 I was summoned for the first child, Helena, and then I removed her to the north of Ireland, because the law only compelled those in the union or district to be vaccinated.

6291. With regard to the death to which you referred, where you saw the child with holes in the lips, ears, and so on, was there any post-mortem examination?—Not one.

6292. Was any report or complaint made to any authority?—I could not say what the parents reported, but I asked the mother of the child that day, "Was "the child healthy when vaccinated?" "So much "so," said she, "that Dr. Dorman praised the "healthy appearance of the child when he was "vaccinating it."

6293. Do you know what the certificate of the cause of death was?—No, there was no certificate given in the Kinsale union, I might safely say, that the vaccination was not successful.

6294. But how did they bury the child without a certificate?—The doctor put down something that I was not aware of. They will not give a certificate that they died from the effects of vaccination, because they do not like to lose the 2*s*.

6295. (*Chairman.*) Will you give us the name of the child, and the date of the death?—The child's name was Hannah. The father's is Maurice Walsh, and his address is Thomastown, Ballygooly, Kinsale, co. Cork. He was a labouring man.

6296-7. What was the date of the death?—About 1879 or 1880.

6298. (*Mr. Whitbread.*) With regard to the second child, whose arm mortified so that you could see into the body of the child?—Oh, yes. I did not see that child. It was the father that told me the state it was in. I saw another child of the name of Nugent at a place quite convenient, and I asked the parents to take some stand against it; but they told me that they did not like to turn the gentry against them as they were poor people. It was in the case of this child that I saw the ears decayed through and holes in the lips of the little corpse.

6299. (*Mr. Meadows White.*) Have there been many other prosecutions than those against yourself in your union?—Not one that I know of. They might be summoned once for not getting it done, and then they would get it done.

6300. You do not know whether there have been other prosecutions in your district than those against yourself?—They might be summoned once, but then they would comply with the law; they did not see their way to oppose it.

6301. How many prosecutions in respect of the first child were there before 1879?—They commenced in 1877, on the 14th of July; then on August 18th, November 3rd, and December 8th. That was all in 1877.

6302. Were they all summonses for not having your child vaccinated, or were they summonses because you did not pay the fine?—For not having the child vaccinated. Then in 1878 I was summoned on January 19th, February 2nd, May 4th, May 25th, August 24th, and October 19th.

6303. Were those all in respect of the same child?—Yes, all of them.

6304. You are sure that those were all summonses for not having the child vaccinated, and not summonses because you did not pay the fine?—No, because when I would not pay they distrained upon my goods.

6305. (*Mr. Picton.*) You say that there have not been many persons fined besides yourself; but is there a prevalent objection to vaccination in your neighbourhood?—A great many persons object to it, but they do not like to go to the trouble of resisting it, and they submit. At the same time, they believe that it is injurious to the children; several have told me that.

6306. Is your knowledge of the operation of the law in Ireland confined to your own neighbourhood?—I believe in Cork several have been summoned for refusing to have their children vaccinated; there is a man of the name of Mr. Bayle, near Cork, and he was summoned several times; but the magistrates, I think, did not ask to follow it out; and in my case they fined me the highest penalty that they could put on.

6307. (*Dr. Collins.*) I think I understood you to say that you were summoned repeatedly in respect of the same child before the year 1879?—Yes.

6308. Do you remember whether you were summoned under the Vaccination Amendment Act of 1868?—Yes, the first two summonses were under that Act. I maintained that they could not fine me secondly under that Act, and they consulted the law advisers about it.

6309. But you were fined repeatedly under that Act?—I was; and then they had to get the sanction of the Lord Lieutenant to take the fine off the books.

6310. In 1871 a witness before the Select Committee stated that "the feeling of the whole country" (speaking of Ireland) "is in favour of vaccination"; could you tell us whether that is the feeling now?—It is not. There are a great many opposed to it now. I am the eldest in Ireland that opposed it, and Mr. Jacob, of Limerick, had to leave the country in consequence, and go to America, and the poor man died going backwards and forwards.

6311. (*Professor Michael Foster.*) What do you mean when you say that you were the eldest who opposed it in Ireland?—I was the first that opposed it in Ireland, and then Mr. Jacob, of Limerick, was the next, and then there was a clergyman near Cork, whose name I forget now; he was summoned several times too; and I could mention a good many more that have been summoned if I had a little time to consider over them.

6312. (*Mr. Bradlaugh.*) Did I correctly understand that you had been distrained on six times?—Yes.

6313. You did not include, I presume, the costs of those distraints in the 1*l.* 0*s.* 6*d.*?—Oh, no!

6314. How much additional cost were you put to by those distraints?—I did not keep a correct record of it, but taking into account my appeals and the additional costs, and what I had to pay lawyers too in the appeal cases, I considered that it cost me about 30*l.* in fines altogether.

6315. The appeal cases were decided against you, were they not?—Yes.

6316. And you were ordered to pay the costs?—Certainly.

6317. And those costs, I presume, were taxed?—Yes.

6318. And you cannot give anything nearer to the amount than that the costs of the appeals and the distraints might be about 30*l.*?—30*l.* I calculated it altogether. I had to employ lawyers to defend me in the court.

6319. When you were summoned before the magistrates for refusing to have your child Helena vaccinated, did you plead as a reasonable excuse for not having it vaccinated the illness of the child Eliza, who, in 1874, was ill, as you believed, from the effects of previous vaccination?—Yes, I said that I thought that certainly if anyone had a reasonable excuse, I had it.

6320. Did you tell that to the magistrates?—I did.

6321. Did the magistrates listen to you patiently, or did they stop you in the course of your explanation?—The chairman told me one day, when I was explaining to him about my grievances and my sufferings, and the illegal fine——

6322. Would you mind answering my question. When you put what you thought was your reasonable excuse to the magistrate did he hear you patiently, or did he stop you and say that he would not hear another word?—In one case he said he would not hear another

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word from me, but he said he had the law, and he should go by it.

6323. In the case when he stopped you, and said he would not hear another word, were you trying to explain as a reasonable excuse for not having the child vaccinated, that a previous child of yours had been seriously ill from the effects of vaccination?—He stopped me because I said I could not be fined twice under the Vaccination Acts, but they never stopped me explaining my reasonable excuse; they would hear me out, and then decide against me.

6324. (*Sir Charles Dalrymple.*) Do you think that your visits to the persons who suffered these terrible things in their families suggested to them in any degree that these dreadful illnesses were caused by vaccination?—I do not think so. I think they understood it very well, because it was evident when the child got bad at the end of three weeks or so that the vaccination was the cause of it, because the child till then had been healthy. I consider it a regular insult to the Almighty.

6325. But they knew you were getting up a case against vaccination?—Of course they did; they heard of it because it was in the public press.

The witness withdrew.

Mr. Joseph William Glaister.

Mr. JOSEPH WILLIAM GLAISTER examined.

6326. (*Chairman.*) You are an importer of manufactured timber in Darlington, are you not?—Yes.

6327. Have you been summoned for breaches of the vaccination laws?—I have.

6328. How many times have you been summoned?—Four times, including the orders.

6329. Was that in the Darlington Union?—In Darlington, once in the borough and once in the county.

6330. Was that in respect of one or more children?—In respect of two children. I have the police superintendent's certificate here.

6331. Were you fined on each of those four occasions?—Yes.

6332. Will you give us the total amount of the fines and costs?—When the order to vaccinate was made the first time there was 7*s.* costs; and when the fine was imposed there was 10*s.* fine and 7*s.* 6*d.* costs, or 14 days imprisonment. Then on the 7th of July 1885 I was fined 10*s.* and 7*s.* 6*d.* costs or 14 days, for the third child.

6333. Then in your case, in respect of two children, in the case of each child there was one order to vaccinate and then a fine for not vaccinating?—Yes.

6334. Were the children vaccinated?—No.

6335. Then there was no further fine?—There was only that one fine for each child.

6336. Had you other children before these?—Yes, I had two before.

6337. Were those unvaccinated?—Yes, and they are so still.

6338. Those, I believe, were born in Newcastle?—They were.

6339. You were not summoned in respect of those children?—No. They sent me plenty of orders but I took no notice.

6340. I think we ought to have the dates of the summonses?—On the second of December 1884 the order was made with costs, 7*s.* On the 7th of July 1885 I was fined 10*s.* and 7*s.* 6*d.* costs, or 14 days. Then for the fourth child the order was made on the 26th of November 1888, 7*s.* costs. On the 18th of February 1889 I was fined 5*s.* and 8*s.* 6*d.* costs or seven days. I declined to pay the fine in this last case and a distraint was made on April 8th, 1889.

6341. (*Mr. Whitbread.*) How long have you had any objection to vaccination?—For about 14 or 16 years, I think.

6342. Before your children were born?—Yes.

6343. What set you against vaccination in the first instance?—It was a lecture by Mr. Alexander Wheeler, of Darlington (who will be a witness later on), that first called my attention to it. About that time I became a vegetarian, and I took up more with hygienic matters.

6344. It was not from any evil result of vaccination in any particular child or children that came under your own observation?—No, but I was told by my father that my brother almost died when he was a child from vaccination.

6345. Did you suffer from vaccination?—I cannot tell you that, I was too young to know.

6346-8. Did your father tell you that you suffered?—No, I have no knowledge of that.

6349. (*Mr. Meadows White.*) Can you tell me what was the exact reason that you gave to the magistrates as the ground for refusing to have your children vaccinated?—They would not allow me to give the reason.

6350. Did you not say something to them?—I attempted to say something to them, to call their attention to the fact that the Registrar-General reported about 52 deaths a year from vaccination; but they said they did not want to hear anything about vaccination; that they were there to carry out the law, and that it was for us to get the law altered. The magistrate was Mr. Edmund Backhouse, of Darlington. That was rather hard upon us, because he had been sent to Parliament, but he did nothing to get the law altered, when he got there.

6351. The reason that you attempted to give was the fact that the Registrar-General reported a certain number of deaths from vaccination?—Yes, but I should have gone further if I had been allowed.

6352. If you had been allowed you would have given your general reasons for your opposition to vaccination?—Yes.

6353. You had no special reasons applicable to your own children?—No, not to my own children.

6354. Had you had children vaccinated previously?—No. I have had no child vaccinated. When the order was made in the first case I called their attention to the 31st section which says that the magistrate may, if he see fit, make the order, but the clerk overruled that and said that they had no option whatever, although the option had been exercised on at least two previous occasions in the same court.

6355. (*Mr. Picton.*) Do you know of many others in your neighbourhood who have been summoned?—Yes, I know a number who have been.

6356. Have they been summoned more than once for the same child?—Not now; we have got past that stage in Darlington.

6357. It is the regular custom now only to summon once?—It is the custom only to summon once, but the guardians have decided not to prosecute at all until this Commission reports.

6358. You lived part of the time in Newcastle; were there any prosecutions there?—Yes, there had been a number of prosecutions.

6359. Did they prosecute more than once for one child there?—I cannot say as to that; I do not think they did.

6360. Do you know of many persons who are allowed to leave their children unvaccinated in Newcastle?—I cannot say as to that. I know a number who have been fined.

6361. But you yourself were never troubled?—I was never troubled at all.

6362. How do you account for that?—Well, I think partly because I do not happen to be a poor man. I think it is the poor who are more persecuted than those in better circumstances, who are frequently let alone.

6363. Do you know any persons of good circumstances in Newcastle who refused to have their children vaccinated?—Yes.

6364. Were they summoned?—I cannot speak upon that point.

6365. (*Mr. Meadows White.*) You do not know whether their refusals have come to the knowledge of the authorities?—I cannot say.

6366. (*Mr. Bradlaugh.*) Are you a member of the Society of Friends?—I am.

6367. Do you happen to know of your own knowledge the Wigton School of the Society of Friends?—Yes.

6368. Was it a rule in that Friends' School that all children who were admitted to that school had to be previously re-vaccinated?—Not in the Wigton, but at the Ackworth School, they had to be previously vaccinated. There was no rule as to re-vaccination.

6369. Was there an attack of small-pox amongst the children in the Wigton School?—That was some years ago.

6370. Was it a long while ago?—I think it was within the last seven or eight years.

6371. Have you any personal knowledge of it yourself?—I had it from the superintendent of the school. I have had children in the school since then, but I had none at that time.

6372. (*Chairman.*) Is there anything further that you wish to state to the Commission?—With regard to the carrying out of the law on emigrant ships, I have repeatedly been a passenger across to America, and saloon and second class passengers are not examined in any way, or asked any questions with respect to vaccination; but the third class passengers, or the steerage passengers as they are generally called, are examined two or three days before they reach land. Upon two occasions I have seen this carried out. Upon the first of those occasions there were over 700 passengers. They were sent below, and the doctor and an assistant stood on the staircase as they came up and examined them one by one, unless they had a certificate; and part of that time they came up indiscriminately, men and women, and the women had to let down their dresses and expose themselves in the presence of men. And I think that the fact that first and second-class passengers who have plenty of accommodation and washing arrangements in their own berths are not so examined goes to show that sanitation has a great deal to do with the matter, in spite of what Dr. Rauch says in his evidence that sanitation has nothing to do with it.

6373. (*Chairman.*) Do you know what regulations they have in the United States with regard to those who land there?—They require each steerage passenger to either produce a certificate or to submit to vaccination, or, I believe, to be kept in quarantine for 14 days.

6374. Is it not in consequence of that requirement that the inspection which you speak of takes place?—Yes; it is done on English ships by English doctors. They require the companies to do that at sea.

6375. They will not let them land without it, will they?—I believe they give them 14 days' quarantine if they do not produce a certificate or submit to vaccination.

6376. (*Mr. Whitbread.*) There is no such examination on the return voyage, is there?—There is no examination on the return voyage.

6377. (*Chairman.*) Unless they were vaccinated on board, if they were unvaccinated, would they not be detained on landing until vaccination had taken place?—I think that is so.

6378. Therefore that is done more or less in the interests of the emigrant, is it not?—I do not think it is done much in his interest, because he is going to earn his living, and many of them have to be vaccinated, and it incapacitates them from working at manual labour.

6379. But if they were not vaccinated on board ship they would have to be vaccinated when they landed, and detained longer still, would they not?—Yes, they would have to be detained.

6380. Therefore your objection is to what the Americans require, and not to what is done on board ship?—It is done on board ship and by our doctors, but it is the American law that requires it.

6381. They would not gain anything, but they would rather lose, by not having it done on board ship, but on shore?—They would lose in point of time, but they would gain in point of health considerably.

6382. I suppose if anybody preferred to land and remain in quarantine there, there would not be any objection to his doing so?—Perhaps so. I cannot tell. Mr. Bradlaugh asked me a question with regard to the Wigton school. I think that question should have been asked with regard to the Ackworth school, which is the largest school in the Society of Friends. Some time ago they had a byelaw requiring all children to be vaccinated, but that has now been suspended. The Royal Commission was made a bridge, and until the Commission reports at any rate unvaccinated children are admitted; but I do not think we shall hear any more of that question at Ackworth. There is one case I know of. I do not know whether this will be of use here. I know a Mr. Grimstone, of Darlington, who has two unvaccinated children and one vaccinated. the vaccinated child took the small-pox, and was taken to the hospital in November 1884. Then the second child, Ivy Winifred, aged four years, unvaccinated, took it so slightly that she never went to bed at all. The third child, a son, named Cooper, aged one year and nine months, unvaccinated, did not take it at all. I have here the doctor's certificate certifying to the second child being convalescent from small-pox on the 29th of November 1884, when the eldest vaccinated child, who took it first, was still in hospital.

6383. Do you think that it would be a reasonable inference to draw from that particular case of itself that not being vaccinated gave them the disease in a lighter form than being vaccinated; would you not have to investigate the matter on a much larger scale in order to arrive at a conclusion upon the point?—I think that shows that we are not the nuisances that we are alleged to be to the public health, that unvaccinated children do not spread small-pox.

6384. That two unvaccinated children did not. But unless you go into the thing on a larger scale than that you cannot arrive at a conclusion, can you?—Quite so, I only give you this as an instance.

6385. Do you know whether any other children living in the same house took the small-pox?—Two of these children were in the same house. I do not think there were any other children in the same house.

6386. (*Dr. Bristowe.*) Do you know that case of your own personal knowledge?—No, I know the father, and I have the doctor's certificate here to say that the second child was convalescent from small-pox, and the father tells me that the eldest was then in the hospital, and had not recovered from it.

6387. (*Chairman.*) But that does not show of itself that it was the second child who took it second?—No, it does not.

6388. (*Professor Michael Foster.*) What was the evidence that this child was not vaccinated?—This was a certificate given by the doctor on the 29th of November 1884 to prevent the father being fined in the police court.

6389. Does the certificate say that the child had never been vaccinated?—The certificate does not say so.

6390. (*Chairman.*) Was it upon the father's statement that you say the unvaccinated child was the one who took it second?—Yes.

6391. The certificate, of course, of itself does not show that?—No.

6392. But that was the father's statement to you?—Yes. The certificate says: "I certify that Ivy "Winifred Grimstone, aged four years is convalescent "from small-pox and vaccination at present would be "useless and unnecessary."

The witness withdrew.

Mr. Thomas Tate Minns examined.

Mr. Thomas Tate Minns.

6393. (*Chairman.*) You are a grocer at Murton Colliery, Seaham Harbour, are you not?—Yes.

6394. Have you been fined for breaches of the vaccination law?—Yes.

6395. How many times?—I was fined four times.

6396. On what dates?—November 7th, 1879; January 7th, 1881; September 29th, 1882; and June 7th, 1887.

6397. Were those fines in respect of different children?—Some of them were twice over. The first time I was fined for one child, and the second time I

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was fined for one, but not the same child. The next time I was fined for two, those two again.

6398. For the same two again?—Yes; and the fourth time I was fined for three, but one of those I had been fined for before was left off. Then I was summoned on the 5th of July last year, under the same section, and the magistrates' clerk discovered that it was illegal. I was summoned for five.

6399. Was there an additional child?—Yes, there was an additional one, but it was more than 15 months old. The magistrates' clerk then found out that it would be illegal to fine me under the same section, and the summonses were withdrawn. I asked for my expenses that day before the magistrates, but they were not granted. Then I was summoned to produce the children in the court, for the magistrates to satisfy themselves whether they had been vaccinated or not.

6400. You did not suggest that they had been vaccinated, did you?—No; but I was summoned under the 31st section, then to produce the children in court for the magistrates to examine. I produced four of them on the 26th of July last year. They were satisfied that they had not been vaccinated. The reason why I did not produce the fifth one was because it was ill. Then they made an order that I was to get those four children vaccinated in 28 days; but that order I have not complied with.

6401. You objected, as I understand, to vaccination?—Yes.

6402. And you stated to the magistrates that you did object?—Yes.

6403. And the objection which you entertain to vaccination was the reason which you gave for not having the children vaccinated?—Yes.

6404. (*Mr. Whitbread.*) What first set you against vaccination?—In the small-pox epidemic in 1871, I was at home along with my father, and I was persuaded by a doctor to be revaccinated. I had four sisters at home, and there were my father and mother and two servants in the house. Two or three days after I had been revaccinated, my sister, about 14 years of age, said because I had got revaccinated, she would also be revaccinated; the others would not. We had both of us very painful arms, although hers was a good deal worse than mine. They got better, and in six weeks after I took the small-pox, and the week after I took it she took it. We were the only two in the house that had the small-pox. Two of my other sisters slept in the same room as she did; they were older than she was. That set me to think about it, and I have had ample reason since to confirm me in the opinion that I had formed that vaccination was no preventative.

6405. Had the two elder sisters who did not take it been vaccinated in their childhood?—Yes, when they were babies.

6406. Were they revaccinated afterwards?—No, none of them were revaccinated, excepting my sister, who was 14 years of age, and myself.

6407. (*Chairman.*) Do you know whether they had been revaccinated on some previous occasion?—They had not.

6408. (*Mr. Whitbread.*) How was the operation performed upon you and upon your sister; was it direct from another arm?—I should think so, but I do not know.

6409. No child was brought from whom you were vaccinated?—No, I was vaccinated by the doctor who was, I think, the public vaccinator at that time, or he was an assistant to the public vaccinator.

6410. Did he come to your house?—No, I went to the surgery.

6411. (*Professor Michael Foster.*) Did he put some ivory points into your arm?—He did it with a lancet.

6412. Did he scrape anything off a glass?—He took it off a glass with his lancet.

6413. Did he blow anything out of a small tube?—No, it was a flat piece of glass that he took it off.

6414. He separated two bits of glass?—Yes. My sister, I should say, was vaccinated by our family doctor.

6415. (*Mr. Whitbread.*) At home?—Yes, but I cannot say how it was done.

6416. You do not know whether any child was brought or not?—I think not; I think I should have known it if there had been.

6417. (*Professor Michael Foster.*) What was the name of the family doctor?—Dr. Parker.

6418. Where does he live?—He lives at Easington Lane, beside our place. He was attending patients in the neighbourhood, and when my sister expressed a wish to be re-vaccinated, my mother asked him if he would re-vaccinate her when he was passing, and he called and did do so; so that I think there would be no child brought.

6419. (*Mr. Whitbread.*) Were there other cases of small-pox in your family?—No.

6420. Nor in the families of your parents as far as you know?—Not that I know of.

6421. You told us just now that one child was let off on that occasion; was there any reason for letting that child off?—It was just at the guardians' own option; I do not know of any reason. I think that perhaps they thought that three were sufficient to prosecute for at a time.

6422. (*Chairman.*) Were you yourself long ill with the small-pox?—About three weeks.

6423. (*Mr. Meadows White.*) Was it a severe attack?—No; my sister was a great deal worse than I was.

6424. You had a slight attack of small-pox?—Quite so.

6425. Do you know how you caught it?—It was an epidemic in our place at the time.

6426. What was the place?—Murton Colliery. It was in the time of the great epidemic in 1871.

6427. (*Chairman.*) Was small-pox widely prevalent at that time in Murton Colliery?—Yes, very widely prevalent. It was very bad in Sunderland, and I used to be in Sunderland once a week; but still I might easily have caught it in our own place, because I was mixing amongst the people a good deal.

6428. (*Mr. Meadows White.*) How long after your vaccination did you catch it?—Six weeks.

6429. (*Mr. Picton.*) Had the vaccination quite run its course and become healed by that time?—Oh, yes, quite.

6430. Are you alone in that neighbourhood in your objections to vaccination?—No.

6431. Are there many others who share your views?—There are not many who have resisted the law; there are two or three who have done so, but there is a strong feeling against it.

6432. Are the local authorities very active in prosecuting all cases of neglect?—They have been a little more active during these last two or three years.

6433. There has been a change then in their policy?—The old clerk to the guardians died and a new one was appointed, and the old vaccination officer left and a new one was appointed, and I think that has made them a little more active.

6434. (*Dr. Collins.*) Did you state the facts which you have just told the Commission with regard to the small-pox in your own family when you were summoned before the magistrates?—I told them to the clerk of the guardians before I was summoned.

6435. Did you mention them in the court as well?—Yes; the same gentleman is chairman of the magistrates who is chairman of the board of guardians.

6436. (*Mr. Bradlaugh.*) So that he heard your excuse twice over, first when you explained the circumstances to the guardians, and afterwards when you were formally summoned and stated this as a reasonable excuse for not obeying the law?—Yes.

6437. Do you know much of the feeling of the colliery people in the neighbourhood of Seaham Harbour with regard to vaccination?—They are very much against vaccination. If the penalties were done away with my belief is that there would not be 10 per cent. of the children vaccinated.

6438. (*Chairman.*) Did your sister who had the small-pox go to school?—She had left school about six months before.

6439. (*Mr. Bradlaugh.*) I do not know whether you have told us how many people were residing in the house at the time of the epidemic in 1871?—There were nine of us.

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6440. And only the two who were revaccinated had the small-pox?—Precisely so.

6441. (*Sir William Savory.*) Do you know upon which arm you were revaccinated?—The left arm.

6442. Do you know whether you got scars on your arm from that revaccination?—Yes, there is a mark.

6443. Is there a mark on the other arm on which you were originally vaccinated?—I am sure I do not know.

6444. (*Dr. Brietowe.*) How long after your sister was revaccinated did she take small-pox?—She was revaccinated two or three days after I was. I took the small-pox about six weeks after being revaccinated, and she took it a week after me.

6445. (*Sir James Paget.*) Do you know whether all the other persons in the house had been vaccinated?—I think they had been vaccinated in infancy.

6446. (*Mr. Whitbread.*) Have you a certificate of successful vaccination for yourself and your sister?—No, I have no certificate.

The witness withdrew.

Mr. George Speed examined.

Mr. George Speed.

6447. (*Chairman.*) You are a merchant's clerk at Horncastle?—Yes.

6448. Have you been summoned for breach of the vaccination law?—I have.

6449. How many times?—10 times, involving 11 appearances in consequence of one adjournment, when I was illegally summoned.

6450. Were those summonses with respect to one child or more?—For one child.

6451. Between what dates?—Between the years 1885 and 1889.

6452. The fines amounted to what?—1*l.* 10*s.*

6453. And the costs?—4*l.* 15*s.* 6*d.* making a total of 6*l.* 5*s.* 6*d.*

6454. Have you objections to vaccination?—Yes.

6455. That was your reason for not complying with the law?—Yes, that was my reason for not complying with the law.

6456. Had you had any previous child to this one?—No.

6457. This is your only child?—This is my only child.

6458. (*Mr. Whitbread.*) Will you give me the dates of your summonses?—1885, September 22nd and November 3rd; February 1886, August 1886, November 1886, April 1887, July 1887, March 1888, September 1888, and September 1889.

6459. All the 10 summonses being for the same child?—All for the same child.

6460. Will you tell me what made you opposed to vaccination, what set you against it?—I was afraid of the evil effects that might accrue from having my child vaccinated.

6461. But was it any personal observation of your own upon a child which had been vaccinated which gave you an idea that it would have evil effects, or was it from reading only?—Partly from reading and partly from observation.

6462. (*Professor Michael Foster.*) What cases had you heard of?—I had heard of a very bad case at Louth in Lincolnshire.

6463. But you had not seen it?—I had not seen that particular case, but I had seen the parents.

6464. (*Mr. Whitbread.*) How long have you been opposed to vaccination?—Six years.

6465. Was that before your child was born?—Yes, I had exercised my mind upon the question somewhat before the child was born.

6466. (*Chairman.*) Had you taken any active part in opposition to vaccination before that time?—No.

6467. (*Mr. Whitbread.*) Will you tell me what first set you against it; was it observation first or reading first?—From reading, I think, first.

6468. (*Mr. Meadows White.*) Did you state any special reason to the magistrates, or did you simply generally state, "I have an objection"?—I stated my fear of any injury which might accrue to my child from having it vaccinated. I have stated it over and over again to them.

6469. You did not state any special objection to it, but that you believed generally that it was a dangerous practice?—Yes.

6470. (*Mr. Picton.*) Are the authorities in Horncastle very rigorous in prosecuting?—Very rigorous indeed.

6471. Are there many cases like yours which have been prosecuted several times?—About half a dozen cases.

6472. Are there many there who have been prosecuted once?—No.

6473. (*Mr. Bradlaugh.*) Is there a very strong feeling of hostility to vaccination amongst the inhabitants of Horncastle?—There is a very strong feeling amongst them.

6474. (*Chairman.*) When you say, "amongst the inhabitants," do you mean that it is wide-spread, or why do you say that there is a very strong feeling of hostility against it amongst the inhabitants there?—I say that from the spontaneous sympathy I have had expressed to me by the inhabitants.

6475. How many inhabitants are there in Horncastle?—Five thousand.

6476. How many do you suppose have expressed sympathy with you?—Perhaps a couple of hundred.

6477. (*Mr. Whitbread.*) Is there any anti-vaccination society in Horncastle?—No.

6478. No list of people opposed to it in any way?—No.

6479. It is a growing feeling?—Yes, it is.

6480. (*Sir Charles Dalrymple.*) What form did the sympathy take; merely speaking to you?—Merely speaking to me upon the subject.

6481. There has been no meeting upon the subject, has there?—No.

6482. There has been no corporate action against the Vaccination Acts?—No.

The witness withdrew.

Mr. Richard Smith examined.

Mr. Richard Smith.

6483. You are an engine-smith at Ashford?—Yes.

6484. How many times have you been fined for a breach of the vaccination laws?—For all the cases, nine times.

6485. Was that in respect of one child or more?—Three children.

6486. Was that three times for each child, or was it more than that in respect of one child?—I have been 12 times summoned in respect of one child, but not fined 12 times for that child.

6487. How many times have you been fined for one child?—Six times.

6488. Between what dates?—The first time was September 28th, 1886, and the last October 29th, 1889.

6489. Then the 12 summonses have been within the three years?—Yes.

6490. What do the total fines amount to?—5*l.* 3*s.*

6491. And the costs?—9*l.* 12*s.*

6492. Have you objections to vaccination?—Yes.

6493. Did you state those to the magistrates?—Yes.

6494. It was upon that ground that you did not comply with the law; it was not merely neglect?—What I

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stated to the magistrates was that I had conscientious objections.

6495. Were those three children the only children that you have?—I have four children now.

6496. You have had one since those three?—Yes, for which I have received notice.

6497. So that your objection to vaccination arose before you had children of your own?—Yes.

6498. Had you taken any active part in opposing vaccination before?—Not until I had children of my own.

6499. (*Mr. Whitbread.*) What was it that first set you against vaccination?—I had a sister vaccinated, and she took the small-pox within 14 days afterwards.

6500. Was that her first vaccination or re-vaccination?—First vaccination.

6501. Was that vaccination considered to be a successful vaccination by the doctor?—Yes.

6502. Was there a certificate to that effect?—I believe there was.

6503. (*Chairman.*) When you say within 14 days, could you tell us how many days after the vaccination the small-pox began?—I could not tell you exactly; it was within the 14 days.

6504. (*Sir James Paget.*) Was it within 10 days?—I do not think so. I think it was more than 10 days afterwards.

6505. (*Professor Michael Foster.*) Is that the whole ground of your objection to vaccination?—No; we have a grave suspicion that it introduced consumption into our family.

6506. (*Mr. Whitbread.*) What is your ground for that belief?—The fact that my grand-parents and parents were individuals amongst whom you could not find any trace of consumption, nor anywhere in the family before vaccination was introduced.

6507. How long ago was your sister vaccinated; how many years ago was it when she took small-pox?—I stated it to our solicitor, but I really forget at present. I think it was in 1860.

6508. Who was the doctor who attended her?—Dr. Maund.

6509. Was she vaccinated at home?—Yes, she was vaccinated at home.

6510. And is she still living?—No, she died from typhoid fever four or five years afterwards, speaking from memory.

6511. (*Mr. Meadows White.*) We have had several gentlemen from Ashford; who is the chairman of the petty sessional division there; who takes the chair when you are fined?—Any justice can do it.

6512. But I thought there would be a gentleman who generally took the chair at the petty sessional division?—Some times it is one of the Walker brothers, and sometimes Lord Hothfield, and sometimes Colonel Groves.

6513. Who is the clerk to the guardians; do you know?—I cannot say whether it is Mr. Langley or Longley; Langley, I believe.

6514. Did you state to the magistrates, as I think one of the gentleman from Ashford did, "I have con-" scientious objections to vaccination," or did you state any further reasons?—I stated no further reasons to the magistrates.

6515. (*Mr. Picton.*) Was this sister the only one of your family that took the small-pox?—No; another sister took it younger than myself, she being unvaccinated.

6516. And the unvaccinated one caught the small-pox from the vaccinated sister?—Yes.

6517. How did the disease progress in the two cases?—As far as we could see with unprofessional eyes the unvaccinated and the vaccinated were both alike.

6518. What was the result afterwards; were they both equally marked?—The unvaccinated one was not marked at all; the vaccinated one was slightly marked.

6519. What is the state of opinion in Ashford; are there many opposed to vaccination?—I believe a good many object to it.

6520. Could you tell us how many persons have recently been summoned in Ashford?—22, I think, altogether.

6521. Within what period?—I should think from 1885 to the present time.

6522. How many times have they been summoned altogether; how many summonses and fines have there been altogether against those 22 people?—I should think that they have been summoned 80 times. But this number does not include the witnesses from Ashford, who were examined by the Commission last week.

6523. Have you counted them up?—Not closely.

6524. (*Dr. Collins.*) Do you happen to know within your own knowledge whether the vaccination in the case of one of your sisters was successful, that it took?—It took in that case that you refer to.

6525. Do you know Mr. Hayward who was here last week?—Yes.

6526. Do you happen to know whether he has since received another summons?—It is issued against him. I heard the rumour yesterday, and I went to the clerk's office before I came away last evening and found that it was the fact.

6527. You have ascertained that the summons has been issued, although as a matter of fact he has not received it?—Yes.

6528. (*Chairman.*) How soon after your sister who first caught the small-pox was taken ill with it was your second sister attacked?—I could not say to a day, it was while the small-pox was out upon her; the two cases were lying together, I believe, in one bed.

6529. But was it two or three days, or a week, or ten days, or what?—I could not tell within a few days.

6530. But they might have caught it from a common source, you do not know that the one took it from the other?—The impression my parents have is that the second caught it from the first.

6531. That is because the other had it a few days afterwards, but it might have been also, seeing that the one took it four or five days after the other, that they got it from a common source, might it not?—I have not regarded it in that light.

6532. What were the ages of the girls?—The eldest was 10 and the youngest 3.

6533. Do you remember how long the second child took it after the first?—I believe it was about 14 days after being vaccinated.

6534. Are you sure that it was more than ten days?—I am pretty sure it was, but I could ascertain from inquiry.

6535. How could you ascertain that?—By inquiry from my parents.

6536. (*Mr. Meadows White.*) Are you speaking of the eruption coming out, or the sickening?—She was sickening a few days after the vaccination.

6537. Then, when speaking of the 14 days, you are speaking of the eruption?—Yes.

6538. (*Sir James Paget.*) Have you any reason to believe that they had not been exposed to small-pox before the first sister was vaccinated?—I think she was the first case in the district. I never heard of any other case of small-pox at the time.

6539. Was it in Ashford?—In Newtown, Ashford.

6540. (*Mr. Meadows White.*) That is where the railway people live on the other side of the railway?—Yes.

6541. (*Mr. Picton.*) Do I understand you to say that there was no other case of small-pox in the neighbourhood?—There was no case of small-pox in the neighbourhood at that time, except in our house, that I know of.

6542. Then if there was no other case in the district the unvaccinated sister must have taken it from the vaccinated?—It would appear so.

6543. (*Dr. Collins.*) Could you tell me at all where the lymph was got from with which your sister was vaccinated?—I could not.

6544. (*Chairman.*) What age was your sister?—When she took the small-pox she was about 10.

6545. Did she go to any school?—Yes, the Newtown school.

6546. (*Mr. Picton.*) Had she not been vaccinated in infancy?—No; my father removed to Ashford from Great Grimsby.

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6547. (*Mr. Meadows White.*) Do you know what led to the vaccination of the sister at the rather late age of 10 years?—Simply the pressure that was put on by the doctor.

6548. But there were other people in the family who are not vaccinated?—The vaccination only arose from pressure upon that one.

6549. (*Professor Michael Foster.*) Had she not been vaccinated before she took the small-pox?—No, not before that occasion.

6550. (*Chairman.*) Is your statement about it entirely from what your parents have told you?—I recollect the case well.

6551. How long is that ago?—About 30 years.

6552. How old would you have been 30 years ago?—About five.

6553. Therefore as to the date at which the small-pox came out after vaccination you do not speak from recollection but from information?—No, I speak from hearing my parents talk of it.

6554. (*Sir Charles Dalrymple.*) Is this a case which has been made a matter of current information. The reason I ask you is that one honourable member of the Commission suggested a date to you?—I use it myself occasionally.

6555-6. (*Mr. Picton.*) Why was one sister vaccinated and not the other at that time; was not the same pressure put on in both cases?—I was asking my father particulars about that, and I think he said that the vaccination in the other case was pending for lymph or something of that kind when she broke out in small-pox, and consequently she was never vaccinated afterwards.

The witness withdrew.

Mr. Caleb Pocock examined.

Mr. Caleb Pocock.

6557. (*Chairman.*) You are a hatter and hosier at Brighton?—Yes.

6558. Have you been fined on several occasions for breaches of the vaccination laws?—Yes.

6559. On how many occasions?—I was first summoned on December 3rd, 1875, and I have been prosecuted at intervals up to March the 8th, 1887, and I have appeared in answer to 18 summonses under the 29th and 31st sections of the Act; here are the summonses with the dates.

6560. What have the total fines amounted to?—I have paid fines and costs to the amount of 12*l*.

6561. How many children was that in respect of?—That was in respect of six children.

6562. Have you had any children since March 1887?—No. On November 24th, 1880, when before the magistrates, I told them that I considered it was persecution, having been prosecuted for the same child over and over again, and for that reason I declined to pay any more fines; since then I have been twice distrained upon and had my goods seized and sold by auction. Upon the last two summonses I have been fined the full penalty of 20*s*. and costs, but they have never been paid, the authorities have several times applied for the money, but I have refused to pay, and the last two summonses have been allowed to lapse up to the present time without being recovered.

6563. Are those six children the only children you have?—We had two before then, John and Annie; my eldest son was vaccinated and apparently got on fairly well, but my second child, Annie, now 21 years old, within a few days had a very bad abscess in the neck after the vaccination; and I might say I was myself vaccinated by the late Dr. Badcock, of Brighton, and my mother often told me that she took me to several doctors in Brighton, and they said that the child was a mass of disease from head to foot, and could not possibly live; however, I am now 49 years of age. Still at the same time that always prejudiced my mind considerably against vaccination, and when I had my own daughter vaccinated, and found her suffering so severely from this abscess in the neck, I said to my wife, if we have any more children we will never have them vaccinated. From that I have never deviated, and the six children I have had since then are all unvaccinated. I have looked into the question, I might say, very carefully indeed, and the more I have looked into it the more firmly am I convinced that vaccination is utterly useless as a preventative against small-pox, and also that it is frightfully injurious to the health of many of those vaccinated.

6564. That is from your reading, as I understand?—From my reading and personal observation. I have spent a great deal of time on the question in visiting and seeing cases of injury after vaccination during the last 12 years.

6565. Have you taken an active part in the anti-vaccination agitation?—I have been secretary to the Brighton Anti-Compulsory Vaccination League for the last 14 years.

6566. That is somewhere about the time of your first case?—It was about a year or two afterwards when I took a very active part in it. I think it is about 12 or 14 years, if my memory serves me rightly, that I have been secretary to the League in Brighton.

6567. (*Mr. Meadows White.*) Did you found the society yourself?—Yes. I have also a list of names which it might be interesting for the Commission to see, of those that have been fined in Brighton during the last 10 or 11 years; they are Messrs. Charles John Harris——

6568. (*Chairman.*) Do they show anything particular, because we shall have a return of all the fines?—If that is coming before this Commission I will not trouble you with this list, only I wished to show that some cases have been repeatedly prosecuted and had their goods distrained on, and some died after being in prison. One man's widow is now a tenant of mine, the widow of Owen Coom. He was summoned and went to Lewes Gaol in January 1886 for 14 days, he was nearly starved there, and he never was himself after he came out of the gaol, and died in August of the same year; I mean to say under this Act that some of the best and most exemplary parents have been most cruelly treated in prison; and I could bring most abundant evidence to prove so in several cases in Brighton; but if that is coming in before the Commission in another way I will not attempt to trouble the Commission with this list.

6569. Will you give us the number of those that have been to prison and distrained on, and tell us how long a time your list covers?—This list covers all the time I have been connected with the League, from 1875; during that period 14 have been distrained upon and seven have been to prison, some to Portsmouth Gaol from the Steyning Union, and some to Lewes Gaol from Brighton.

6570. (*Sir James Paget.*) How soon after the vaccination did the child have the abscess in the neck?—Almost immediately; within a month.

6571. (*Professor Michael Foster.*) About how many cases of mischief from vaccination have come under your observation?—With the permission of the Commission I have a statement of them here.

6572. I only wanted a statement of the number; how many cases have you investigated?—We have investigated something like 11 cases.

6573. (*Sir James Paget.*) In 14 years?—I have copies of them here; we have carefully tabulated the cases, with the doctor's replies. The reason why we never furnished the Brighton board of guardians with any statement of more cases of injury arising from vaccination was simply that they said it was their duty to carry out the law and not to inquire into cases of injury. Therefore they refused to pay attention to them, and consequently we found it useless to spend our time and labour and trouble in getting up cases and reporting them to the board; but those I have here are the cases of injury we have reported to the board, and the Doctor's replies thereon; these cases are within a month, and many others have been reported to us from time to time.

6574. What is the date of the first?—April 1878.

6575. What was the date of the last?—Those that I have here all occurred in 1878; would you allow me to read them?

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6576. (*Chairman.*) No, we cannot allow you to read them; we should never report at all if we were to take them all in detail?—These are very important cases, one of them is the case in which a child had a very bad arm indeed, and the doctor in his report to the board of guardians characterised the case as that of a scrofulous and delicate woman, whereas in this very case Dr. Ross, one of our public vaccinators, who vaccinated the child of this so-called scrofulous delicate woman, said in the vaccination station to the woman "Is this your baby"? She said, "Yes, sir." He said "Now then, Dr. Hall," speaking to a physician who was at the vaccination station, and who wanted a healthy subject to take to Brunswick Terrace to have a young lady and two children vaccinated from, "here you are." Dr. Ross also took thirty points from this child, but the child suffered so dreadfully from the effects of vaccination that (the woman and the child are both dead now) the woman declared to us that after 18 months of nursing she had to lift the child out of bed in a sheet, and when we saw it, it was piteous to behold.

6577. What was your knowledge of the facts you have stated; were you present when the doctor said this to the mother in the vaccination station?—No; the mother made the statement to me in the presence of two witnesses, Messrs. G. H. Ashwell and C. J. Harris. I have a copy of the doctor's report.

6578. You have told us what took place in the vaccination station; but were you present at the time?—No, but there is the mother's statement for it that Dr. Hall gave the woman 5*s.* to take a cab and drive to Brunswick Terrace, West Brighton.

6579. Did you learn that from her?—We learnt that from the woman; she made the statement and signed it, and I have it.

6580. (*Dr. Collins.*) Is that woman living now?—No, she is dead.

6581. (*Mr. Whitbread.*) I wish to ask you whether there has been a case of death attributable to vaccination in Brighton?—There is not a case in that record.

6582. But has there been one?—Yes, there is a case mentioned in the placard I have here of a child which was vaccinated in the Brighton workhouse. I can furnish you with the particulars of that case — it was vaccinated at three weeks old, and died a few days afterwards.

6583. Was any inquiry held as to the cause of death?—No; we brought that matter at a public meeting before the Brighton guardians, and one of the guardians said as the child was dead the subject had better be allowed to drop; it was no use proceeding with it, we could get no further with it.

6584. Did you see the child?—I did not.

6585. What is your ground for saying it died from the effects of vaccination?—Because we had information brought to us, the name of the child, who it was vaccinated by, and all particulars.

6586. But what were the particulars which led you to the conclusion that death resulted from vaccination?—The statement of the mother of the child; it was decidedly her opinion that the child never rallied afterwards.

6587. Because the death occurred shortly afterwards?—Yes, the child failed from that time having been all right before. It was three weeks old when it was vaccinated.

6588. And do you know how old it was when it died?—My note is that it died a few days after the operation.

6589. Was any appeal made to any office or authority in London for inquiry into that case?—No.

6590. All you did was to publish that placard and call a meeting?—Yes, to publish that placard when we got information of the case, and we brought it before the guardians, and it was not denied. I knew the vice-chairman of the board of guardians personally, and I brought the case before him, but he only shook his head, and said, "Well, the child is dead, we can do no "good now; it is no use proceeding; we had better let "the matter drop."

6591. How many members of your society are there in Brighton?—We muster 150 members.

6592. Subscribing members?—Subscribing members; we spent in one year 175*l*

6593. Has it an increasing number of members?—Since my children have got beyond the age of being vaccinated I have not taken such interest in it as I did when I was being prosecuted.

6594. (*Mr. Dugdale.*) It depends a good deal upon you, apparently?—I had a good deal to do with it when I was being fined. I do not say so from any boasting spirit, but I have done it from principle, believing that vaccination is entirely wrong, and I certainly have thrown a good deal of energy into it, and though I do not take so active an interest in it now I am still just as strong against vaccination as ever I was in my life.

6595. (*Mr. Whitbread.*) Have the guardians been more lax lately than they were?—Some years ago the Brighton board of guardians, owing to the prosecutions of so many of us repeatedly, passed a resolution that they would only prosecute once for one child, so that as soon as you have paid one penalty for one child you are allowed to go free; that took a good deal of energy out of the anti-vaccination agitation in Brighton, because the repeated prosecutions of the same individuals had excited a great deal of feeling in Brighton. I have myself been summoned over and over again for the same child, and paid the full penalty time after time in respect to it.

6596. (*Mr. Meadows White.*) Did you give any special reason to the magistrates beyond your general objection to vaccination?—I always endeavoured to the very best of my ability to give a reasonable excuse, viz., cases of injury and death after vaccination; cases of small-pox after vaccination, &c., &c., but I have always been met before the Brighton magistrate, who is a stipendiary, by his saying that the magistrate could not take anything but the doctor's certificate as an excuse. I have urged to him that the Act of Parliament never said so.

6597. Have you ever said to the magistrate anything beyond this, that you think vaccination dangerous, or that you think it objectionable; have you ever given any special reason to the magistrate, founded upon any particular fact?—Yes, decidedly.

6598. What have you said?—I have said that I had one child vaccinated, who suffered so severely after the operation that I would not allow another one to submit to it.

6599. Your reason was that you had a child which had had an abscess in the neck?—Yes, that and many other reasons.

6600. Do you think that vaccination is general in Brighton?—Vaccination is pretty general in Brighton.

6601. It is universal, is it not, with very few exceptions?—I know a large number of parents in Brighton who decline to have their children registered; they do not certify the birth of the child on purpose to escape the penalties for breach of the Vaccination Acts. The register is where the authorities get the information of the children born, and it is the source from which the vaccination officer also gets his information; numbers of children, however, now in Brighton are not registered, but grow up unregistered and unvaccinated. I have also, with others, got up two petitions in Brighton with something like 4,000 signatures in one case, and 3,700 signatures in another, which were duly presented in the one case by James Ashbury, formerly member for Brighton, and in the second case by Mr. Holland, who was our member, which we presented to him in the House of Commons, and I have no hesitation in saying that if I went to any working-class district in Brighton I should find eight or nine out of every 12 decidedly opposed to compulsory vaccination. I am quite certain, in my own opinion, that if it were not for the Acts and the penalties the great majority of the working classes would not have their children vaccinated.

6602. (*Chairman.*) Some, possibly, would not take the trouble?—Unfortunately there are some few careless parents.

6603. (*Sir Edwin Galsworthy.*) Do you say that you are opposed to compulsory vaccination or to vaccination pure and simple?—I am bitterly opposed to vaccination itself.

6604. Does that objection arise from your child having had an abscess?—Yes, but not that alone.

6605. Your first child did very well, did it not?—Fairly well.

6606. The second child had an abscess?—Yes.

6607. What made you connect the abscess with the vaccination?—Because it came so shortly afterwards.

6608. How soon afterwards?—Within a month.

6609. Did you feel quite sure that the abscess was caused by the vaccination?—I did.

6610. Upon whose authority were you so impressed; was it medical authority?—No, it was my opinion. I have brought up a large family of children, and since my second child was born I have never had a doctor's bill.

6611. Did you have medical advice for the abscess?—Yes, we called in the medical man who attended my wife in her confinement, and who had vaccinated the child; he came in and saw the child, and wanted to lance this abscess. I said, "Doctor, "what is your opinion about it?" He said, There "is matter forming; it must come up to a head "and break." Dr. Money was our doctor at the time. He said, "I will just open it with a lancet." I said to Dr. Money (he is alive now, and you can refer to him), "I have had enough of the lancet already, "and I will have no more of it. If it is your opinion "that this abscess must come up and break, we will "get it up by natural means; we will poultice it and "foment it as much as you like, but certainly it shall "not be lanced." He said, "Surely you must be a "very stupid man." I said, "Very likely, I am not "the only one possibly, but I shall have my own way "in this matter." We poulticed the abscess, and we got rid of it. Dr. Money continued to treat the child, and after a time it got better. It took her off her legs for the time being (she was then 15 months old), but the abscess gradually disappeared and went away.

6612. You say it took her off her legs?—It did; she could not run, and could hardly walk for several weeks; she was altogether ill.

6613. (*Chairman.*) The point of that last incident seems to be that you were a better judge than the doctor who attended her as to how an abscess should be treated, but I do not see the connection of that with the point put by you as to the relation of the vaccination to the abscess; no light seems to be thrown upon that by the question of whether the abscess should be lanced or not?—In my simple judgment, I think that if we put matter into a child it is only natural if we see eruptions following afterwards, to connect those with the original putting in of that matter. It is like putting seed into the ground; seeing that a large abscess came up soon after putting the matter into the child, I thought and I think still that had she not been vaccinated she would not have had the abscess. No amount of medical men will ever eradicate that opinion from my mind.

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6614. Have you ever heard of an abscess forming without any matter being put in?—I have heard of people having abscesses after they are grown up.

6615. Where there has been no putting of matter in?—Quite so.

6616. (*Sir James Paget.*) Have you not known children to have abscesses?—My own sister, after she was vaccinated, had 13.

6617. (*Chairman.*) Have you never heard of it apart from vaccination?—I cannot say that I have. One of my cousins after she was vaccinated had a large number of abscesses, and is in delicate health now—that was in consequence of vaccination, as I take it.

6618. As I understand, your reason for connecting the two things was the short period that elapsed between the vaccination and the appearance of the abscess?—Yes.

6619. (*Sir James Paget.*) Did the abscess on your child discharge?—No; by fomentation and poulticing it went away.

6620. What is the evidence then that it was an abscess at all?—Dr. Money said that it was an abscess and that it must break.

6621. You rely for the fact that it was an abscess upon the statement of the medical man?—Yes, I rely upon his words, that there was matter forming, and where there is matter forming I understand it must come up.

6622. Would it not be more right to say that it was suspected to be an abscess, but that there is no evidence that an abscess had formed?—I only know what the doctor said.

6623. (*Sir Edwin Galsworthy.*) That is not the same doctor who said that you could not possibly live, I suppose?—No; that was the late Dr. Badcock who took a very active part in supplying cow-pox lymph.

The witness withdrew.

Mr. Alfred Rawlings examined.

Mr. Alfred Rawlings.

6624. (*Chairman.*) You are a stationer at Guildford?—Yes.

6625. I believe you have made inquires with the view of ascertaining how the Vaccination Act is carried out by boards of guardians?—Our local society did so, necessarily in an imperfect way an account of the short time that we had to do it in; the subject was coming before the Guildford board of guardians, and we were anxious to find out what was being done in different districts in the country, in order to show them that a very severe course was not necessary to be followed.

6626. How many boards of guardians did you inquire of?—I think it was 76.

6627. And of those you find that 29 do not prosecute at all?—Yes.

6628-9. Eight have suspended prosecution during the sittings of the Commission. That eight prosecute once?—Yes; eight prosecute once, and seven prosecute twice or more.

6630. Have you received answers from only 52 out of 76?—From 58 we received answers; there were seven or eight others which simply stated that they still prosecute, without stating the number of times they prosecute; so I did not include them under any heading.

6631. Are those boards of guardians in different parts of the country, or how was the selection made of those 76?—We selected these simply because we knew we could get information readily where there were societies existing for a similar purpose to that for which we existed—that is to say, local anti-compulsory vaccination societies. We could have adopted another course, namely, applying to the clerks to the boards of guardians, only that it was not possible to expect a complete return in the time, we only having about nine days.

6632. (*Dr. Collins.*) Could you tell me whether there is any difference in practice as regards the fines between the county and the borough?—There was a wide difference. In our own case, where of course the prosecuting body is the same, in the borough we are fined 10*s.* including costs, and in the county 20*s.* That, from the returns which I obtained, occurs very frequently over the country.

6633. (*Mr. Picton.*) Is there any feeling on the point you refer to, the inequality in the action of the law?—I do not think it has been much noticed; in respect to other offences the same inequality exists also, so that I am afraid it has become a matter of course.

The witness withdrew.

Mr. John Rupert Saunders examined.

Mr. John Rupert Saunders.

6634. (*Chairman.*) You are a sailmaker at Newhaven?—Yes.

6635. You have been summoned for breach of the vaccination laws?—Yes.

6636. In respect of one child or more?—One.

6637. And you were ordered to vaccinate the child?—Yes.

6638. And you were fined for not vaccinating?—Yes.

6639. And in default of payment of the fine you were imprisoned?—I was.

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6640. How long were you imprisoned?—Seven days.

6641. In Lewes Gaol?—Yes.

6642. (*Mr. Picton.*) When you were in prison, how were you treated?—I did not find any fault to the Governor.

6643. You were treated like an ordinary criminal?—Yes, I had to pick oakum.

6644. Had you to lie on a plank bed?—Yes.

6645. Were you able to sleep?—No, I was not.

6646. Did you suffer any consequences?—Yes; I was weak after I came out.

6647. (*Mr. Whitbread.*) What diet were you on?—Brown bread and water.

The witness withdrew.

Mr. Thomas Gordon Collins.

Mr. Thomas Gordon Collins examined.

6648. (*Chairman.*) You are a book-keeper?—I am.

6648A. And also choir master at a church in London?—I was.

6649. I believe you have been fined three times for a breach of the vaccination laws?—Yes.

6650. Was that in respect of one or more children?—Three children.

6651. Was it once in respect of each child?—Yes.

6652. And in default of payment of one of those fines you were imprisoned for seven days?—Yes.

6653. You were imprisoned in Pentonville?—Yes.

6654. (*Mr. Whitbread.*) What diet were you on?—Brown bread and water only was what I had. I had something else brought for dinner which I found it impossible to eat.

6655. (*Mr. Picton.*) Had you to sleep upon a plank bed?—Yes.

6656. How was it you were in prison in this instance and not in the other case?—Because in this instance I determined not to pay the fine.

6657. Did you resist distraint?—I had made over my effects to my wife some long time prior to that.

6658. (*Dr. Collins.*) Do you happen to know whether there are any other persons in your neighbourhood who have not been treated with the same rigour that you have, although they have not complied with the vaccination laws?—The president of the Anti-Compulsory Vaccination League for that district, the Rev. William Cuff, has not been summoned, as I am informed on good authority.

6659. Was your health affected by your imprisonment?—Very seriously.

6660. Did you find on your return home that your neighbours regarded you as a criminal?—Not at all; public opinion was too strong against vaccination, specially the compulsory clauses.

6661. (*Mr. Picton.*) Did it make any difference to your position as choir master?—I had previously retired from that position.

6662. (*Sir Edwin Galsworthy.*) Was it regarded at all as a grievance that the Rev. William Cuff was not summoned?—I think it is regarded as a grievance that clergymen and people of position are not summoned, while working men, like myself, are.

The witness withdrew.

Mr. Brown Lee.

Mr. Brown Lee examined.

6663. (*Chairman.*) You are a foreman tailor at Keighley?—Yes.

6664. You have been imprisoned for breach of the vaccination laws?—I have.

6665. Upon refusal to pay fines?—Yes.

6666. You had seven days in September 1879 and 14 days in October of the same year?—Yes, without being allowed to speak in my own defence.

6667. What was the second case for, was that for another child?—For the same child.

6668. A further fine?—The first thing I went for was for the costs of the hearing; they made an order to have the vaccination done in 14 days.

6669. The second was for non-payment of the fine for not vaccinating?—Yes, and the costs.

6670. (*Mr. Picton.*) What set you against vaccination?—Seeing a case which had been vaccinated when it was 12 months old, a little boy which could run about.

6671. It was an injury caused by vaccination?—Yes, it could never walk any more.

6672. (*Chairman.*) Was it your own child?—No.

6673. When did this happen?—It was in 1874 when I saw it; it was then 12 years of age, it was at Cullingworth near Bingley; the parents brought it in in their arms for me to look at.

6674. (*Mr. Picton.*) Do you recollect the epidemic of small-pox in 1877 in your district?—That was in Bingley.

6675. Did you examine 11 cases?—I asked the parents in certain cases where the patient was too young to answer for itself.

6676. In how many cases did you find they had been vaccinated?—There were 10 out of the 11 cases, and one had been twice vaccinated; he was 17 years of age, and the first to have the small-pox.

6677. How long were you imprisoned?—I was imprisoned for 14 days the second time; the first time seven days.

6678. Were you treated as an ordinary prisoner?—I was.

6679. Did you sleep on a plank bed?—I had a hammock.

6680. Was it before the time of plank beds?—I do not know about plank beds.

6681. What kind of food did you have?—Bread and water.

6682. What kind of work had you to do?—Tailoring.

6683. Were you sentenced to hard labour the second time?—No.

6684. (*Dr. Collins.*) Have you been summoned again since your imprisonment?—No.

6685. Was that because your imprisonment had induced you to have your children vaccinated?—No, my children are not vaccinated; I have no children vaccinated; there have been none summoned in that town since, while before that they were repeatedly summoned time after time and their furniture sold. As long as they fed them with fines and that sort of thing it continued, but as soon as they found some one was going to resist them strongly, prosecution was discontinued, and there has been no one summoned since.

The witness withdrew.

Mr. William Guest.

Mr. William Guest examined.

6686. (*Chairman.*) You are a gardener at Quinton?—Yes.

6687. In 1878 I believe you were fined 1*l.* and 8*s.* costs for breach of the Vaccination Act?—Yes.

6688. In June 1880 were you sentenced to 14 days' hard labour in the case of each of two children for not vaccinating them, or for not paying the fine imposed?—On that occasion, or a month before then,

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I was summoned, and orders were made to have the children vaccinated within 14 days, and upon not complying with that order I was summoned again, and then two fines were imposed.

6689. You were imprisoned for not paying the fine?—Yes.

6690. I believe eight days of your term were remitted?—I suppose it was on account of inflicting hard labour on that occasion, which was illegal.

6691. In December 1882 and in June 1887 did you again suffer seven days' imprisonment on each of those occasions for non-vaccinating your children?—In 1882 I was summoned for two children at once, and I suffered seven days for each child.

6692. Fourteen days in all?—Yes, 14 days in all.

6693. It was the same in 1887?—It was. I was in prison 14 days for one child only.

6694. (*Mr. Picton.*) In all those cases were you treated in prison as though you were a criminal?—In everything, excepting the hard labour. In the first instance hard labour was imposed until I objected to it to the governor or chief warder of the gaol, and then he said he should not keep me to hard labour any longer until he had made inquiries from the magistrates at Halesowen, and then they remitted eight days of the sentence. I suppose it was in consideration of the fact that they had illegally inflicted hard labour.

6695. Had you to wear the ordinary prison dress?—Yes.

6696. (*Dr. Collins.*) What labour had you to do?—Breaking stones. When not on hard labour I had to pick oakum.

6697. (*Mr. Meadows White.*) Do you happen to know of any other persons imprisoned for not paying fines imposed?—I did not hear of them.

6698. Was there any difference made between your case and such cases as theirs?—I could not tell. I almost think I have some little recollection of one man who was there for debt, but I could not say anything about his treatment.

6699. (*Dr. Collins.*) Have you found that your neighbours thought less well of you on your return from gaol?—No, I think there was more sympathy than anything else.

The witness withdrew.

Mr. George Bainborough examined.

Mr. George Bainborough.

6700. (*Chairman.*) Are you a grocer at Gainsborough?—Yes.

6701. I believe in 1876 you were fined 20*s.* and 12*s.* costs for breach of the vaccination laws?—Yes.

6702. And for non-payment you were sentenced to 14 days' hard labour?—Yes.

6703. And you were kept on the tread-mill?—Yes.

6704. You have been subsequently fined 1*l.* 9*s.* 6*d.* for each of three children?—That is so.

6705. Did you pay the later fines?—Yes; in each case.

6706. But you have not vaccinated the children?—No.

6707. (*Mr. Picton.*) Was it found afterwards that the sentence of hard labour was illegal?—Yes.

6708. What took place in consequence?—The magistrates paid the sum of 40*l.* as compensation to me.

6709. Was that done without any appeal to a law court?—No; an appeal was made to the High Court by Messrs. Wilkinson and Sons, I believe.

6710. (*Mr. Meadows White.*) Was there any action brought against the magistrates?—It never came to trial.

6711. But there was a writ issued?—Yes.

6712. And they paid 40*l.*?—Yes.

6713. (*Mr. Picton.*) Do you know on what ground that was done?—Because I suffered hard labour.

6714. Was any attempt made to distrain upon you before giving you the hard labour?—No; the point upon which the writ was taken out was giving me hard labour.

6715. How many have been summoned in Gainsborough within the last three years?—There were about 170 or 180 cases that were in arrears besides ordinary cases.

6716. (*Dr. Collins.*) How long have you lived in Gainsborough?—I have lived there twice; it was 15 years since I was there, and then I was three years and a half in the Sleaford district, where I was prosecuted and sent to the tread-mill.

6717. Have you any personal knowledge of injury from vaccination occurring in Gainsborough?—Not in Gainsborough. What originally drew my attention to the subject was the case of a child of an employer of mine at Market Rasen; the child was perfectly healthy when it was vaccinated, and shortly after its vaccination its head was covered with sores, which one of his medical attendants attributed to vaccination.

6718. Are you not aware of some cases of erysipelas occurring in Gainsborough some years ago which were the subject of an inquiry?—I only know about it through the newspapers.

The witness withdrew.

Mr. Samuel Joseph West examined.

Mr. Samuel Joseph West.

6719. (*Chairman.*) You are a coffee-house keeper at Gillingham in Kent?—Yes.

6720. You have been fined for breaches of the vaccination laws?—Yes.

6721. Can you tell me in all how many times?—I have been prosecuted 15 times.

6722. And how many times fined?—The total of the fines is 14*l.* 14*s.* 6*d.*; twice I have been to gaol, and six times a distraint was levied on my goods.

6723. How long were you in gaol?—Seven days the first time and 31 days the next.

6724. Was that for non-payment of the fine?—Yes.

6725. (*Mr. Picton.*) Have you had experience of the operation of the law in your neighbourhood in cases besides your own?—Yes, in the case of Mr. Charles Washington Nye; he has been up nine different times; he has received sentences of six calendar months.

6726. That is putting them altogether, is it?—No, those are the separate sentences. One 14 days, one 21 and one 31 days; one sentence, 14 days, was never put in force; he was sentenced to imprisonment nine times, and imprisoned eight times.

6727. What was the six months for?—Those were six separate sentences of 31 days.

6728. He is personally known to you?—Yes. I have the whole of his statement written by himself, if the Commission desire to see it.

6729. Who is the medical officer of the Medway Union?—Mr. Walter Buchanan.

6730. Do you remember his reporting six deaths from small-pox?—Yes, at the time of the small-pox epidemic in Chatham.

6731. Did he report them as unvaccinated?—Yes.

6732. Was an inquiry made afterwards?—Yes.

6733. (*Chairman.*) How do you know he reported them as unvaccinated?—By a local newspaper giving a report of the meeting of the board of guardians.

6734. (*Mr. Picton.*) Was a definite inquiry afterwards made into those cases?—Yes.

6735. Was it an official inquiry?—No, we organised the inquiry ourselves under the orders of the Local Government Board; the board of guardians would not furnish us with the names and addresses at first. Mr. Sclater Booth was then the president, and we wrote to

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him and he gave the order that we were to be supplied with the names and addresses of the persons who had been reported as having died unvaccinated. The father of the medical officer is the clerk to the guardians; he said he could not give the addresses; it was impossible that the parties he supposed had gone to Heaven; and when we got the addresses it was found that one of the children had been vaccinated by the very person who gave the report that it had not been vaccinated.

6736. Did Dr. Buchanan acknowledge having vaccinated it?—He acknowledged that, and he corrected his error, but then he got out of it in this way. He said that these were cases of confluent small-pox, so that he could not see the cicatrices, and that was how he came to report them as unvaccinated.

6737. Did he acknowledge that he had been wrong?—Yes, he acknowledged that he had been wrong, but that he had not wilfully made the error.

6738. (*Mr. Meadows White.*) Was that the only case?—No, there was the case of Peter Baker; he had been twice revaccinated in the militia.

6739. (*Mr. Picton.*) Did you find that out of the six alleged unvaccinated cases five were vaccinated?—Yes, and one did not die till two days after the doctor made this report.

6740. Did Dr. Buchanan acknowledge that he had been in error?—Yes, to the guardians as reported in the columns of the local newspaper.

6741. Have you the cuttings from that newspaper?—I have not them with me, but I could refer you to them.

6472. Would it appear in the minutes of the guardians?—Yes, only the doctor's father would have the entering of the minutes; his father is the clerk.

6743. (*Dr. Collins.*) Is Mr. Smallman, of Strood, known to you?—Yes.

6744. Has he been prosecuted for not having his child vaccinated?—Yes.

6745. Do you know what certificate he produced to the court?—Yes, the certificate of the death of his previous child; the following is a copy of the certificate, "To the registrar of the sub-district in which the "death took place: I hereby certify that I attended "Charles Smallman, aged four months last birthday; "that I last saw him on February 25th, 1875; that he "died on February 27th at Rochester, and that the "cause of his death was—Cause of death: First, vac-"cination. Second, erysipelas. Time from attack "till death, 1 month 20 days.—J. A. Brown, prof. title "M.D. Address, Rochester. Date, March 2nd, 1875."

6746. Was Mr. Smallman fined notwithstanding?—Yes.

6747. And you speak on behalf of Mr. Charles Washington Nye, of Chatham?—Yes.

6748. Could you tell me the date of the first prosecution of Mr. Nye; was it 1866?—It was on the 9th of October 1869.

6749. Was that the first time he was prosecuted?—Yes; it was in 1866 that he lost two children through vaccination.

6750. Was he sentenced to 14 days' imprisonment for refusing to have his children vaccinated, on the 19th of October 1869?—Yes.

6751. Was he again sentenced to 14 days' imprisonment for the same offence on the 1st of March 1870?—Yes, but he did not undergo the imprisonment.

6752. Upon the 19th of May 1870 was he sentenced for the same offence?—Yes, for 21 days.

6753. And he was imprisoned for 21 days?—Yes.

6754. Was he again apprehended for the same offence upon the 28th of July 1870, and taken to the county gaol at Canterbury for 31 days?—On the 28th of July.

6755. Was he again apprehended for the same offence in December 1870?—Upon the 16th of December.

6756. Did he again have 31 days' imprisonment in Canterbury Gaol?—Yes.

6757. (*Chairman.*) When you say for the same offence do you mean for the non-payment of the fine or for the non-vaccination of the same child?—For not having the same child vaccinated.

6758. (*Mr. Meadows White.*) With regard to the case of Dr. Walter Buchanan, were certificates of vaccination produced in the cases of the five or six persons alluded to?—We only had information from the relatives.

6759. But did you go to the registrar to ascertain whether there were certificates of vaccination?—No, it would not have been any good our going there because he was the very man who was prosecuting us.

6760. (*Chairman.*) But that does not matter—there are books in which there is kept the registration, which would show whether the children had been vaccinated?—I did not know that the ratepayers would be allowed to look at those.

6761. (*Mr. Meadows White.*) If there had been no registration of the vaccination that was an improper neglect, and you might have complained of the negligence of the officer; but have you any record of what you say, namely, that Dr. Buchanan acknowledged the error?—No, not with me. I only received notice to appear here on Monday night; I have two large cupboards full of anti-vaccination papers at my house.

6762. But, having to come up, did you seek for the papers you had to rely upon?—Yes, I did seek for the papers.

6763. But you have not got them?—I have not got the newspaper containing the report.

6764. (*Mr. Picton.*) Will you let us have such proofs as you possess that Dr. Buchanan acknowledged his mistake to the board of guardians?—Yes, the whole of the inquiry was taken up and conducted by myself and Mr. Nye.

The witness withdrew.

Adjourned till Wednesday next at 1 o'clock.

Twenty-sixth Day.

Wednesday, 19th February 1890.

PRESENT:

THE RIGHT HON. THE LORD HERSCHELL IN THE CHAIR.

Sir JAMES PAGET, Bart.
Sir W. GUYER HUNTER, K.C.M.G., M.P.
Sir EDWIN HENRY GALSWORTHY.
Sir WILLIAM SAVORY, Bart.
Mr. CHARLES BRADLAUGH, M.P.
Dr. WILLIAM JOB COLLINS.
Mr. JOHN STRATFORD DUGDALE, Q.C., M.P.
Professor MICHAEL FOSTER.
Mr. JONATHAN HUTCHINSON.
Mr. J. ALLANSON PICTON, M.P.
Mr. SAMUEL WHITBREAD, M.P.
Mr. F. MEADOWS WHITE, Q.C.

Mr. BRET INCE, *Secretary.*

Mr. ARTHUR F. HOPKIRK, M.D. (Jena), further examined.

Mr. Arthur F. Hopkirk, M.D.

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6765. (*Dr. Collins.*) Perhaps I should ask you in the first place whether you are desirous of supplementing any evidence which was given by you before the Commission on the occasion of your last appearance here?—With regard to the evidence from Chemnitz, I have taken some more notes from Flinzer's work in which he enters into detail as to the spread of the epidemic. In the first place, speaking of the various households, he says, "of the 2,208 inhabited buildings in Chemnitz in "943 houses, i.e., 42·71 per cent., there were cases "of small-pox. Of the whole population 3,596, or "5·60 per cent., and of the total 13,881 households "2,108, or 15 per cent., were attacked by the disease, "and in such a manner that 2·67 per cent. of the cases "fell to such establishments as were inhabited by per-"sons all of whom had been vaccinated, but 12·48 per "cent. where unvaccinated individuals were to be "found." I am not giving Flinzer's words exactly, but only an abbreviation of them. "Of the total num-"ber of households 9,464, or 68·18 per cent., con-"tained none but vaccinated individuals, and showed "371, i.e., 3·92 per cent. of cases of small-pox; "whereas in 4,417 or 31·52 per cent. of households "containing unvaccinated individuals, 1,732 or 39·11 "per cent., of cases occurred." Then I have some notes as to the distribution of the disease amongst the various groups, notes which also show the relation of the vaccinated to the unvaccinated in the various households, and how the disease spread.

6766. That I suppose could be obtained by anyone who made a reference to Flinzer's paper?—Yes, it is in the first part of Flinzer's unimpeachable report.

6767. Have you any reason to suppose from your careful examination of that epidemic that that epidemic was one of the ordinary type of small-pox?—It was an epidemic which varied very much according to the part of the town that was attacked; in some parts of the town it was fairly severe and in other parts it appeared in a very light form, and Flinzer has been able to show that where there was but little vaccination the epidemic took a severe form, that where there was good vaccination it took a mild form, and that in those parts where vaccination was bad, even the well-vaccinated households were more severely attacked than in those parts where the vaccination was good.

6768. Then am I right in concluding that where the epidemic attacked the unvaccinated it attacked them severely?—Not very severely; there were not many very bad cases in Chemnitz altogether as far as I can find from Flinzer's report.

6769. I think in your Table E. you gave the mortalty of the unvaccinated under 10 years of age as 9 per cent.?—Yes.

6770. In Table N. am I right in saying that you gave the mortality of the vaccinated in Coblentz in 1871 as 18·03 per cent.?—Yes.

6771. Is there any other correction that you wish to make in your evidence given upon the last occasion?—I should like to be allowed to read these further notes from Flinzer as to the epidemic in Chemnitz, as they bear very much upon this question, as to how the small-pox attacked the various portions of the community, according to the number of vaccinated or unvaccinated living in the different portions of the community. "Of "the 135 streets and public places 21 were free from the "disease. These streets, &c., contained 66 houses, "with 201 households, and 1,056 inhabitants; i.e., "for each house 16·00 persons. Of these households "in 80·60 per. cent. there were none but vaccinated "individuals, and in 19·40 there were unvaccinated "persons. Of the occupiers 89·40 per cent. were "vaccinated, 4·26 unvaccinated, and 6·34 had already "had small-pox; of the latter 74·63 per cent. had "never been vaccinated. The per-centage of re-vac-"cinated was 7.29. In 45 streets containing 591 "houses, 11,955 inhabitants in 2,550 households, giving "on an average 20·23 persons per house. Where there "were cases without deaths: 74·08 per cent. of the "households were vaccinated and had but 3·29 per cent. "of cases, whereas of the 25·92 per cent. of households "containing unvaccinated individuals there were 26·48 "per cent. of cases. In the other 69 streets there "were 1,551 houses with 11,130 households and 51,244 "inhabitants, an average of 33·04 persons per house. "Of these households only 66·60 per cent. contained "vaccinated persons, 33·40 having also such as were "unvaccinated; of the former 3·8 per cent. and of the "latter 41·89 per cent. were attacked by small-pox. "Of the inhabitants 82·95 per cent. were vaccinated, "9·47 unvaccinated, and 7·58 per cent. had previously "had small-pox, 78·30 per cent. of the latter being un-"vaccinated and 21·70 per cent. vaccinated."

6772. (*Mr. Picton.*) Have you any indication as to the ages of the vaccinated and the unvaccinated?—Table VI. of Flinzer's Report, given in my Table E. (*see page* 235), gives the number of cases amongst the vaccinated and the unvaccinated, and also the number of mild cases amongst the vaccinated.

6773. (*Dr. Collins.*) Is there any other point upon which you desire to correct or add to your previous evidence?—I think not. I have only quoted from recognised authorities.

6774. At Question 1543 you gave us some information respecting the 23,469 French soldiers who are said to have died from small-pox during the war of 1870-71, and you remarked: "This statement has recently been "confirmed from Paris, but I have only seen it men-"tioned in a German newspaper, and I have not "been able to find out on what French authority it is; "but it is stated that it is really confirmed that so "many men died from small-pox. I believe the "recent confirmation of that is official"; have you anything that you could add to that answer?—No, except that I believe that it is really official; that it is an absolute fact. I am fully convinced that the paper from which I quoted took the statement from a recent French official public document.

6775. You are acquainted with the reports which are presented to the Minister of the Interior annually in France, are you not; you quoted from such reports in your answer to Question 1546?—Yes.

6776. That would be the proper authority to refer to for statistics of that kind, would it not?—Not as far as the military statistics are concerned, but only for the local communes. There are certain military statistics given there, but only for the garrison of Paris; the others

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were nearly all as to vaccinations performed on the civil population in the different departments.

6777. Have you seen the report presented to the Minister of the Interior in 1889?—No.

6778. Will you be so good as to look at pages 46 and 47; does not that report give the figures for the whole army?—At the bottom there is a table from the "Ministre de la Guerre"; that is only of the mortality from small-pox from 1863 to 1887.

6779. Would you kindly read from page 46 the figures of the deaths from small-pox from the year 1863?—This says, "Minister of War: Graphic table show-"ing the morbidity and mortality from small-pox in "the French Army from 1863 to 1887."

6780. Will you give us the deaths in 1863?—They are given as 67; for 1864, 69; for 1865, 55; for 1866, 43; for 1867, 70; for 1868, 156; for 1869, 63; for 1870 and 1871, no statistics.

6781. Do you observe on page 47, the last paragraph but one, "In 1870–71 the medical statistics are want-"ing"?—Yes, that is to say, absolutely accurate medical statistics in all details are wanting; but there has been a very fair summary, a summary that has not been challenged by any French authority of note.

6782. Will you read and translate the paragraph under Table B., page 47?—"The two diagrams show "all that the medical statistics of the army have to "show from documents relating to morbidity and "mortality from small-pox from 1863 to 1887"; but I see no reference in that to the very important paper by Chenou, nor from the Reports of the *Société française de secours aux blessés*.

6783. But you are acquainted with these "Rapports "presenté à son Excellence le Ministre de l'Agriculture "par l'Académie Impériale de Médicine sur les Vaccina-"tions pratiquées en France"?—Yes.

6784. Having read that report would you adhere to the statement "that the recent confirmation of that is "official," as you stated a short time back?—I should imagine so.

6785. What official authority is there for these figures apart from those tables presented to the Minister of War, which state that they contain all French army statistics since 1863 relative to small-pox?—Of recent absolute official authority I know nothing personally, but the fact remains that those figures have not been contradicted outside this country.

6786. Do you happen to know how that figure of 23,469 was arrived at?—I should imagine partially by calculation because it must have been perfectly impossible for the French, in the state that they then were, to keep accurate statistics. The Germans themselves were unable to keep such, but the statement given by me agrees entirely with the statistics shown by Chenou for Langres, although a little bit higher.

6787. Are you aware of any figures upon which that calculation was based?—No.

6788. In the absence of any figures upon which that calculation was based, and in the absence of any statistics of that kind in the Report to the Minister of War for the years 1870–71, do you still adhere to the statement that the recent confirmation was official?—I consider it to be official, otherwise it would not have been published in a trustworthy German medical journal as officially confirmed in Paris.

6789. Will you kindly give me a little more information with regard to the alteration which was made in the Vaccination Law of the German Empire in the year 1874, I think; will you tell me once again what were the provisions which obtained for securing thorough vaccination under previous enactments?—In the year 1835 there was an ordinance according to which children entering certain schools should be vaccinated, and also, according to which, in case of the outbreak of an epidemic, the police authorities could enforce compulsory vaccination. The law or ordinance also affected the Army; the Landwehr as well as the regular army had to be vaccinated or re-vaccinated as the case might be. Certain penalties were supposed to be imposed but were very seldom enforced; and, in fact, as every German authority, including the celebrated Robert Koch, admits, all it amounted to was that there was no real compulsion. As he wrote before, vaccination was obligatory and not compulsory. In 1874 the law was altered.

6790. Could you give me paragraph 54 of the law of 1835?—No, I am sorry to say I could not.

6791. Does it state "Heads of schools, master "craftsmen, tradesmen, and the employers of servants "will do well to satisfy themselves that those who have "entered on a course of instruction with them, or into "apprenticeship, or have taken service with them, have "been vaccinated; persons who seek any scholarship or "other benefices for their children or their wards, or "who seek to place them in any public establishment, "are to be refused if they cannot furnish proof of their "vaccination having been duly performed"?—But you will take into consideration that the words are "will do well." I can assure you that that ordinance never had the absolute force of law. Schultz states it in his work to be only "advice," and so does Pfeiffer, and I am not aware that any member of the German Commission gave any other interpretation of the law in question than that I have given.

6792. Are you aware that the proclamation which stands in front of the law of 1835 declares "I have "approved these rules and now confirm them with an "order that they should be obeyed by everyone within "the whole extent of my dominion under penalty of the "fine and imprisonment provided; and that all officials "concerned should act upon them"?—I cannot say that I ever studied that enactment of 1835.

6793. It would be important to study the enactment of 1835, would it not, in order to come to a just conclusion as to the degree to which Prussia was a well vaccinated country prior to 1874?—I think one has sufficient evidence of that in the statistics of vaccination prior to 1874; so marked is it that it must be evident to any one that there could never have been any pressure at all. All German authorities are agreed upon the point that compulsion could not and did not exist, prior to the law of 1874.

6794. Are you aware that Dr. Seaton before the Committee of 1871 when asked by Mr. Jacob Bright at Question 5608, "Then Prussia is not one of the best "protected countries in Europe?" replied, "You are "asking me about things as to which I should like to "refresh my memory, but I know Prussia is well "protected"?—If you refer to one of the tables which I have handed in, Table B., you will see the proportion of vaccinations to births in Berlin from 1860 to 1871, and there you will see that whereas in 1864 there were 24,631 births and 25,153 vaccinations, in 1870 there were 32,594 births and only 9,547 vaccinations, showing that there was not a very strong law rendering vaccination compulsory.

6795. Then the result of your reading is to go to show that the statement made by Dr. Seaton before the Committee of 1871, that of his own knowledge Prussia was well protected as regards vaccination was incorrect?—That it was incorrect, being in fact based upon inaccurate information.

6796. Was not there prior to 1835 a law of June the 16th, 1834, which had reference to vaccination in the army?—Yes, in the army.

6797. Do you happen to remember the provisions of that enactment?—I cannot say that I do.

6798. Will this (*handing a paper to the witness*) refresh your memory? Would you kindly translate that for the benefit of the Commission?—In this regulation, under paragraph 3, it is stated that recruits must be revaccinated during the first six months of their being called in, either by military doctors or by surgeons under special supervision and instruction from the said army surgeons, at least 10 insertions being made in each arm.

6799. (*Sir James Paget.*) Is there any evidence that that was obeyed or not?—I believe it was obeyed always; and those men who refused to be vaccinated were tied down and vaccinated by force.

6800. And that would include all the healthy male population of Prussia?—Nearly all; certain men, however, would escape the military service.

6801. Very few would?—Very few, no doubt; but in the case of a widow with one son, the son might under certain circumstances escape.

6802. (*Dr. Collins.*) Do the statistics of mortality from small-pox in Germany since that time show a vast preponderance of female mortality?—That is a question into which I have never gone.

6803. It would be an interesting question to follow out?—"A vast preponderance," I am almost certain they do not show, for the simple reason that the re-

vaccinations only affected the military population, and were only really thoroughly successful in later years.

6804. Do you happen to know that they show a preponderance of deaths of males over females?—No.

6805. Do you happen to know that they do not?—I am not aware of these facts.

6806. (*Chairman.*) At about what age do they enter the army?—From 19 to 21; educated men generally a little bit later, generally 22 or 23. I would beg to say, that all those tables of the earlier date have really very little value, because the returns were collected in a most careless manner; there is really no authority for them. You find that the police lists and the doctors' lists do not agree; that has been shown on several occasions, even as late as the statistics for Berlin in the epidemic of 1871-72, when the police lists showed less deaths from small-pox than the certificates of death.

6807. (*Dr. Collins.*) Might I call your attention to a statement that you made at the end of your answer to Question 1469, where you say that "none of the "children under 10 died who were vaccinated—that "was the same in Prussia;" do I understand from that that no vaccinated children died from small-pox under 10 in Prussia?—Yes; I think that is accurate. I think if you refer to Dr. Guttstadt's paper, you will find the statement there. Of course I am expressing no opinion of my own. I simply quote what I have taken from officials.

6808. I called your attention to the Beiträge, published in Berlin in the year 1888; have you had an opportunity of consulting that?—I have not seen that.

6809. Would you look at the figures given on page 160; directing your attention to the last table on that page, would you kindly tell us what it states?—This table refers to cases only, not to deaths.

6810. Will you give the statement contained in that paper?—It only says here, "Collected by the Berlin Sanitary Commission."

6811. Does that table show that there were cases of small-pox occurring in vaccinated or re-vaccinated persons under the age of 10?—Yes, certainly. I had meant to imply deaths by my statement, and you will find that in the epidemic of 1881 all the deaths amongst children were of unvaccinated children. I think there were 150 deaths altogether then in Berlin.

6812. But does that statement, that none of the vaccinated children under the age of 10 died of small-pox, apply to the epidemic of 1870, 1871, and 1872?—I should have to refer to Dr. Guttstadt's paper for that.

6813. Would you kindly look at page 168 of the same official work; that table gives the attacks, and also the deaths; do you find there any cases of deaths amongst children under 10 years of age from small-pox who had been vaccinated or revaccinated?—Certainly.

6814. Would you read out the numbers in the first year of life?—In the first year there were 259 cases and 136 deaths; from one to six there were 1,244 cases and 437 deaths; from the 6th to the 10th year there were 737 cases and 133 deaths; but it must be borne in mind that at this time there was no guarantee that any person was vaccinated at all; no guarantee whatever.

6815. (*Mr. Picton.*) But are they not entered in the table as vaccinated?—Yes, a thing which, in Germany, now-a-days, counts as nothing.

6816. (*Sir William Savory.*) Should you accept that as trustworthy?—No, I should not, because every authority I have ever read upon the subject has invariably stated that before 1874 it was utterly impossible to say whether a person had been vaccinated or not, unless you could see the marks upon his or her arm; there were no official lists kept.

6817. (*Mr. Picton.*) That would affect both the lists of the vaccinated and the unvaccinated, would it not?—Yes, to a certain extent.

6818. (*Mr. Bradlaugh.*) Had you, prior to giving the answer to Question 1469, referred to any of those tables?—No, not to Dr. Collins' tables; I had not seen them.

6819. Had you referred to any tables in which it appeared to be stated that vaccinated children died?—For Leipzig I had seen such tables, but here I was answering for Prussia.

6820. Would it not have been fairer to the Commission, when you gave the positive answer that no vaccinated children under 10 died in Prussia, to have stated that there were some tables that stated to the contrary?—It was not my intention to mislead the Commission at all, I have done my best to state nothing but the truth.

6821. (*Chairman.*) The table you had seen, I understand, did not refer to Prussia at all?—It did not refer to Prussia, at all; it referred to Leipzig.

6822. (*Mr. Bradlaugh.*) Had you referred to any Prussian tables at all showing the deaths of vaccinated and unvaccinated persons before you gave that answer?—Yes, to Dr. Guttstadt's tables. Dr. Guttstadt, in the large table provided by him, does not state the details as to vaccination; he only gives the total number.

6823. Had you referred to any tables whatever of Prussian statistics, which showed the vaccinated and unvaccinated children who had died of small-pox?—I spoke at that time simply from the tables I had referred to generally. I could not refer to any special one.

6824. (*Professor Michael Foster.*) Do you not quote Dr. Guttstadt?—Yes.

6825. Have you a copy of the proceedings of the seventh day of the Commission?—Yes.

6826. In Question 1469 there is a hyphen after "vaccinated"; there ought to be a full stop after "vaccinated," ought there not? Then you say it was the same in Prussia, and your reason for that is Dr. Guttstadt's authority?—Yes. What I mentioned came from Dr. Guttstadt.

6827. But now you mean that "vaccinated" for that epoch in Prussia has no meaning?—No absolute meaning because you never could be absolutely certain.

6828. (*Dr. Collins.*) Has "unvaccinated" at that epoch in Prussia any meaning?—Yes, to an extent.

6829. You would accept the one and you would refuse the other?—Yes, certainly, because many people would pretend they were vaccinated simply to escape the possibility of penalty. Others who did not care would admit that they were unvaccinated.

6830. (*Sir William Savory.*) What was the inducement to state that they were vaccinated when they were not?—To escape the penalty, and so as to get their children into certain cheap schools.

6831. (*Dr. Collins.*) Were not the police held responsible for the accuracy of those statements which they prepared?—They were supposed to be, but the lists have been shown to be very faulty, especially at Berlin. Müller's lists for Berlin 1870 have been shown to be utterly incorrect; those are the police lists.

6832. (*Sir William Savory.*) Did they accept the person's statement that the person was vaccinated without requiring any authority?—Yes, the mere statement of the parent or guardian, or even of the pastor of the parish was accepted.

6833. (*Dr. Collins.*) Was there no medical certificate required?—Yes; but when that was not forthcoming, under certain circumstances the statement of the parent, or of those other persons mentioned above, was taken.

6834. Was not there a medical certificate required in the case of a death from small-pox, stating whether the patient was vaccinated or not?—Yes, in the case of a death from small-pox, but where would it come from?

6835. Would not the doctor giving the certificate have to satisfy himself as to the facts?—Yes, no doubt, so far as he could.

6836. At any rate you would adhere to the answer you gave to Question 1633 that "these statistics are "now considered valueless in Germany"?—Yes.

6837. Although they appear in a work published by the Kaiserlichen Gesundheits-Amte in 1888?—Certainly. All the authorities are agreed on this point.

6838. In reference to Table A., under which you purport to show by your statistics the influence of vaccination, why do you terminate it with the year 1870?—I had no further statistics. Those are taken from Dr. Guttstadt's Reports. I have been most careful to take them as they were given by the authorities, not adding anything to or taking anything from them.

6839. You give the figures for the year 1871 in the next table you will observe?—Yes, exactly as you will find them in Dr. Guttstadt's Report; a copy is here, I know.

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6840. Table F. gives an account of the small-pox epidemic in the three towns Rawicz, Bojanowo, and Sarnowo in 1795-6, does it not?—Yes.

6841-2. That would be prior to any vaccination; what was the total mortality per cent. in that epidemic?—15·9; that is to say, up to the twentieth year.

6843. Will you turn to Table G.; might I ask you kindly to explain again with what object that table is put in?—The object was to show the difference between the mortality from the first up to the twentieth year under pre-vaccination, and from the first to the twentieth year after Jenner's discovery.

6844. What was the mortality in the first year of life prior to Jenner's discovery as shown by that table?—35·9.

6845. And after Jenner's discovery?—34·7; but without any question as to the amount of vaccination, because in Bavaria at that time there was no vaccination compulsory until the end of the third year. Under the first vaccination law in Bavaria, passed in 1807, it was not necessary that a child should be vaccinated until it had completed its third year.

6846. What was the mortality from 0 to 20 before Jenner's discovery?—15·9.

6847. And afterwards?—13.

6848. You, I think, adhere or subscribe to the opinion that small-pox and cow-pox are identical diseases, or at any rate closely related?—Certainly, closely related.

6349. In fact, that small-pox can be converted into cow-pox by inoculation of the cow?—Yes.

6850. (*Chairman.*) Is your per-centage in Table G. the per-centage of deaths to cases, or what?—Deaths to cases.

6851. Then of those 27 deaths to the 210 cases which make the 13 per cent., 26, or all but one, took place under one year of age?—Yes, at the time when there was no vaccination. That is the time when in all probability they were not vaccinated at all. There is always that to be considered in dealing with tables, that in Bavaria up to 1864 vaccination was not compulsory until the third year, or rather the end of the second year. (*To Dr. Collins.*) The question of the transferability of small-pox into cow-pox has been recently discussed again in Germany, not only did Voigt of Hamburgh in Germany succeed in 1882 but two other men have since done so.

6852. (*Dr. Collins.*) What are the names of the other two men?—I cannot remember at the moment. I think one was in Heidelberg, and the other in Carlsruhe.

6853. Have you read their works?—I have not read their works; the only one I have thoroughly studied is Voigt of Hamburgh.

6854. You give Sunderland as one of your authorities?—Sunderland is mentioned by Pfeiffer.

6855. Have you read his paper?—No.

6856. Are you not acquainted with the way in which he worked?—No.

6857. Neumann is also mentioned?—Neumann is also mentioned.

6858. Have you read his paper?—I have not read his paper, but I have read a summary of it.

6859. Do you know how many experiments he made?—I could not say.

6860. Macpherson, in India, is also mentioned?—Yes; those are all older works mentioned in the literature of the subject.

6861. You have read Voigt's experiments, I understand you to say?—Yes.

6862. In the case in which he was successful in variolating a cow, had that cow not also been recently inoculated with vaccine?—It had been vaccinated on one side and variolated on the other, but he has had other successful experiments since then.

6863. Could you kindly give me the reference to the other successful experiments since then?—I am afraid I could not do so at the moment, but they are published either in the "Berliner Klinische Wochen-"schrift" or the "Wiener Medicinische Wochen-"schrift."

6864. (*Mr. Bradlaugh.*) I think you told Dr. Collins that you have yourself studied the Prussian ordinance or enactment of 1835?—No.

6865. Nor that of 1834?—No; I have seen copies of them, but I have never studied them.

6866. What does that statement mean; does that mean that you have or have not examined them yourself?—I never examined them minutely, because at the time I saw them they presented no aspect of interest.

6867. You did not regard them?—No.

6868. Not at all?—Not as laws rendering vacciation compulsory.

6869. Then when you gave the answer to my Lord's question, No. 1433, "certainly," as to the vaccination laws, you were not relying upon any reading of the laws yourself?—No, I was relying upon the interpretation which was given me by people in authority in Berlin.

6870. On what occasion did people in authority in Berlin give that interpretation of the laws?—I attended an anti-vaccinationist meeting in Notting Hill, I think it was, and a certain Mr. Alfred Milnes flatly contradicted me upon the question of the vaccination laws of Germany. Upon that I wrote at once to Geheimrath Koch, and I wrote to Professor Fürbringer, my old teacher, and asked them was I right in stating that there had been no compulsory vaccination in Germany before 1875. Both of them answered me that I was perfectly right in my statement.

6871. Was there anything more in the statement than that?—Professor Fürbringer said that for the army vaccination or revaccination had been made compulsory in 1834 or 1835, and for the civil population in 1874 or 1875.

6872. That was what you founded your answer to Question 1433 upon; you rather positively stated that the Order of 1835 had never had the force of law. You have no personal knowledge of that yourself?—No. I am hardly old enough to have personal knowledge of it. I took it from Schultz, who is an authority.

6873. You told Dr. Collins that all the tables of early date are of little value or are without value?—Not altogether but to a great extent, because there were so many persons included among the vaccinated who were not really vaccinated.

6874. In the first place, what should we understand by "the tables of early date"; from what date to what date?—For absolute statistical value, so far as Germany is concerned, I would say up to 1875.

6875. And back to when?—To an indefinite period.

6876. How far have you examined them back from 1875?—As far as Guttstadt goes; that is, 1816.

6877. Did you make any other examination of the tables than by reading Guttstadt's book?—I have read various other works.

6878. To what date, apart from Guttstadt, have you examined the tables back from 1875?—That is quite impossible for me to say.

6879. I understood you to want to give me some modifications of the words, "had very little value," which you used just now; I want you to precisely reply; will you do it now?—Simply in this respect, that in many cases there was a false statement made as to the condition of the person with regard to vaccination.

6880. Have you personal knowledge of any case in which a false statement was made and embodied in any paper?—Personally, none.

6881. Could you refer us to any authority as to any specific false statement made and embodied in tables?—I can only refer you to the general concensus of medical opinion in Germany.

6882. Can you refer me to any specific authority, giving any false statement embodied in any of the statistics?—I think I can. No, I must leave that as a general statement, but one which can be very thoroughly substantiated by referring to authorities.

6883. Until some statistics were put to you in examination which purported to contradict others which you had handed in, did you draw the attention of the Commission to the fact that you had found these early tables to be of little value?—No, I had not called the attention of the Commission to the fact.

6884. Do I take it that you had thought the tables sufficiently valuable to hand in in support of the theory you were putting to the Commission, but valueless where they told against it?—No, not at all. That they were valuable, as a whole, as far as it was possible to arrive at the truth; but that there might be a certain amount of falsehood underlying them was always left possible.

6885. And there might not?—There might not.

6886. (*Chairman.*) I did not understand you to say that they were altogether valueless?—Not altogether valueless, only as regards the vaccinated condition of the population as to which it was never possible to arrive at an absolutely exact computation.

6887. (*Mr. Picton.*) You said, I think, in reply to Dr. Collins, that there was a small epidemic of small-pox in Germany in 1881?—In Berlin that was chiefly, I think.

6888. Then, at the time you wrote to the *Hertfordshire Standard*, upon the 4th of April 1889, you were not aware of that, because you say that, "Since the "Imperial Vaccination Law of Germany came into "force in 1875, there has been no outbreak of small-"pox in Germany"?—Not in Germany generally; this was in Berlin.

6889. After the years 1870 and 1871 you have a knowledge that vaccination has improved in the French army, have you not?—I believe it is only in quite recent years that vaccination has been of any value in the French army; since 1885, when the new orders were issued by the Minister of War.

6890. Then you attach no importance to the statistics before 1885 of vaccination in the French army?—The value of the statistics depends entirely upon how they were collected.

6891. Do you know the number of officially-stated cases in the French army in 1885?—No.

6892. Are you aware that there were 214. Then the vaccination orders were improved, and in 1880 the numbers were 288, according to this return, with 16 deaths; and in 1889 there were 382 cases, with 16 deaths, in the French army?—May I ask if that gives the number of vaccinations per number of recruits?

6893. In 1885 there were vaccinations and re-vaccinations, 172,888?—But is the per-centage of successes given because so much depends upon that? Bad vaccination being no better than no vaccination at all.

The witness withdrew.

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App. No. 1.

APPENDIX I.

SURGEON-GENERAL JOHN PINKERTON to the CHAIRMAN of the COMMISSION.

Office of the Surgeon-General
with the Government of Bombay,
Town Hall, Bombay,
22nd November 1889.

MY LORD,

WHEN I gave my evidence before you on the 9th ultimo I was requested by Mr. Bradlaugh, a member of the Royal Vaccination Commission, to forward to you extracts from the Vaccination Reports of the Presidency of Bombay bearing on a particular part of my evidence. I have now the honor to forward the extract to you through the Government of Bombay.

I have the honor to be,
My Lord,
Your most humble obedient Servant
(Signed) J. PINKERTON,
Surgeon-General.

To Lord Herschell,
President,
Royal Vaccination Commission,
Whitehall, London.

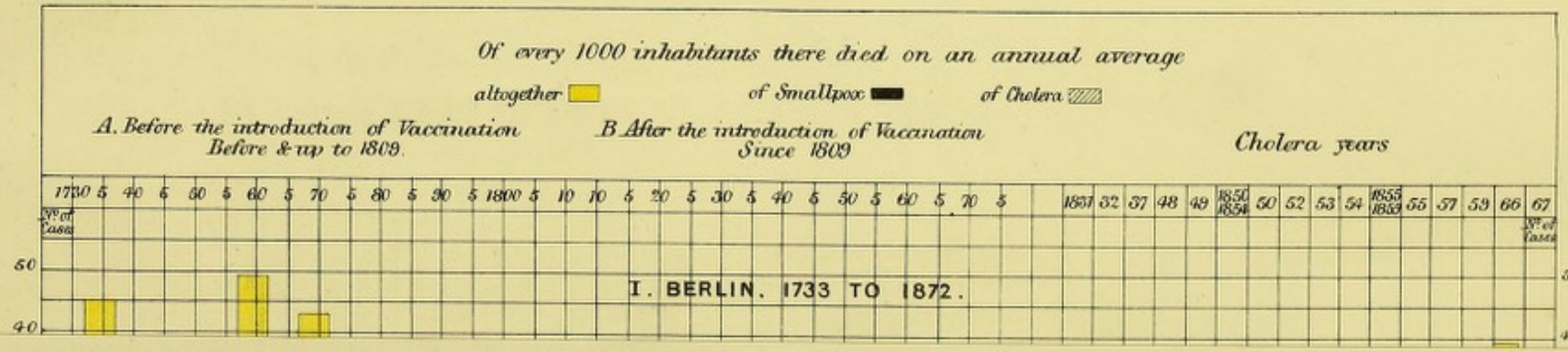
[*Enclosure.*]

Extract from the Report on Vaccination throughout the Bombay Presidency and Sind for the year 1866.

Page 19.

Para. 13. From the month of January to July of 1866 the existence of small-pox was reported from several talookas, generally the disease seems to have been in a mild form, and subsequent inquiries have shown that in some instances it was only chicken-pox, measles, or both. These two infantile diseases were very prevalent in several widely separated parts of Sind during the first half of the past year. It would be very interesting to know how many were attacked and died of small-pox, and of these how many had been vaccinated, but such information could not be obtained. By the commendable industry of Hussah Mull, 1st Assistant Superintendent of Vaccination, I am in a position to give the particulars of an outbreak of small-pox in the village of Jadoo Khan Lagari, in the tappidarate of Allizar-Ka-Tanda. It appears that Chanderam, local vaccinator in the talooka of Allizar-Ka-Tanda, wanted to vaccinate all the unprotected children in the village of Jadoo Khan Lagari in the month of August last; he did vaccinate a number of Mussulmans, but the Hindoos obstinately and persistently refused to have their children operated on. Small-pox attacked nineteen unprotected Hindoo children in November, and of these five died, one became blind of one eye, and another totally blind; this gives the frightful per-centage of 25·8 deaths to attacks, and this in a village surrounded by a cordon of vaccinated villages. One stands aghast to contemplate what the awful loss of life would be in an unprotected population under a widespread epidemic of such virulence; truly small-pox maintains the awful and fatal character ascribed to it by the writers of the last century. De la Condamine estimated that "small-pox destroys, maims, or disfigures the fourth "part of mankind." (Mémoire sur l'inoculation de la petite verole, 1754.) Here in Sind we have more than realised this estimate in a single and an isolated village. The mukhi, who would not assist with his influence or example to get these children vaccinated, must have an easy conscience, if he feel no remorse for his conduct; no doubt he soothes his own and his friends' afflictions with the balm that it was the will of *Matadeo*. I feel well convinced that had there not been so many protected children, and had there not been so many vaccinators in Sind, we should have had a severe epidemic of small-pox in several districts during the early months of the year With my present strength of vaccinators I was able to surround small-pox, wherever it made its appearance, with a wall of vaccinated children, and so prevented the circumfusion of the disease. I think I am not saying too much for my establishment by asserting my belief that the activity of the vaccinators saved many young lives to the State.

DIAGRAM *Showing the Mortality from Small-pox (I) in BERLIN from 1732 to 1871, and (II and III.) in the kingdoms of PRUSSIA and SWEDEN from 1775 to 1871, compared with the general Mortality, and the Mortality from Cholera in Cholera years. (After Guttstadt.)*



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APPENDIX II.

(Papers handed in by Mr. Arthur F. Hopkirk, M.D., 9th and 11th October 1889.)

Table A.

Table showing, for the City of Berlin, the Number of Inhabitants, the Deaths from all Causes, and the Deaths from Small-pox in the Years 1758 to 1774 and 1782 to 1872, and in particular for each of the Years of Small-pox Epidemics.

(Zeitschrift des Königl. Preuss. Stat. Bureau. Jahrgang 12; 1872; *Art. "Die Pocken-Epidemie in Berlin* 1870–72," *by Dr. Guttstadt.)*

Quinquennial Average for	Inhabitants.	Total Number of Deaths.	Per-centage of Deaths to Inhabitants.	Deaths from Small-pox.	Per-centage of Deaths from Small-pox to Total Number of Deaths.
1758-62	95,671	4,726	4·93	389	8·23
1763-67	122,008	4,033	3·31	444	11·00
1768-72	130,186	5,591	4·29	383	6·85
1773-74 and 1782-84	133,392	4,865	3·65	443	9·11
1785-89	135,400	5,214	3·85	487	9·34
1790-94	145,000	5,263	3·63	449	8·53
1795-99	165,612	5,984	3·61	396	6·52
1800-4	177,225	6,192	3·49	463	7·48
1805-9	152,014	7,323	4·82	466	6·36
Influence of Vaccination.					
1810-14	165,000	5,525	3·35	51	0·74
1815-19	198,663	5,974	3·02	80	1·34
1820-24	210,000	5,930	2·82	9	0·15
1825-29	230,000	6,686	2·91	31	0·46
1830-34	255,000	8,622	3·40	48	0·55
1835-39	285,000	8,566	3·01	52	0·60
1840-44	325,000	9,062	2·79	44	0·49
1845-49	390,000	11,070	2·84	7	0·06
1850-54	408,000	11,370	2·76	19	0·14
1855-59	450,000	12,736	2·83	83	0·
1860-64	590,000	16,276	2·76	176	1·08
1865-69	690,000	23,303	3·38	182	0·78
1870	—	26,594	3·02	171	0·64
Years of Small-pox Epidemics.					
1759	94,433 (Garrison wanting.)	4,469	5·26	600	13·20
1765	125,878	4,653	3·69	1,009	22·07
1770	133,520	5,123	3·83	987	19·26
1786	147,338	5,077	3·44	1,077	21·21
1789	119,717 (Garrison wanting.)	5,900	5·00	911	15·25
1801	176,709	7,681	4·34	1,626	21·17
1864	632,749	17,848	2·81	617	3·45
1871	826,341	32,362	3·92	5,084	15·70
1872	—	28,763	3·48	1,100	3·82

App. No. 2.

Table B.

Table showing the proportion of Vaccinations to Births in Berlin from 1860 to 1871.

(*Zeitschrift des Königl. Preuss. Stat. Bureau. Jahrgang* 12 ; 1872 ; *Art.* "*Die Pocken-Epidemie in Berlin* 1870-72," *by Dr. Guttstadt.*)

Year.	Births.	Vaccinations.	Re-vaccinations.	For every 100 Children born there were vaccinated	Year.	Births.	Vaccinations.	Re-vaccinations.	For every 100 Children born there were vaccinated
1860 - -	18,220	10,736	277	58·90	1866 - -	27,908	10,587	1,018	37·90
1861 - -	20,777	10,581	963	50·92	1867 - -	27,313	14,377	1,000	52·64
1862 - -	21,364	11,436	536	53·53	1868 - -	29,413	16,729	1,417	56·87
1863 - -	23,301	15,728	2,222	67·49	1869 - -	37,668	17,682	1,344	57·65
1864 - -	24,631	25,153	22,506 and more (year of epidemic)	102·12	1870 - -	32,394	9,547	4,530	29·29
1865 - -	26,061	9,405	2,734	36·08	1871 - -	29,530	37,206	102,965 and more (year of epidemic)	—

Table C.

Deaths from Small-pox according to Age-periods before the introduction of Vaccination.

(*Lotz*, "*Pocken und Vaccination*," *Basel*, 1880, *page* 14.)

	(1) Ostheim-vor-der-Rhon, 1739-1752.	(2) Parishioners of the Collegiate Church, Manchester, 1769-1774.	(2) Warrington, 1773.	(3) Dessau, 1791. Excluding Jewish Children.	(4) Posen, from June 1795 to April 1796.	(5) Brunswick, 1787.
0-6 months - -	13	21	10	20	4	87
6-12 „ - -	48	119	39		11	
1-2 years - -	58	216	84	14	21	144
2-3 „ - -	34	110	33	15	12	
3-4 „ - -	39	59	18	20	11	82
4-5 „ - -	16	34	15	6	9	
0-5 „ - -	208	559	199	75	68	313
5-6 „ - -	9	?	4	5	4	?
6-7 „ - -	14	?	2	3	11	?
7-8 „ - -	2	?	2	3		?
8-9 „ - -	2	?	4	1	7	?
9-10 „ - -	1	?	—	—		?
5-10 „ - -	28	29	12	12	22	55
10-15 „ - -	1	1	—	1	3	[From 10-14, 2 and over 14, 2.]
15-20 „ - -	—		—	—	—	
over 20 „ - -	—	—	—	—	—	—
	237	589	211	88	93	372

Of the 1,590 deaths given in the above table only 10 were those of individuals more than 10 years of age.

Similarly in Trieste in 1796 (see (1) above, 4th Part, p. 283) only 5 out of 695 deaths were those of adults. The figures for Arinthia for the same year were as follows (see (1) above, 5th Part, p. 503) :—

0-7 years - - - - -	706
7-17 „ - - - - -	20
over 17 „ - - - - -	2
	728

(1) Juncker, "Archiv der Aerzte und Seelsorger wider die Pockennoth." 2nd Part, page 123.

(2) Ibid. Page 11.

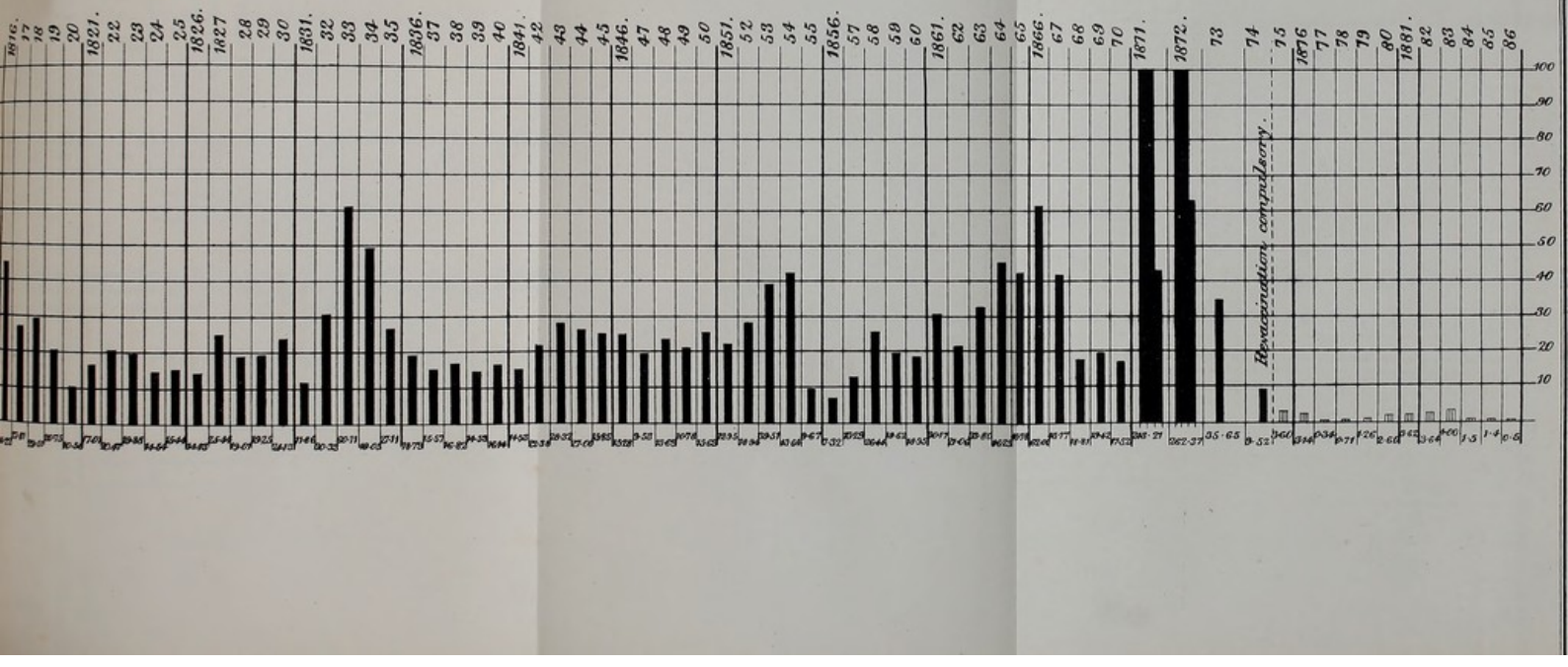
(3) Juncker, "Gemeinnutzige Vorschläge und Nachrichten . . . . in Rücksicht der Pockenkrankheit." Erster Versuch. Halle. Appendix for Doctors, page 84.

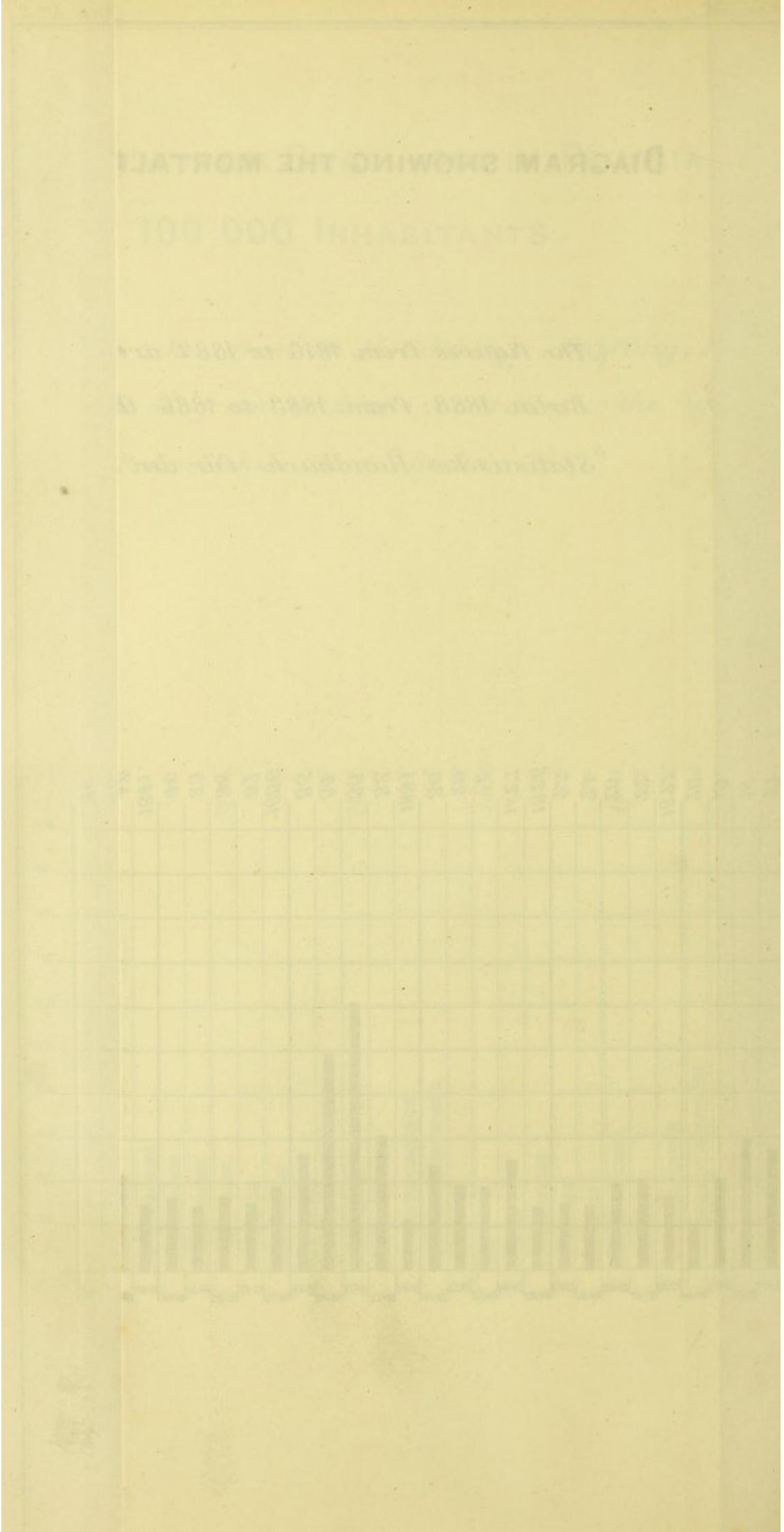
(4) Juncker, "Archiv der Aerzte und Seelsorger wider die Pockennoth." 4th Part, page 77.

(5) Ibid. 2nd Part, page 12.

DIAGRAM SHOWING THE MORTALITY FROM SMALL-POX IN PRUSSIA FROM 1816 TO 1886 PER 100,000 INHABITANTS.

(The figures from 1816 to 1882 are taken from Dr. M. Schultz's "Impfung, Impfgeschäft und Impftechnik" Berlin 1888; from 1883 to 1886 the diagram is drawn according to the figures given on page 149 of Vol. I. "Statistisches Handbuch für den Preussischen Staat" Berlin, 1888.)





App. No 2.

Table D.

Table showing the number of Cases of, and Deaths from, Small-pox, during the Epidemic from December 1795 to the end of the Year 1796, in the three Towns Rawicz, Bojanowo, and Sarnowo.

(Lotz, "Pocken und Vaccination," Basel, 1880, page 18, after Juncker.)

Aged.	Rawicz, 9,500 Inhabitants.		Bojanowo, 2,495 Inhabitants.		Sarnowo, 1,334 Inhabitants.		Total, 13,329 Inhabitants.		Deaths per 100.
	Cases of Small-pox.	Deaths.	Cases of Small-pox.	Deaths.	Cases of Small-pox.	Deaths.	Cases of Small-pox.	Deaths.	
Under 1 year -	25	9	2	—	12	5	39	14	35·9
1st-2nd „ -	110	34	12	—	23	8	145	42	29·0
2nd-3rd „ -	126	27	8	—	34	6	168	33	19·6
3rd-4th „ -	137	28	27	2	41	4	205	34	16·6
4th-5th „ -	137	17	22	2	27	6	186	25	13·4
0-5th „ -	535	115	71	4	137	29	743	148	19·9
5th-6th „ -	91	10	24	6	28	2	143	18	12·6
6th-7th „ -	93	11	23	6	18	—	134	17	12·7
7th-8th „ -	54	3	16	1	5	—	75	4	5·3
8th-9th „ -	32	2	13	1	7	2	52	5	9·6
9th-10th „ -	27	3	8	—	2	1	37	4	10·8
5th-10th „ -	97	29	84	14	60	5	41	48	10·9
10th-11th „ -	13	—	6	—	2	1	21	1	
11th-12th „ -	7	—	3	—	—	—	10	—	
12th-13th „ -	6	—	5	1	—	—	11	1	
13th-14th „ -	6	—	—	—	—	—	6	—	
14th-15th „ -	4	—	6	—	—	—	10	—	
10th-15th „ -	36	—	20	1	2	1	58	2	3·4
15th-16th „ -		—	5	—	—	—	7	—	
16th-17th „ -	—	—	1	—	—	—	1	—	
17th-18th „ -	—	—	1	—	—	—	1	—	
18th-19th „ -	—	—	—	—	—	—	—	—	
19th-20th „ -	1	1	—	—	—	—	1		
15th-20th „ -	3	1	7	—	—	—	10	1	10·0
Total -	871	145	182	19	199	35	1.252	199	15·9

Rawicz, a town of Prussia, 55 miles south of Posen.
Bojanowo, a town of Prussian Poland, 44 miles N.N.W. of Breslau.
Sarnowo, a town of Prussia, 83 miles south of Posen.

Note.—The above table was taken by Dr. Lotz from a table compiled by Dr. Juncker, and published by him in "Archiv der Aerzte und Seelsorger wider die Pockennoth," (Leipzic, 1798, 4th Part, page 33), the following extract from which shows the careful classification made by Dr. Juncker.

No. of House.	No. of Cases of Small-pox in each House.	Age of the Patients.	Month in which the Disease appeared in each Case.	No. of Deaths.	Age at Death.	No. of Recoveries.	Injuries left by Small-pox.	No. still left susceptible to Small-pox.
3	1	5	May - - - -	—	—	1	—	2
4	2	2, 4	December, January -	—	—	2	—	—
5	1	8	January - - -	—	—	1	—	—
—	3	7, 5, 2	January and February -	—	—	3	—	1

App. No. 2.

Table E.

Statistics of the Small-pox Epidemic in Chemnitz in 1870–71.

(Mittheilungen d. Stat. Bureaus der Stadt Chemnitz, by Dr. Max Flinzer, Chemnitz 1873, page 14.)

Number of Inhabitants.

Streets.	Number of Houses inhabited.	Number of Households.	Inhabitants. Total.	Inhabitants. Males. Under 14 Years of Age.	Inhabitants. Males. Over 14 Years of Age.	Inhabitants. Females. Under 14 Years of Age.	Inhabitants. Females. Over 14 Years of Age.	Of these there were: Vaccinated. Males. Under 14 Years of Age.	Vaccinated. Males. Over 14 Years of Age.	Vaccinated. Females. Under 14 Years of Age.	Vaccinated. Females. Over 14 Years of Age.	Unvaccinated. M.	Unvaccinated. F.	Had had Small-pox. Unvaccinated. M.	Had had Small-pox. Unvaccinated. F.	Had had Small-pox. Previously vaccinated. M.	Had had Small-pox. Previously vaccinated. F.	Re-vaccinated. M.	Re-vaccinated. F.
1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	19.	20.
135*	2,208	13,881	64,255	10,162	22,091	10,062	22,600	6,528	20,635	6,507	20,161	2,967	2,745	1,576	2,006	486	584	732	1,196
				64,255				53,831				5,712		4,652				1,928	

* Flinzer gives the statistics for the whole 135 streets. This is only a summary.

Cases of Small-pox.

No. of the Houses With Cases of Small-pox.	No. of the Houses With Deaths.	No. of the Cases. M.	No. of the Cases. F.	No. of the Deaths. M.	No. of the Deaths. F.	Households. With only vaccinated Persons. No. of Households.	Number attacked. Families.	Number attacked. Individuals.	Households containing unvaccinated Persons. No. of Households.	Families.	Individuals.	Unvaccinated. M.	Unvaccinated. F.	Vaccinated without effect. M.	Vaccinated without effect. F.	Took Small-pox during Vaccination Period. M.	Took Small-pox during Vaccination Period. F.	Vaccinated. M.	Vaccinated. F.	Re-vaccinated. M.	Re-vaccinated. F.	Took Small-pox a second time. M.	Took Small-pox a second time. F.
21.	22.	23.	24.	25.	26.	27.	28.	28.	30.	31.	32.	33.	34.	35.	36.	37.	38.	39.	40.	41.	42.	43.	44.
943	189	1,672	1,700	121	117	9,464	371	473	4,417	1,732	2,939	1,270	1,276	24	27	4	2	365	386	9	7	1	1
				238								2,546		51		6		751		16		2	
Town Hospital.	—	148	76	6	5	—	—	184	—	—	49	22	18	—	—	—	—	126	58	—	—	—	—
943	189	1,820	1,776	127	122	9,464	371	657	4,417	1,732	2,939	1,292	1,294	24	27	4	2	491	444	9	7	1	1
				249								2,586		51		6		935		16		2	
																		2,643					
																				953			

Of the 64,255 inhabitants of Chemnitz in 1870–71, 53,891 = 83·87 per cent. were vaccinated; 5,712 = 8·89 per cent. were unvaccinated: and 4,652 had already had the small-pox.

TABLE E—*continued.* App. No. 2.

STATISTICS OF THE SMALL-POX EPIDEMIC IN CHEMNITZ IN 1870–71—*continued.*

Distribution of the Cases of Small-pox* amongst Vaccinated and Unvaccinated, and according to Age.

—	Of the Cases of Small-pox there were		Cases the Vacci-
	Vaccinated.	Unvaccinated.	No. of very mild amongst nated.
1st year -	8	372	7
2nd „ -	15	527	13
3rd „ -	30	442	25
4th „ -	31	329	27
5th „ -	43	229	30
6th „ -	35	195	28
7th „ -	46	194	33
8th „ -	24	96	19
9th „ -	18	70	6
10th „ -	15	70	11
	265	2,425	199

—	Of the Cases of Small-pox there were		Cases the Vacci-
	Vaccinated.	Unvaccinated.	No. of light amongst nated.
11th year	12	37	4
12th „ -	18	37	6
13th „ -	12	26	6
14th „ -	14	9	12
15th „ -	10	3	2
16th „ -	12	5	5
17th „ -	11	4	7
18th „ -	17	3	7
19th „ -	6	5	5
20th „ -	15	5	5
	127	134	59

—	Of the Cases of Small-pox there were		Cases the Vacci-
	Vaccinated.	Unvaccinated.	No. of light amongst nated.
21st year	14	2	5
22nd „ -	11	5	2
23rd „ -	11	3	4
24th „ -	8	4	3
25th „ -	12	2	3
26th „ -	13	2	5
27th „ -	15	2	8
28th „ -	20	1	9
29th „ -	12	2	5
30th „ -	14	6	6
	130	29	50

—	Of the Cases of Small-pox there were		Cases the Vacci-
	Vaccinated.	Unvaccinated.	No. of light amongst nated.
31st year	17	—	7
32nd „ -	18	—	12
33rd „ -	21	2	5
34th „ -	14	1	4
35th „ -	10	—	4
36th „ -	9	—	5
37th „ -	1	1	2
38th „ -	8	2	4
39th „ -	12	1	4
40th „ -	15	—	2
	135	7	49

—	Of the Cases of Small-pox there were		Cases the Vacci-
	Vaccinated.	Unvaccinated.	No. of nated.
41st year -	13	1	4
42nd „ -	15	—	6
43rd „ -	7	1	—
44th „ -	3	—	—
45th „ -	4	—	2
46th „ -	11	—	3
47th „ -	4	—	1
48th „ -	4	2	2
49th „ -	4	—	—
50th „ -	9	—	—
	74	4	18

—	Of the Cases of Small-pox there were		Cases the Vacci-
	Vaccinated.	Unvaccinated.	No. of light amongst nated.
51st year	3	—	—
52nd „ -	2	1	—
53rd „ -	4	—	1
54th „ -	3	—	—
55th „ -	2	—	—
56th „ -	4	—	1
57th „ -	2	2	2
58th „ -	2	—	1
59th „ -	3	—	1
60th „ -	3	—	1
	28	3	6

—	Of the Cases of Small-pox there were		Cases the Vacci-
	Vaccinated.	Unvaccinated.	No. of nated.
61st year	—	—	—
62nd „ -	2	—	—
63rd „ -	2	—	—
64th „ -	4	—	1
65th „ -	—	—	—
66th „ -	—	—	—
67th „ -	1	—	—
68th „ -	—	—	—
69th „ -	1	—	—
70th „ -	1	—	1
	9	—	2

—	Of the Cases of Small-pox there were		Cases the Vacci-
	Vaccinated.	Unvaccinated.	No. of nated.
71st year	—	—	—
72nd „ -	—	—	—
73rd „	1	—	1
74th „ -	—	—	—
75th „ -	—	—	—
76th „ -	—	—	—
77th „ -	—	—	—
78th „ -	—	—	—
79th „ -	—	1	—
80th „ -	—	—	—
	1	1	1

* This is Table VI. in Flinzer's Report, and appears on page 26.

Proportion, per 100 cases, for the various life-periods, and for each of the years 1–14.

Age.	Vaccinated, per cent.	Unvaccinated, per cent.	Age.	Vaccinated, per cent.	Unvaccinated, per cent.
1–10 years -	9·85	90·15	41–50 years -	94·87	5·12
11–20 „ -	48·66	51·34	51–60 „ -	90·32	9·68
21–30 „ -	81·76	18·24	61–70 „ -	100·00	0·00
31–40 „ -	95·07	4·93	71–80 „ -	50·00	50·00
1 - - -	2·11	97·89	8 - - -	20·00	80·00
2 - - -	2·77	97·23	9 - - -	20·45	79·55
3 - - -	6·36	93·64	10 - - -	17·65	82·35
4 - - -	8·61	91·39	11 - - -	24·49	75·51
5 - - -	16·35	83·65	12 - - -	32·73	67·27
6 - - -	15·22	84·78	13 - - -	31·58	68·42
7 - - -	30·67	69·33	14 - - -	60·87	39·13

Of the 769 cases amongst vaccinated individuals, 384, or 49·93 per cent., were described as very slight.

App. No. 2.

TABLE E—*continued.*

STATISTICS OF THE SMALL-POX EPIDEMIC IN CHEMNITZ IN 1870–71—*continued.*

Note.—Dr. Max Schultz, writing of Flinzer's statistics, calls attention to the fact that they show that there was one case of small-pox to every 255 households containing none but vaccinated persons, but one to every 26 households containing both vaccinated and unvaccinated persons. The figures prove the danger which unvaccinated persons are to the vaccinated, and thereby establish the value of compulsory vaccination. *Vide* Impfung, Impfgeschäft, &c. Berlin, 1888.

Deaths.—Of 3,596 cases, 249 or 6·92 died. Amongst the deaths are those of 117 boys, 17 male adults, 111 girls, and 11 female adults. *All the children who died were unvaccinated*, and of the adults, 3 males and 4 females were vaccinated, the remainder unvaccinated.

Of the 249 deaths, 242 were thus unvaccinated, and only 7 those of vaccinated persons, the former category contributing 97·19 and the latter 2·81 per cent. of the deaths. Separating the cases of small-pox amongst the vaccinated from those amongst the unvaccinated persons, we find that of the former, only 0·73 per cent. died, but that of the latter class 9·16 per cent. died.

Of the 224 cases in the town hospital 184 had been vaccinated, 37 were unvaccinated, and 3 were doubtful. *None of the vaccinated died*, but 11 of the unvaccinated succumbed to the disease (15 cases of unvaccinated children under 10).

Hence the accuracy of the following Table given by Lotz on p. 56 of his "Pocken und Vaccination."

Age.	Vaccinated.			Unvaccinated.		
	Cases.	Deaths.	Mortality per cent.	Cases.	Deaths.	Mortality per cent.
For the 1st year	8	—	—	373	102	27·3
„ 2nd „	15	—	—	528	51	9·6
„ 3rd „	30	—	—	444	26	5·9
„ 4th „	31	—	—	331	29	6·3
„ 5th „	43	—	—	222	9	4·0
„ 6th „	35	—	—	197	7	3·6
„ 7th „	46	—	—	105	1	0·9
„ 8th „	28	—	—	98	2	2·0
„ 9th „	18	—	—	71	1	1·4
„ 10th „	15	—	—	71	—	0·0
Total under 10 years of age	265	—	—	2,440	230	9·0

TABLE F.

TABLE SHOWING THE MORTALITY FROM SMALL-POX, BETWEEN THE AGES OF 0–20 YEARS, IN THE THREE TOWNS, RAWICZ, BOJANOWO, AND SARNOWO DURING THE EPIDEMIC OF 1795–96, AND IN THE LEIPZIGER POLIKLINIK IN 1871.

(*The figures relating to Rawicz, Bojanowo, and Sarnowo are taken from Lotz, "Pocken und Vaccination," Basel, 1880, after Juncker, and for Leipzig from Lotz, in the same work, after Thomas, in "Archiv der Heilkunde," vol. xiii., p. 188, et seq.*)

Ages.	In Rawicz, Bojanowo, Sarnowo. 13,329 inhabitants.			In the Leipzig Poliklinik in 1871.					
	1795-96.			Vaccinated.			Unvaccinated.		
	Cases.	Deaths.	Per cent.	Cases.	Deaths.	Per cent.	Cases.	Deaths.	Per cent.
0-1 year	39	14	35·9	—	—	—	69	35	50·7
1-2 „	145	42	29·0	—	—	—	56	26	46·4
2-3 „	165	33	19·6	—	—	—	57	24	42·1
3-4 „	205	34	16·6	—	—	—	35	14	40·0
4-5 „	186	25	13·4	2	—	—	23	3	13·0
5-10 „	441	48	10·9	25	—	—	20	7	35·0
10-15 „	58	2	3·4	90	—	—	6	1	16·7
15-20 „	10	1	10·0	53	—	—	2	1	50·0
20-30 „	—	—	—	89	3	3·4	—	—	—
30-40 „	—	—	—	88	6	6·8	1	1	100·0
40-50 „	—	—	—	43	5	11·6	1	1	100·0
50-60 „	—	—	—	20	3	15·0	—	—	—
60-70 „	—	—	—	6	1	16·7	—	—	—
Over 70	—	—	—	1	—	—	1	1	100·0
	1,232	199	15·9	417	18	4·3	271	114	42·1

App. No. 2.

Table G.

Table showing the Mortality from Small-pox in the three Towns, Rawicz, Bojanowo, and Sarnowo, during the Epidemic of 1795–96, and in Lower Franconia in 1866–67, Primary Vaccination being Compulsory in the latter instance.

(*The figures for Rawicz, Bojanowo, and Sarnowo are taken from Lotz, "Pocken und Vaccination," Basel*, 1880, *after Juncker; those for Lower Franconia from the "Zeitschrift des König. Bayr. Stat. Bureau," Jahrgang IV.*, 1872, *page* 6.)

Age.	Rawicz, Bojanowo, Sarnowo. 13,329 inhabitants. 1795-96.			Lower Franconia. About 500,000 inhabitants. 1866-67.		
	Cases.	Deaths.	Per cent.	Cases.	Deaths.	Per cent.
0–1 year	39	14	35·9	75	26	34·7
2–10 „	1,145	182	15·8	25	—	—
11–20 „	68	3	4·4	110	1	0·9
0–20 „	1,252	199	15·9	210	27	13 nearly.
0–60 „	—	—	—	1,394	143	10·3

Small-pox mortality per 100,000 in the three towns Rawicz, Bojanowo, and Sarnowo in 1796 (no vaccination) - - - - 149·2
Do. do. in Lower Franconia in 1866-67 (vaccination) - - - - - - - - - 28·6

Table H.

Table showing the Deaths in Bavaria from the various Epidemic Diseases from 1857–58 to 1869–70.

(*Zeitschrift d. K. Bayr. Stat. Bureau, Jahrgang IV.*, 1872, *p.* 1.)

Years.	Total Number of Deaths.	Deaths.				
		Small-pox.	Measles and Rötbeln.	Scarlet Fever.	Hooping-cough.	Typhoid.
1857–58 - - - - -	136,664	316	798	1,848	3,547	4,641
1858–59 - - - - -	137,623	150	1,306	1,850	4,154	3,988
1859–60 - - - - -	122,916	131	548	1,447	2,387	4,755
1860–61 - - - - -	137,871	73	1,395	1,041	3,371	3,236
1861–62 - - - - -	137,124	121	1,575	2,201	3,193	4,212
1862–63 - - - - -	141,133	111	988	3,005	4,429	3,419
Average - - -	135,455	150	1,102	1,899	3,512	4,050
Per 10,000 deaths - -	—	11	81	140	259	299
1863–64 - - - - -	147,432	108	809	2,363	3,429	3,444
1864–65 - - - - -	153,428	221	825	1,580	2,739	3,604
1865–66 - - - - -	151,315	577	2,085	1,256	3,159	4,235
1866–67 - - - - -	147,930	1,210	994	1,144	4,089	2,863
1867–68 - - - - -	154,181	917	831	2,846	3,147	2,731
1868–69 - - - - -	159,186	487	989	5,157	2,744	3,145
Average - - -	152,245	587	1,089	2,391	3,206	3,337
Per 10,000 deaths - -	—	38	72	157	211	219
1869–70 - - - - -	158,629	363	1,019	3,897	2,813	2,842
Per 10,000 deaths - -	—	23	64	246	177	179
General average - -	144,997	368	1,089	2,280	3,317	3,628
Per 10,000 deaths - -	—	25	75	157	229	250

App. No. 2.

Table J.

Table showing the Deaths from Small-pox in the various Governmental Districts of Bavaria in the Years 1857–70.

(Zeitschrift des König. Bayerischen Stat. Bureau, Jahrgang IV., 1872, p. 2.)

Year.	Oberbayern.	Niederbayern.	Pfalz.	Oberpfalz.	Oberfranken.	Mittelfranken	Unterfranken.	Schwaben.	Königreich.
1857-58 - -	85	28	13	7	133	8	16	26	316
1858-59 - -	13	17	12	17	33	39	11	8	150
1859-60 - -	6	10	29	25	8	38	11	4	131
1860-61 - -	7	10	9	31	5	5	—	6	73
1861-62 - -	2	10	26	25	21	20	12	5	121
1862-63 - -	4	8	25	14	39	2	2	17	111
1863-64 - -	37	11	21	12	16	5	4	2	108
1864-65 - -	60	53	28	16	14	—	6	44	221
1865-66 - -	72	167	41	171	77	7	5	37	577
1866-67 - -	306	135	18	259	122	67	143	160	1,210
1867-68 - -	129	265	9	142	40	161	74	96	917
1868-69 - -	52	67	45	104	22	75	85	37	487
1869-70 - -	30	15	117	52	23	27	86	13	363
Total -	803	797	393	875	553	454	455	455	4,785
Yearly average	62	61	30	67	43	35	35	35	368
Per 10,000 deaths from all causes -	23	34	19	42	30	19	21	18	25

Compulsory primary vaccination has been the law of Bavaria since 1807; in the earlier period all children had to be presented for vaccination before the termination of the third year of life.

Table K.

Table showing the Deaths from Small-pox in Bavaria in 1871 and 1872, classified according to Age and Sex.

(Zeitschrift d. K. Bayr. Stat. Bureau, Jahrgang V., 1873, p. 216.)

Age in	1871.			1872.			1871 and 1872 together.	Per-centage.		
	M.	F.	Total.	M.	F.	Total.		1871.	1872.	Together.
1st year - -	369	374	743	268	252	520	1,263	14·7	17·4	15·7
2-5 „ - -	68	69	137	33	34	67	204	2·7	2·2	2·5
6-10 „ - -	15	33	48	12	12	24	72	0·9	0·8	0·9
11-20 „ - -	90	82	172	29	28	57	229	3·4	1·9	2·8
21-30 „ - -	328	291	619	103	142	245	864	12·2	8·2	10·7
31-40 „ - -	319	387	706	163	212	375	1,081	13·9	12·5	13·4
41-50 „ - -	447	391	838	252	273	525	1,363	16·5	17·6	16·9
51-60 „ - -	491	414	905	346	218	564	1,469	17·9	18·9	18·2
61-70 „ - -	399	306	705	268	218	486	1,191	13·9	16·2	14·8
71-80 „ - -	104	80	184	72	51	123	307	3·6	4·1	3·8
81 and over - -	9	4	13	3	3	6	19	0·3	0·2	0·3
	2,639	2,431	5,070	1,549	1,443	2,992	8,062	100	100	100

Table L.

Table showing, for the Years 1871–74, the Mortality from Small-pox in Prussia per 100,000 Inhabitants.

(Lotz, "Pocken und Vaccination," p. 88. After Guttstadt.)

	In the Years			
	1871.	1872.	1873.	1874.
In the Old Provinces *without* Compulsory Vaccination.				
1. Prussia - - - - - -	224	503	80	18
2. Brandenburg - - - - -	340	282	24	5
3. Pomerania - - - - -	237	249	15	3
4. Posen - - - - - -	455	682	128	24
5. Silesia - - - - - -	214	321	53	21
6. Saxon - - - - - -	277	176	28	3
7. Westphalia - - - - -	255	209	14	2
8. Rhineland and Hohenzollern - -	264	106	5	9

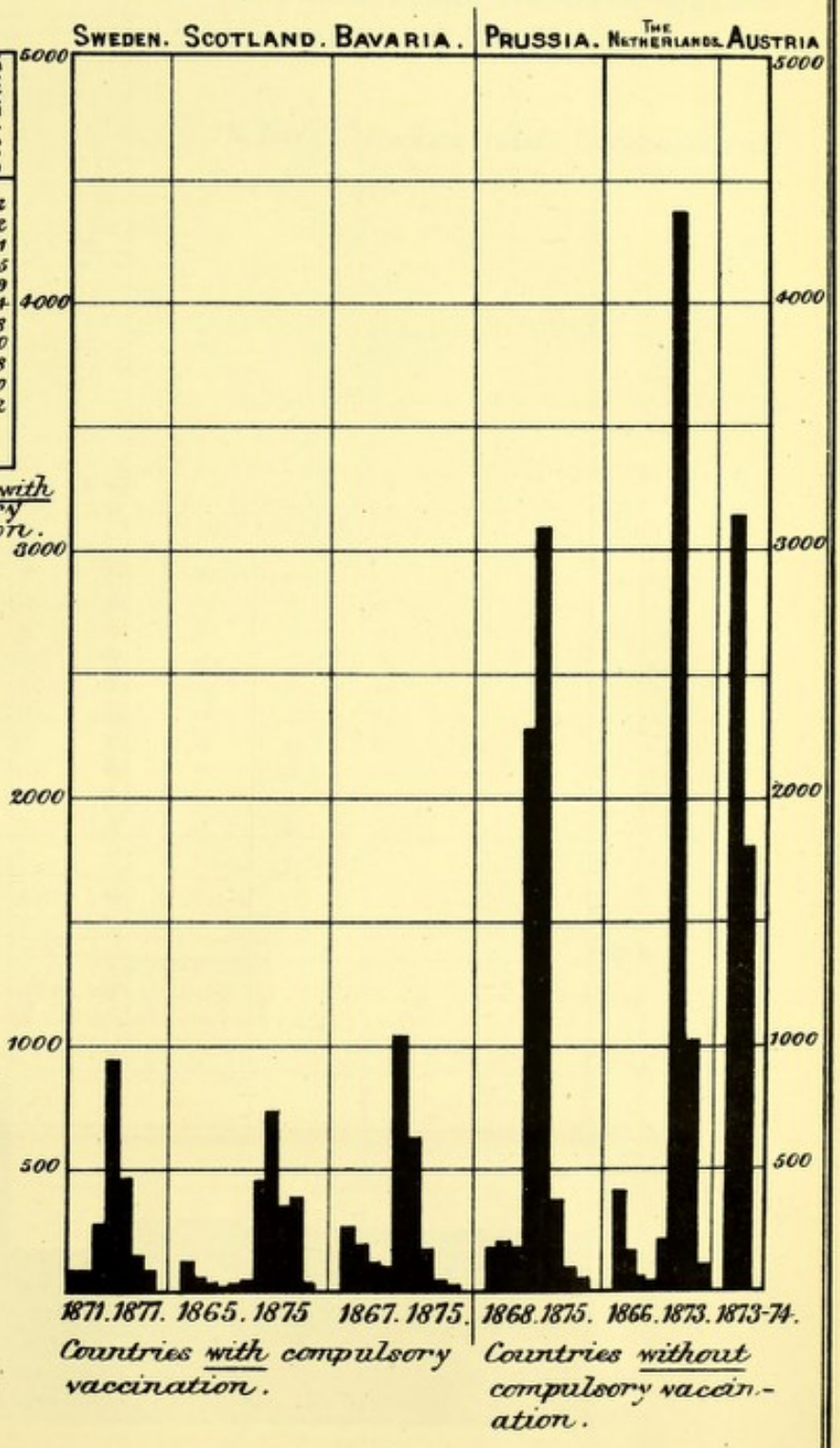
DIAGRAM *showing the small-pox mortality in certain countries where vaccination is compulsory and in certain others where it is not. (Lotz, "Pocken und vaccination" Basel. 1880.)*

Mortality from small-pox-per 1,000,000 living in.

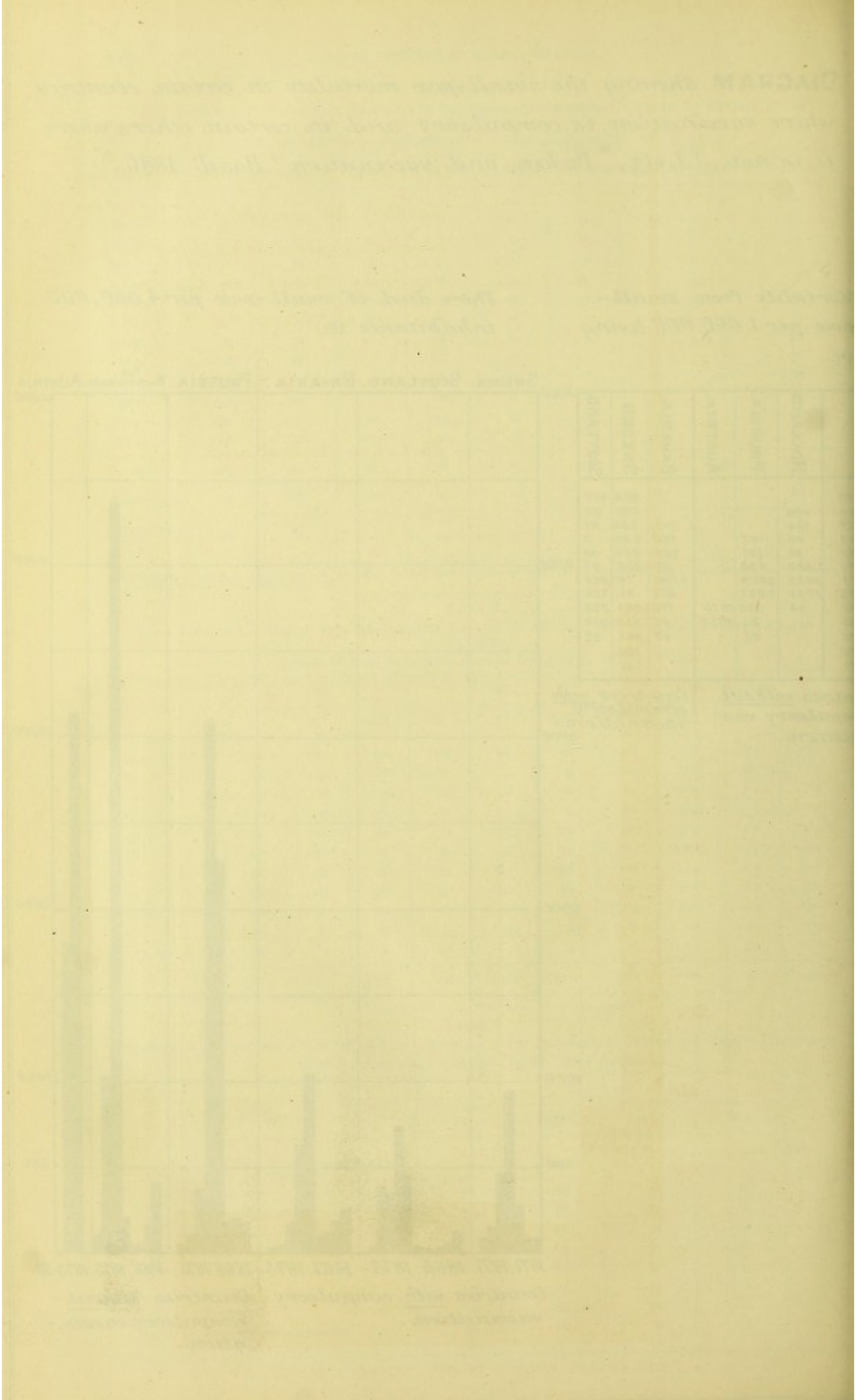
	Holland.	Prussia.	Austria.	Bavaria.	Sweden.	Scotland.
1865					324	132
1866	406				292	62
1867	154			251	253	31
1868	40	187		190	342	5
1869	14	191		101	354	19
1870	196	183		97	185	34
1871	4355	2309		1048	78	428
1872	1021	2621		612	81	720
1873	95	356	3173	176	261	328
1874		95	1754	47	336	360
1875		86		17	461	22
1876					136	
1877					80	

Countries without compulsory vaccination. | *Countries with compulsory vaccination.*

There died of small-pox per 1,000,000 inhabitants in



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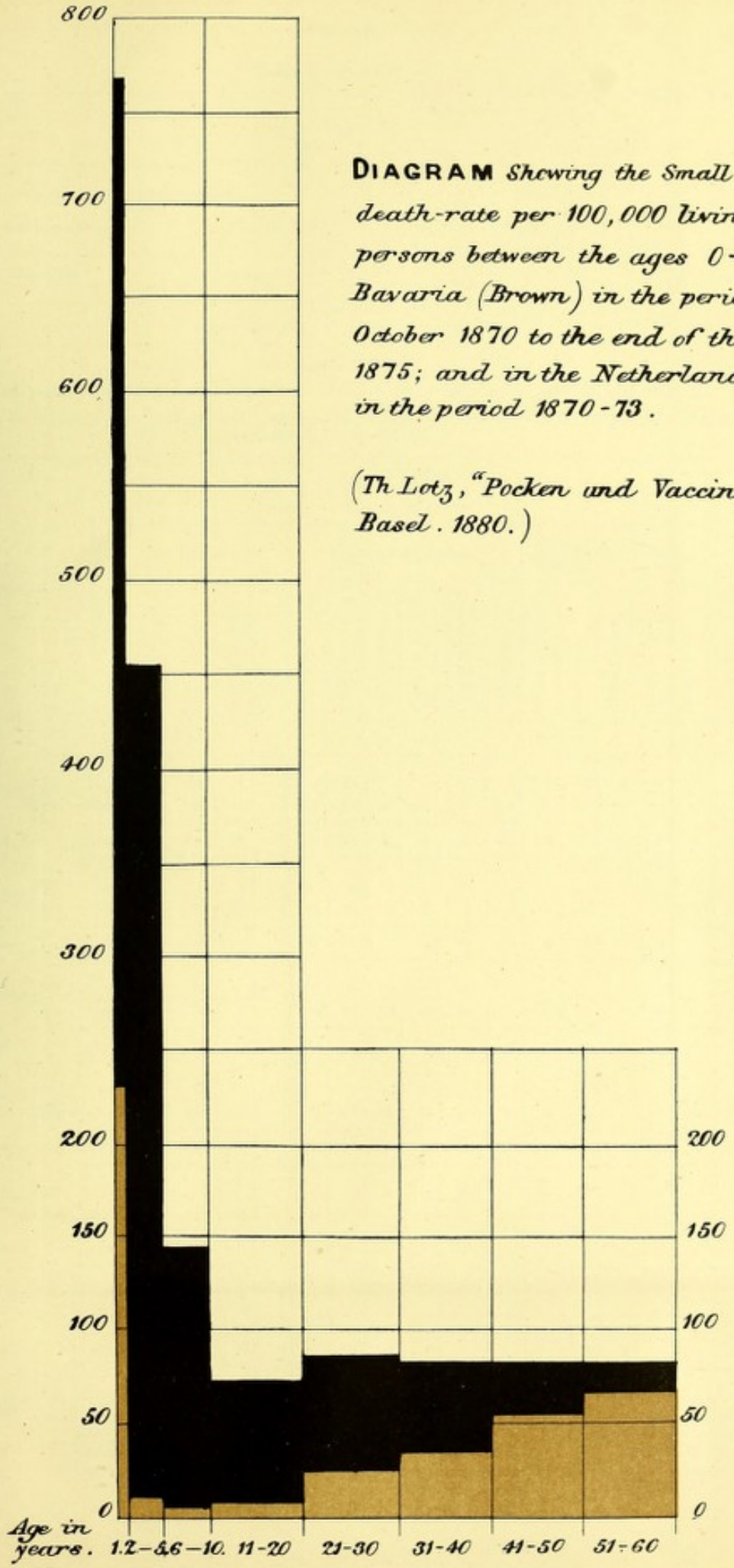


DIAGRAM *Showing the Small-Pox death-rate per 100,000 living, of persons between the ages 0-60, in Bavaria (Brown) in the period from October 1870 to the end of the year 1875; and in the Netherlands (Black) in the period 1870-73.*

(Th Lotz, "Pocken und Vaccination"; Basel. 1880.)

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TABLE L.—*continued.* App. No. 2.

	In the Years			
	1871.	1872.	1873.	1874.
In the New Provinces with Compulsory Vaccination.				
9. Schleswig-Holstein - - - - -	180	46	1	0·7
10. Hanover - - - - - -	77	81	13	3
11. Hesse-Nassau - - - - -	93	45	9	4

TABLE M.

TABLE SHOWING THE MORTALITY FROM ALL CAUSES OF THE GERMAN ARMY DURING THE WAR OF 1870–71.

(*Zeitschrift des Königl. Preuss. Stat. Bureau. Jahrgang* 12–13; 1872–73; *art. Beiträge zur Statistik des Krieges von* 1870–71, *by Dr. Engel.*)

Contingent.	Number of Deaths from all causes.	THE DEAD.																Number of the Missing.
		CAUSES OF DEATH.																
		Violence.				Acute internal Diseases.						Chronic internal Diseases.			No Statement of the			
		Killed in Action.	Died of Wounds.	Otherwise Killed.	Suicide.	Dysentery.	Typhoid.	Gastric Fever.	Small-pox.	Inflammatory processes in the Air-passages and in the Lungs.	Other causes.	Pulmonary Phthisis.	Other causes.	Sudden Sickness.	Disease.	Cause of Death.		
1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	
Prussia (altogether) (638,360) - -	Off.	1,415	750	469	7	1	14	38	6	4	2	8	5	7	9	45	—	1
	Men	28,709	12,926	7,541	261	11	1,370	4,623	116	144	380	400	443	160	62	192	70	2,695
Total - -		30,124	13,676	8,010	268	12	1,384	4,781	122	148	382	408	448	167	71	237	70	2,696
Saxony (altogether) (43,516) - -	Off.	93	54	30	1	—	—	3	—	—	—	1	1	—	1	—	2	—
	Men	2,397	872	517	14	4	122	477	7	11	19	31	30	10	8	8	207	438
Total - -		2,490	926	547	15	4	122	480	7	11	19	32	31	10	9	8	209	438
Hesse (altogether) (15,293) - -	Off.	44	21	17	—	—	2	1	—	—	—	—	—	—	2	1	—	—
	Men	1,026	276	220	11	9	87	291	5	34	10	17	17	9	4	25	10	8
Total - -		1,070	297	237	11	9	89	292	5	34	10	17	17	9	6	27	10	8
Bavaria (altogether) (100,319) - -	Off.	284	162	120	—	—	—	2	—	—	—	—	—	—	—	—	—	2
	Men	4,552	1,597	1,169	13	1	356	936	16	50	62	33	21	18	5	211	64	777
Total - -		4,836	1,759	1,289	13	1	356	938	16	50	62	33	21	18	5	211	64	779
Wurtemberg (altogether) (27,774) - -	Off.	25	21	4	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	Men	1,128	456	272	37	—	15	282	—	1	10	15	—	40	—	—	—	70
Total - -		1,153	477	276	37	—	15	282	—	1	10	15	—	40	—	—	—	70
Baden (altogether) (25,399) - -	Off.	46	23	17	1	2	—	1	—	—	—	—	1	1	—	—	—	—
	Men	1,024	412	331	5	1	5	161	8	5	8	10	3	1	2	70	2	18
Total - -		1,070	435	348	6	3	5	162	8	5	8	10	4	2	2	70	2	18
German Army (altogether) (850,601) - -	Off.	1,907	1,031	657	9	3	16	95	6	4	2	9	7	8	12	46	2	3
	Men	38,836	16,539	1,050	281	26	1,955	6,840	152	245	489	506	514	238	81	507	413	4,606
Total - -		40,743	17,570	10,707	290	29	1,971	6,935	158	249	491	515	521	246	93	553	415	4,609

App. No. 2.

Table N.

Table showing the per-centages of Deaths from Small-pox among Vaccinated and Unvaccinated in various places in different years.

(From the Zeitschrift des Königl. Preuss. Stat. Bureau. Jahrgang XIII., p. 155.)

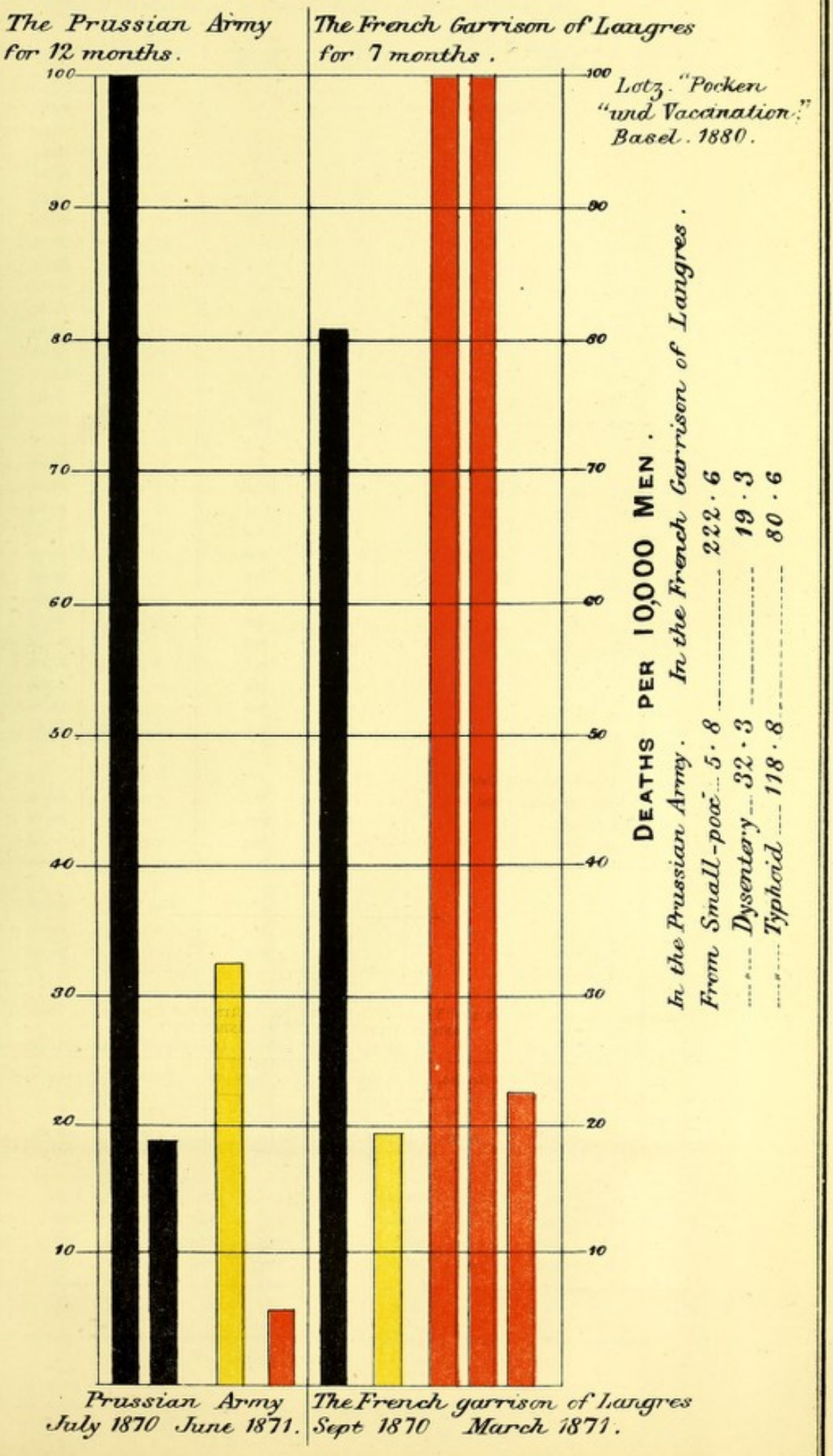
Places.	Years.	For every 100 Vaccinated.	For every 100 Unvaccinated.
France	1816-41	1·0	16·2
Marseilles	1828	1·0	25·0
Wurtemburg	1831-35	7·1	27·3
"	1840-50	3·5	38·9
Canton of Waadt	1825-29	2·1	24·0
Bohemia	1835-55	5·1	29·8
Milan	1830-51	7·6	38·3
Verona	1828-39	5·6	46·6
Breslau	1831-38	2·1	53·8
Copenhagen	1828-37	1·0	27·6
Vienna, Hospital	1837-56	5·0	30·0
" "	1859	3·8	13·8
" "	1870	2·0	17·4
Prague, Children's Hospital	1840-58	3·0	32·0
London, Small-pox Hospital	1836-56	7·0	35·0
" " "	1863	12·0	48·0
" " "	1864	8·7	36·0
" " "	1865	7·4	38·0
" " "	1866	7·3	35·7
" " "	1867	8·29	36·8
" " "	1868	6·2	34·0
" " "	1870	7·9	38·5
" " "	1871	14·9	66·5
Poland	1871	11·41	32·96
Frankfort, Town	1871	16·0	49·0
" "	1872	16·6	46·0
" Government District	1871	14·8	43·36
Liverpool, Small-pox Hospital	1870	12·73	72·0
Berlin, Lazaretto	1871-72	14·07	81·25
Coblentz	1871	18·03	56·89

Table O.

Table showing, for each of the Years 1870-83, the Mortality from Small-pox in Berlin, in London, and in Vienna, per 100,000 Inhabitants.

Year.	Berlin.	London.	Vienna.	Year.	Berlin.	London.	Vienna.
1870	22·37	39·29	46·71	1878	0·78	38·81	75·91
1871	632·56	242·16	74·90	1879	0·75	12·13	46·91
1872	138·61	53·80	536·98	1880	0·81	12·50	73·52
1873	11·21	3·55	228·50	1881	4·74	61·91	123·95
1874	2·47	1·66	155·26	1882	0·43	11·07	108·29
1875	5·19	1·32	113·50	1883	0·33	3·00	9·6
1876	1·81	20·80	167·80	Average for nine years from 1875-83	1·7	25·83	89·29
1877	0·40	70·98	84·01				

DIAGRAM *showing the death-rate per 10,000 from Typhoid (black) Dysentery (yellow) Small-pox (red) amongst*



App. No. 2.

Table P.

Table showing, for each of the Years 1831–69, the statistics of Small-pox in the Prussian Army.
(*Villaret's Handwörterbuch der Gesamten Medizin, page* 12. *Stuttgart*, 1888.)

Year.	Strength of Army.	Total Number of Small-pox Attacks.	Number of Small-pox Attacks per 10,000 Men.	Total Number of Small-pox Deaths.	Number of Small-pox Deaths per 10,000 Men.	Proportion of Deaths per 100 Attacks.	Mortality from Small-pox per 10,000 of the Civil Population.
1831	143,930	—	—	108	7·50	—	1·2
1832	143,930	—	—	96	6·67	—	5·6
1833	143,930	—	—	108	7·50	—	6·0
1834	135,362	619	47·73	38	2·81	6·14	4·9
1835	135,362	259	19·13	5	0·37	1·93	2·7
1836	130,306	130	9·98	9	0·69	6·92	1·9
1837	126,391	94	7·44	3	0·24	3·19	1·6
1838	126,263	111	8·79	7	0·55	6·31	1·7
1839	129,024	89	6·90	2	0·15	2·25	1·4
1840	127,451	74	5·81	2	0·16	2·70	1·6
1841	127,451	59	4·63	3	0·24	5·08	1·4
1842	127,451	99	7·77	2	0·16	2·02	2·2
1843	127,451	167	13·10	3	0·24	1·80	2·8
1844	127,451	69	5·41	3	0·24	4·35	2·7
1845	127,480	30	2·35	1	0·08	3·33	1·6
1846	126,164	30	2·38	1	0·08	3·33	1·5
1847	126,413	5	0·39	—	—	—	0·9
1848	127,095	22	1·73	1	0·08	4·55	1·4
1849	123,022	62	5·04	1	0·08	1·61	1·1
1850	123,022	176	14·31	1	0·08	0·57	1·6
1851	136,023	246	18·83	3	0·23	1·22	1·3
1852	130,023	87	6·05	1	0·08	1·15	1·9
1853	131,492	138	10·49	1	0·08	0·72	3·9
1854	131,642	121	9·19	3	0·23	2·48	4·4
1855	131,642	12	0·91	—	—	—	0·9
1856	131,708	21	1·59	—	—	—	0·7
1857	142,345	35	2·46	1	0·07	2·86	1·3
1858	142,345	64	4·50	—	—	—	2·6
1859	142,412	58	4·07	2	0·14	3·45	2·0
1860	?	44	—	3	—	6·82	1·9
1861	?	56	—	4	—	7·14	3·0
1862	202,420	25	1·24	1	0·05	4·00	2·1
1863	202,200	90	4·45	—	—	—	3·4
1864	201,545	120	5·95	1	0·05	0·83	4·6
1865	202,615	69	3·41	1	0·05	1·45	4·4
1866	?	91	—	8	—	—	6·2
1867	253,230	188	7·42	2	0·08	1·06	4·3
1868	250,376	97	3·87	1	0·04	1·03	1·8
1869	248,746	108	4·34	1	0·04	0·94	1·9

Table Q.

Table showing the number of Births, Vaccinations, and Cases of, and Deaths from, Small-pox in France from 1860 to 1871.
(*Dr. Vacher.* "*Gazette Médicale de Paris.*" *No.* 38. 18*th September* 1875.)

Year.	Births.	Vaccinations.	Cases of Small-pox.	Deaths.	Disfigured or rendered chronic Invalid.	Year.	Births.	Vaccinations.	Cases of Small-pox.	Deaths.	Disfigured or rendered chronic Invalid.
1860	956,875	520,705	13,755	1,662	—	1866	1,006,258	632,935	21,326	593	2,745
1861	1,005,078	533,477	9,678	1,746	820	1867	1,007,775	592,375	16,027	2,081	1,532
1862	995,167	565,677	1,375	1,813	1,263	1868	984,140	651,456	22,928	3,200	2,502
1863	1,012,794	540,680	13,188	1,440	1,199	1869	948,526	623,500	26,240	4,164	2,497
1864	1,005,880	602,639	29,576	3,290	2,231	1870	Returns wanting.				
1865	1,005,573	608,376	25,033	4,166	4,089	1871	835,129	891,697	221,417	58,236	24,004

Thus from 1860 to 1869 there were 9,928,226 births with 5,811,869 vaccinations, a proportion of 59 vaccinations to 100 births.

App. No. 2.

Table R.

Table showing the number of Vaccinations and Births in the Department of the Seine, and the number of Re-vaccinations performed on Soldiers of the Paris Garrison in the Year 1868.

(*Rapport présenté à S. Exc. M. le Ministre de l'Agriculture, &c., &c., par L'Académie Impériale de Médicine sur les Vaccinations pratiquées en France, pendant l'année* 1868. *Paris*, 1870.)

Department of the Seine.

Table drawn up by the Prefect.

65,155 births.
42,983 vaccinations.
770 deaths.

Chief Vaccinators.

M. Depaul, Director of Vaccination	2,203 re-vaccinations. 4,206 vaccinations.
M. Lamoix, Doctor of Medicine	5,089
„ Moim „	528
„ Joseph „	358
„ Boulay „	328
„ Roelandts „	328

Independent of the 4,206 vaccinations performed by M. Depaul, that gentleman re-vaccinated 1,751 soldiers, with results given in the following table:—

Table of the Re-vaccinations performed on Soldiers in the Year 1868.

Name of the Corps.	Number of Re-vaccinations.	Results.			Per-centage of Successes to Re-vaccinations.
		Successful.	Doubtful.	Unsuccessful.	
Cuirassiers (Imperial Guard)	6	3	—	3	50 per cent.
Train (Imperial Guard)	91	25	—	66	27·47 „
2nd Regiment of Algerian Sharpshooters	325	124	102	99	66·15 „
2nd Regiment of Grenadiers	63	18	—	45	35 „
3rd „ „	16	4	—	12	25 „
Battalion of Chasseurs à Pieds (Imperial Guard)	57	28	—	29	49·12 „
2nd section of "Moriers Militaires d'Amnistration"	171	37	57	77	21·63 „
9th Regiment of the line	44	13	—	31	29·54 „
24th „ „	32	20	—	12	62·50 „
43rd „ „	8	2	—	6	25 „
61th „ „	9	4	1	4	44·44 „
93rd „ „	53	3	—	50	17·66 „
59th „ „	4	3	1	—	75 „
99th „ „	23	8	—	15	34·78 „
8th Battalion of Chasseurs à Pieds	171	73	6	92	42·69 „
20th „ „	32	5	3	24	16·16 „
Garde de Paris	21	3	—	18	14·50 „
Total	*1,126	373	170	583	33·12 „

* To these must be added 625 re-vaccinations, concerning which no "state" has been made; the total number of soldiers re-vaccinated in 1868 was consequently 1,751.

APPENDIX III.

(Papers handed in by Mr. William Gayton, M.D., 15th October 1869.)

Table A.

Analysis of 10,603 Small-pox Cases.

| AGES. | VACCINATED WITH GOOD MARKS. | | |

APPENDIX III.—*continued.*

App. No.

TABLE B.

ANALYSIS OF THE SAME 10,403 CASES, showing that in the Not Vaccinated the Mortality at each Age-period is greater as compared with the respective Mortalities amongst those Vaccinated with good, and those with imperfect, marks, and those said to have been Vaccinated but with no marks visible.

Ages.	Vaccinated with good marks.			Vaccinated with imperfect marks.			Said to have been Vaccinated, but no marks visible.			Not Vaccinated.		
Years.	Cases.	Deaths.	Per-centage.	Cases.	Deaths.	Per-centage.	Cases.	Deaths.	Per-centage.	Cases.	Deaths.	Per-centage.
0 to 2	4	0	0	32	3	9	22	9	41	276	181	66
2 to 5	57	0	0	150	18	12	96	38	40	401	202	50
5 to 10	206	2	1	532	27	5	207	40	19	510	180	35
10 to 15	439	5	1	939	32	3	214	42	20	317	74	23
15 to 20	606	12	2	1,037	66	6	205	39	19	204	86	42
20 to 25	389	11	3	843	100	13	167	56	34	174	83	8
25 to 30	189	12	6	529	80	15	116	35	30	105	56	53
30 to 40	147	14	10	526	78	15	137	40	36	103	42	41
40 to 50	29	4	14	186	33	18	85	24	28	49	21	43
50 and above	19	2	11	80	18	22½	46	20	43	30	13	43
All ages	2,085	62	3	4,854	455	9	1,295	352	27	2,169	938	43

Combined mortality 7·45 per cent.

App. No. 4.

APPENDIX IV.

(Papers handed in by Mr. F. W. Barry, M.D., Sc.D., 16th, 18th, 23rd, and 25th October 1889.)

MEMORANDUM ON THE STEPS SPECIALLY REQUISITE TO BE TAKEN IN PLACES WHERE SMALL-POX IS PREVALENT.

I.—BY BOARDS OF GUARDIANS.

As it is by vaccination that the spread of small-pox can most effectually be prevented, boards of guardians, as soon as any case of that disease is brought into or occurs in their respective unions or parishes, should see that measures are promptly taken to secure, as far as necessary, the vaccination (or, as the case may be, re-vaccination) of all such persons as are especially exposed to the danger of the infection.

Under the Order of the Privy Council of February 18th, 1868 (Reg. I. Art. 1), the public vaccinator is authorised to vaccinate, elsewhere than at the public station, cases in which there exists a special reason (to be noted by him in his register) for taking this exceptional course; and sect. 13 of 34 & 35 Vict. c. 98. provides that district medical officers in attendance upon any person suffering from small-pox shall be entitled to payment from the guardians for vaccinating or (as the case may be) re-vaccinating any person who is resident in the same house as such sick person, and who could lawfully be vaccinated or (as the case may be) re-vaccinated by a public vaccinator at the public expense.

These provisions, promptly applied on the occurrence of any isolated case or cases of small-pox, will in general be found adequate to stop the further spread of the disease; but if from neglect of them, or from any other circumstances, cases of small-pox shall have become numerous, special measures (as below explained) should be taken to expedite, as far as practicable, the vaccination of all unvaccinated persons in the district, and to promote the re-vaccination of adults and adolescents who have not already been successfully re-vaccinated; and special arrangements (as below explained) may also be requisite to facilitate the performance of public vaccination and re-vaccination.

This memorandum is intended to afford information on those measures and arrangements.

A.—SPECIAL INSTRUCTIONS TO VACCINATION OFFICERS.

1. On the occurrence of any special prevalence of small-pox, the vaccination officer should give his first and special attention to the particular localities in which the infection exists.

2. In order that for this purpose he may have the earliest possible information of the occurrence of cases of the disease, the guardians should instruct their district medical officers to give him immediate notice of every fresh case of small-pox which comes under their treatment. (With the same object the co-operation of the officers of the sanitary authority, and of others who visit among the poor, should be invited.) The guardians should also arrange with the registrars of deaths to forward to the vaccination officer immediate notice of each death registered from small-pox. For convenience of transmitting such notices, each district medical officer and registrar should be supplied with forms duly stamped for post, or with postcards adapted for the purpose. Private medical practitioners should also be invited to give similar information.

3. In each locality in which the infection exists, the vaccination officer should, with the utmost possible despatch, personally ascertain what children are unprotected by vaccination, and should use his utmost exertions to obtain the prompt vaccination of all such children. Generally speaking, his own judgment and local knowledge will guide him as to the manner in which his inquiries can best be made; but in infected courts or alleys, as well as in certain kinds of streets, inquiries from house to house, and, in tenement houses, from room to room, will be indispensable. In order that speedy discovery may be made of all unvaccinated persons, whether born in the district, or newly arrived there, it will frequently be desirable, in populous places, that some temporary assistance be given to vaccination officers, in the manner provided in the General Order of the Local Government Board, dated 31st October, 1874. (Section 1, Article 1.)

4. Where any child (between the ages of three months and 14 years) is found illegally unvaccinated, the vaccination officer should give a notice requiring the vaccination to be done within a specified period. This period, when there is small-pox in the house, or other special risk of exposure to the contagion, should not exceed 24 hours; but in other cases some days, not exceeding a week, may be allowed. A second visit from the vaccination officer will, of course, afterwards be necessary, in order to see that his notice has been complied with.

With regard to unvaccinated children, not yet three months old, who may be in infected localities, the vaccination officer should advise the parents not to incur the unnecessary risk of waiting for the child to reach that age before having its vaccination performed; for vaccination is perfectly well borne by children even immediately after birth. In no house in which there is small-pox ought a child, however young, on any account to remain unvaccinated, unless on medical examination it be pronounced unfit to be vaccinated.

5. The vaccination officer should make it well known in infected localities that the public vaccinator is at liberty to re-vaccinate grown up and young persons (not under 10 years of age) who have not before been successfully re-vaccinated, and who apply to him for that purpose; and that persons not vaccinated since childhood, who are likely to be exposed to contagion, ought to be re-vaccinated without delay. Above all, this is necessary for persons whose original marks of vaccination are imperfect.

6. All notices given and representations made as above, should be accompanied with information as to the provisions made for public vaccination in the district. If any case requiring prompt vaccination by the public vaccinator cannot, in the judgment of the vaccination officer, properly be taken to the station or to the residence of the public vaccinator, the vaccination officer should give to the public vaccinator immediate information of the case.

7. Besides the above-described special proceedings in localities already infected, the vaccination officer should take every means to ensure that the vaccination of his district generally is as complete as possible. He should make frequent examination of his birth-lists, and deal, as soon as practicable, with every case of default as it arises; and he should be prompt and diligent in his inquiries respecting the other children to whom his duties extend under section 12 of his "Instructions," as issued by the Local Government Board.

8. The vaccination officer should give immediate information to the local sanitary authority of any house in which small-pox has appeared, in order that needful means of isolation and disinfection may be taken.

B.—SUPPLEMENTARY ARRANGEMENTS FOR SPECIAL PUBLIC VACCINATION.

1. In the case, first, of towns which have regular weekly attendances for the performance of public vaccination, it cannot be too clearly understood that the appearance of small-pox gives extra reason for scrupulousness in maintaining systematic primary vaccination and all practicable re-vaccination, AT THE APPOINTED DAY AND HOUR, AND NOT AT OTHER PERIODS.

It is on the regular weekly attendances that the vaccinator has to depend for the means of adequately meeting the demands for vaccination; and the experience of every recent epidemic of small-pox has shown that to attempt at such times an indiscriminate daily performance of vaccination and re-vaccination, leads

only to difficulties and disadvantages. There are two reasons, indeed, for which at such times an adherence to systematic arrangements is of more than ordinary consequence; first, because it is then peculiarly important that each primary vaccination should be done under conditions which scarcely admit of failure; and, secondly, because without system it is not possible properly to meet the large demands for re-vaccination which at such times are sure to arise; nor yet to have trustworthy lymph for use in such exceptional primary vaccinations as may really need to be done under circumstances of urgency. Re-vaccinations, unless of persons residing in houses in which there is small-pox, or under other exceptional circumstances, should ordinarily be reserved for the regular vaccinating days.

Nevertheless there are conditions justifying certain additional attendances besides those of the ordinary day and hour; these are:—

(*a.*) In the case of a town district of particularly large population, it may be convenient that, during the stress of the epidemic, the station should be open for the general performance of vaccination on two days (instead of one day) in each week.

(*b.*) In the case of many artisans requiring re-vaccination, and being unwilling to lose part of their working day with the object of securing the desired protection, it may be expedient to appoint for their attendance some evening hour of the day appointed for systematic vaccination, when the public vaccinator possesses abundance of fresh lymph.

(*c.*) And, thirdly, in order to meet cases of emergency, special daily attendances at the station may be appointed to take place at a fixed hour, not for vaccination or re-vaccination generally, but for giving protection to the particular persons who are running exceptional risk of exposure to small-pox infection.

2. In districts (whether of town or country) which ordinarily have their public vaccinations performed at quarterly or half-yearly or other intervals, should small-pox break out at a time of year when vaccination is not going on, it will be necessary that the station, for the district or part of district in which the disease is prevailing, should at once be opened, and that a WEEKLY ATTENDANCE should be given thereat for a limited period, during which period the vaccination officer should take steps as above directed for making the vaccination of the district or part of district as complete as possible. In districts of the kind now under consideration, it will probably be more convenient that in CASES OF EMERGENCY persons should be vaccinated at their own homes under the exceptional provisions of Regulation 1, Article 1, of the Order of February 18, 1868 (above referred to), than that daily attendances should be given at the station.

3. Any exceptional vaccination arrangements made as above by the guardians with reference to epidemics of small-pox should be for some fixed period, not exceeding six weeks; at the end of which period they can, in case of need, be renewed by a further order of the guardians; but every such making or renewal of the exceptional arrangements should be reported without delay to the Local Government Board.

II.—By Sanitary Authorities.

The sanitary authority of any district into which a case of small-pox may be brought, or in which it may occur, should immediately, on obtaining information of the occurrence, give notice to the board of guardians (the local authority for vaccination purposes), or the vaccination officer, in order that all requisite measures in regard to vaccination may be taken. The sanitary authority should also instruct their officers to assist in the administration of the Vaccination Acts by spreading a knowledge of the advantages of vaccination and re-vaccination, and by giving to the vaccination officer any information they may obtain as to children and others unprotected by vaccination.

The sanitary authority themselves should, on any appearance of small-pox within their district, at once proceed (under the powers of the Public Health Act, 1875) to see that proper means to prevent the spread of the disease by ISOLATION OF THE SICK, AND BY DISINFECTION OF INFECTED HOUSES AND THINGS, are adopted. Any extension of the disease from the house first infected, or any fresh importation of it, needs to be dealt with in the same way. And as, from the extreme infectiousness of small-pox, every new case is a fresh source of danger, it is of the first importance towards preventing the spread of the disease that the necessary measures of the kind above mentioned should be taken in each case at the earliest possible moment. Hence the necessity, for every sanitary authority to see—at any time when small-pox threatens to become prevalent—that their machinery for supplying to the medical officer of health information from the district medical officers of every fresh case of small-pox occurring amongst paupers, and from the district registrars of all cases of death from small-pox, is in complete working order; and to request the medical practitioners of the district to give information of any fresh cases of the disease occurring in their private practice. To facilitate the carrying out of these arrangements, post cards, addressed to the medical officer of health, should be distributed to district medical officers, medical practitioners, and registrars.

The following are the measures which sanitary authorities should take for the attainment of these objects.

1. It is of great importance that all persons suffering from small-pox, and so lodged that the isolation of them from healthy persons cannot be secured without their removal, should be removed to some special hospital or place for the reception of the sick. The 124th section of the Public Health Act, 1875, in the cases before mentioned, gives power to a justice to order such removal; and resort should be had to this provision wherever such a measure seems necessary to prevent the spread of the disease. The 91st section of the same Act, including within the term "nuisance" such overcrowding of a house or any part of a house as is dangerous or injurious to the health of the inmates, should also receive the special attention to the sanitary authority wherever any infectious disease is or threatens to become prevalent in the district; and the powers given in the 142nd section should, if necessary, be exercised with regard to the bodies of persons who die of small-pox.

2. If it be doubtful whether suitable accommodation will be found in existing hospitals for the cases of small-pox in the district which ought to be removed from their homes, the sanitary authority, who (under section 131 of the Public Health Act) have power to provide any requisite accommodation for such cases, should, if they have not already exercised their powers in this behalf, exercise such powers without delay, and to the full extent required.

3. It is equally necessary that all houses or rooms and things infected with small-pox should be disinfected under skilled direction, and with as little delay as possible after the death, removal, or convalescence of the patient, and for this, provision is made in section 120 of the Public Health Act. To secure the disinfection of houses or rooms being properly performed, it will be desirable that it should, in as many cases as possible, be done by the servants of the sanitary authority, and to the satisfaction of the medical officer of health: and in order that articles and things may be readily but sufficiently disinfected, it will be necessary that a place with the requisite apparatus and attendance for disinfection should be ready for use (Public Health Act, section 122). If these public means of disinfecting infected articles and things have not already been provided, this should at once be done. Often it will be better, instead of disinfecting infected articles (such as bedding and clothing), to destroy them; and the sanitary authority have power, under section 121 of the Public Health Act, to do this, and to make compensation for the articles destroyed.

4. As infectious diseases may be spread by the use of public carriages for the conveyance of the sick and of convalescents, the sanitary authority should (under section 123 of the Public Health Act) provide suitable means of conveyance to and from hospital of persons suffering or recovering from small-pox.

5. Public notice should be given of the penalties to which persons are liable on account of the exposure of small-pox patients, the use without proper precautions of public carriages for the conveyance of persons suffering from small-pox, the letting of infected houses or rooms, or the sale or sending about of infected things; and proceedings should be taken by the sanitary authority in every case in which these provisions are disobeyed. (See Public Health Act, sections 126–129.)

GEORGE BUCHANAN
Medical Officer.

Local Government Board,
February 10th, 1888.

App. No. 4.

FORM OF CARD USED IN MAKING INQUIRIES INTO CASES OF DEATHS FROM SMALL-POX IN SHEFFIELD DURING 1887–88.

(*See Question* 1900.)

_____ DISTRICT.

Name _____

Address _____

Occupation _____ Age _____

Date of Death _____

Vaccinated (When) _____

(Where) _____

(By whom) _____

(If successful number of scars) _____

Revaccinated (When) _____

(Where) _____

(By whom) _____

(If successful number of scars) _____

If not vaccinated, reasons for non-vaccination _____

Dates of previous attacks of small-pox (if any) _____

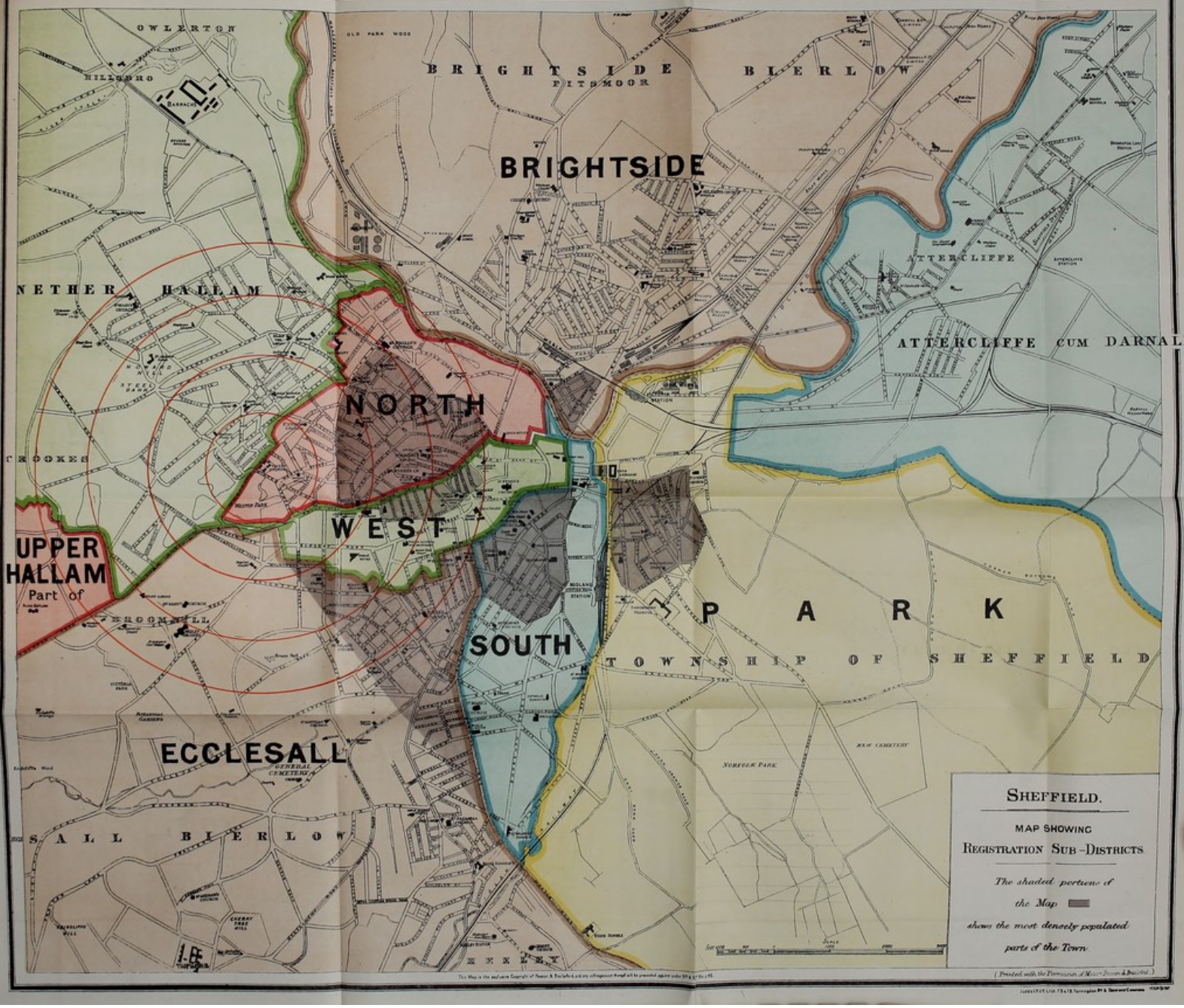
Character of small-pox _____

Length of illness _____

Previous health of deceased _____

Name of person verifying above facts _____

Relationship of such person to deceased _____

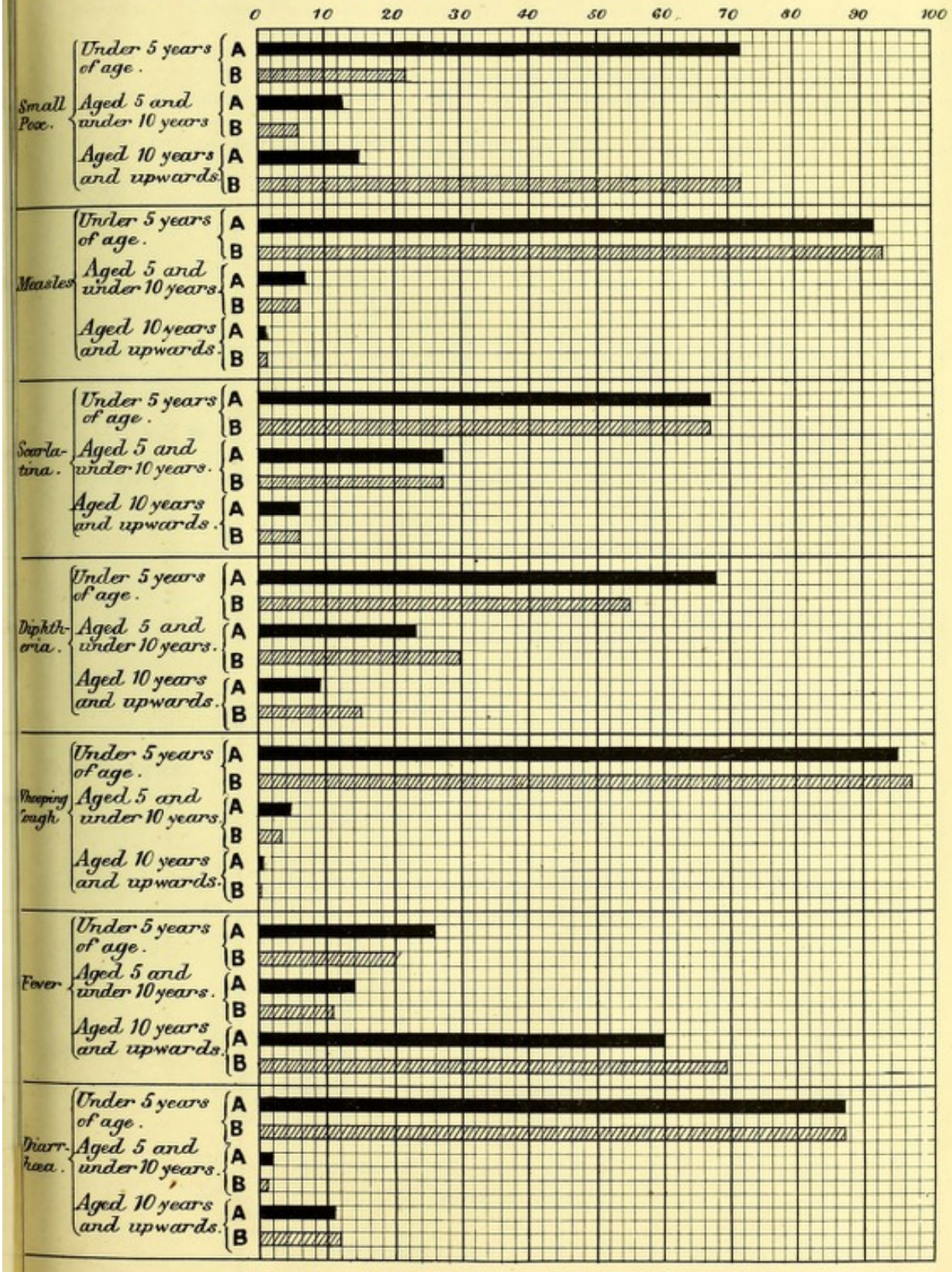


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DIAGRAM A.

DIAGRAM showing the variations in the Age Incidence of the several fatal Infectious Diseases in the Borough of Sheffield as witnessed during A. the ten years 1861-70, B. the ten years 1876-83, 86-87.



NOTE. It will be observed that the lines indicating the age incidence at one and another time have no relation to the actual amount of disease prevalent. The total of the black line gives a constant 100 for the one period and the total of the shaded line a constant 100 for the other.

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DIAGRAM B.

[INVADED HOUSES; SHEFFIELD; IN 3 GROUPS OF AGES.]

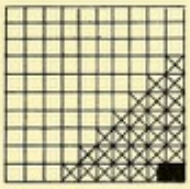
DIAGRAM *showing separately for "Vaccinated" and for "Unvaccinated" persons, living in those houses of Sheffield which had, up to the date of the Census, become invaded by Small-pox, the Small-pox attacks and the Small-pox deaths that had occurred up to that date, per cent of the inhabitants; under 10 years of age, over 10 years, and at all ages.*

(The large squares contain each one hundred small squares, so that each small square represents a rate of one per cent, ⊠ of non-fatal attacks, ■ of fatal attacks upon the population, shown by the large square, at the respective periods of life.)

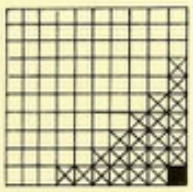
VACCINATED.



Under 10 years of age.

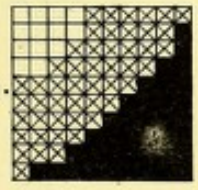


10 years of age and upwards.

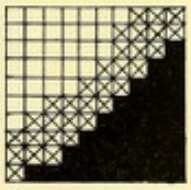


All ages.

UNVACCINATED.



Under 10 years of age.



10 years of age and upwards.



All ages.

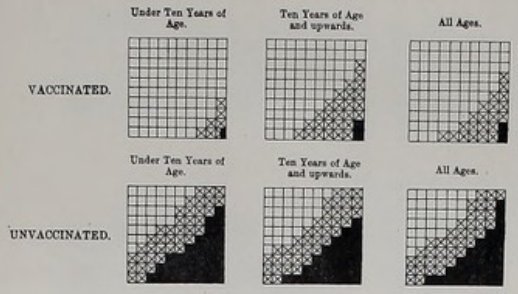
(The two work-houses are excluded from the above diagram.)

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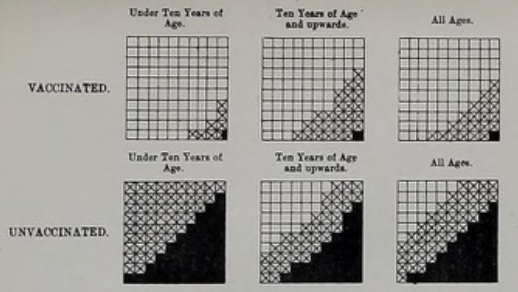
DIAGRAM *showing the proportion in each 100 persons (of the "Vaccinated" and "Unvaccinated" classes respectively) reported by the Census enumerators to have resided in the several Sub districts of Sheffield in houses invaded by Small-pox who were attacked by the disease during 1887–88 (distinguishing fatal and non fatal cases.)*

Non-fatal Small-pox. ⊠
Fatal Small-pox. ■

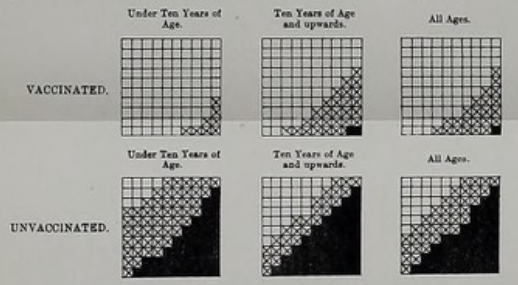
(1.) ATTERCLIFFE. (*Diagram I., page 24: Sheffield report.*)



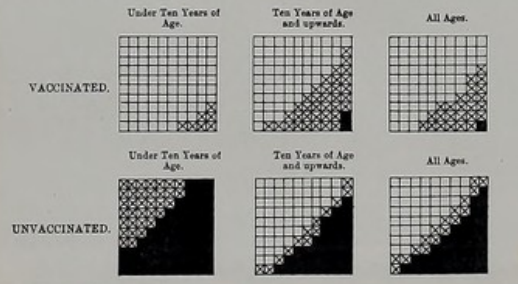
(2.) BRIGHTSIDE. (*Diagram III., page 38: Sheffield report.*)



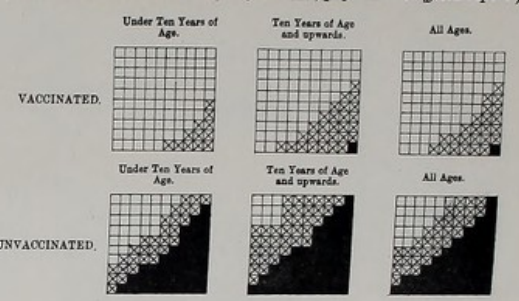
(3.) NORTH SHEFFIELD. (*Diagram V., page 59: Sheffield report.*)



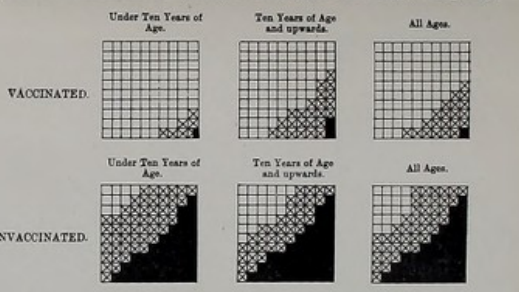
(4.) SHEFFIELD PARK. (*Diagram VII., page 80: Sheffield report.*)



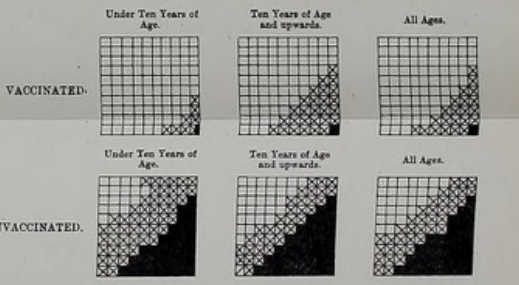
(5.) SOUTH SHEFFIELD. (*Diagram IX., page 94: Sheffield report.*)



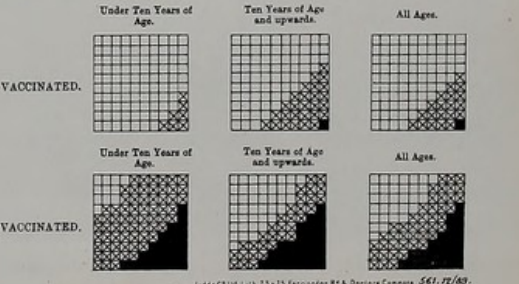
(6.) WEST SHEFFIELD. (*Diagram XI., page 108: Sheffield report.*)



(7.) ECCLESALL. (*Diagram XIII., page 127: Sheffield report.*)



(8.) NETHER HALLAM. (*Diagram XV., page 147: Sheffield report.*)



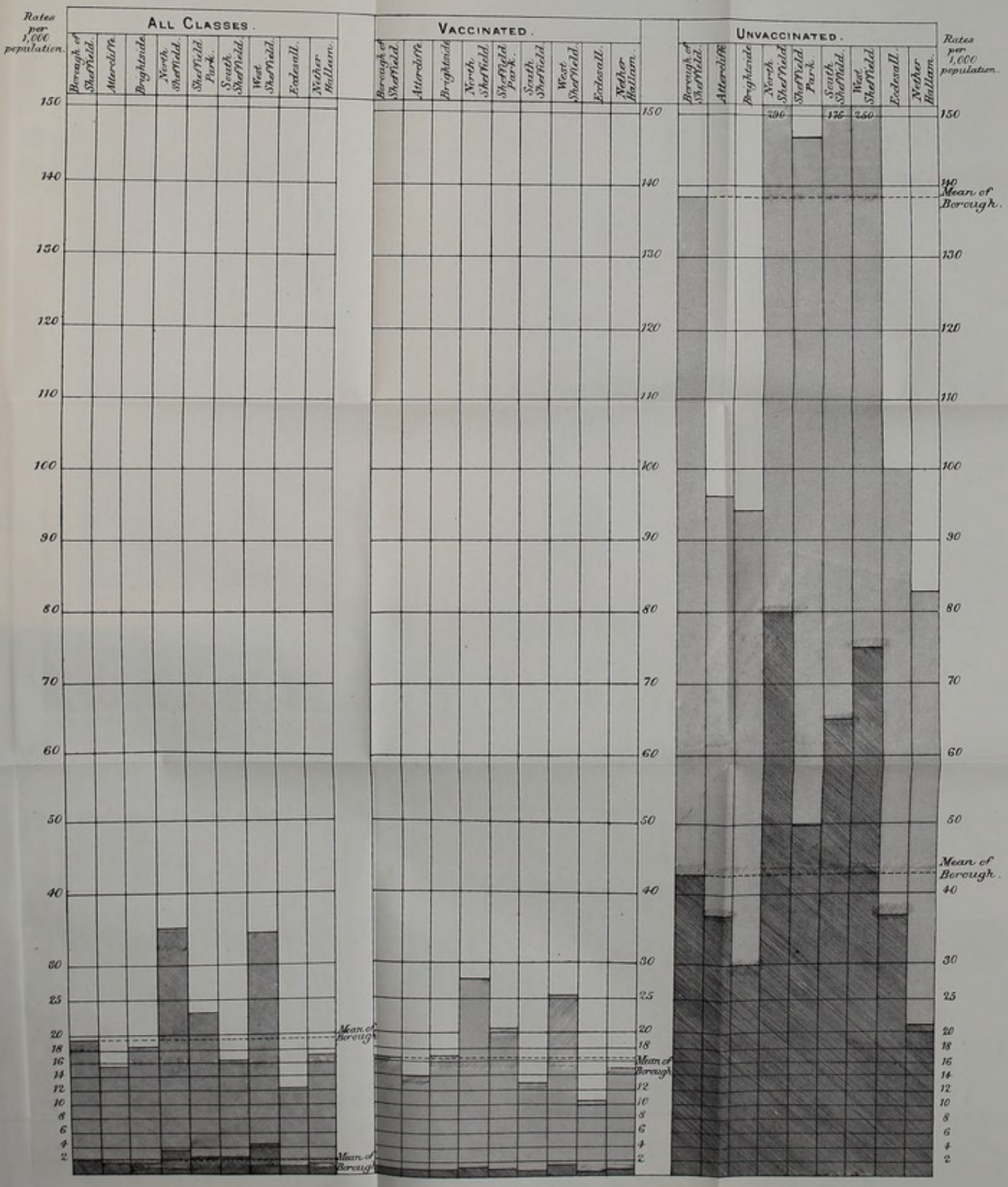
Judd & Co. Lith. 73 & 75 Farringdon Rd & Doctors Commons. 561. 12/89.

To face page 248.

DIAGRAM G.

App. N° 4.

DIAGRAM *showing for the whole period of the Epidemic, and severally for "all classes" for "Vaccinated," and for "Unvaccinated," Small-pox Attack rates (lighter shading) and Small-pox Death rates (darker shading) in the Borough of Sheffield and in each of its sub-divisions*



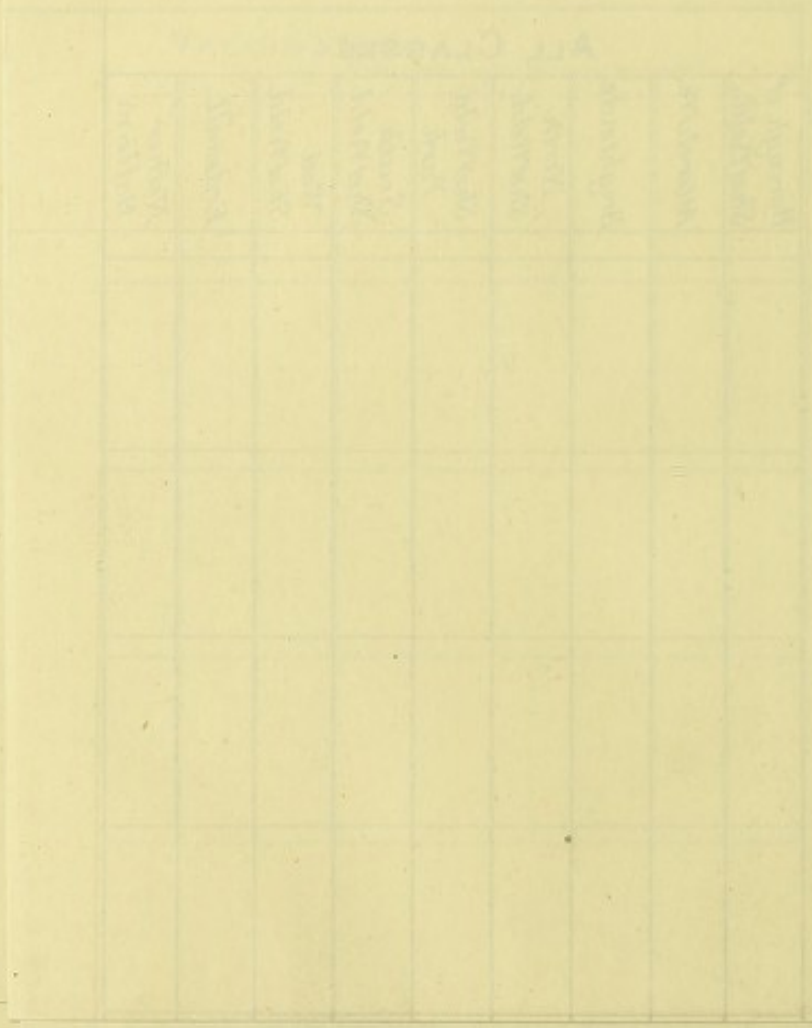


DIAGRAM H.

DIAGRAM SHOWING, FOR THE WHOLE PERIOD OF THE EPIDEMIC, AND SEVERALLY FOR "ALL CLASSES", FOR "VACCINATED", AND FOR "UNVACCINATED", THE FATALITY (CASE MORTALITY) OF SMALL-POX IN THE BOROUGH OF SHEFFIELD AND IN EACH OF ITS SUB-DIVISIONS.

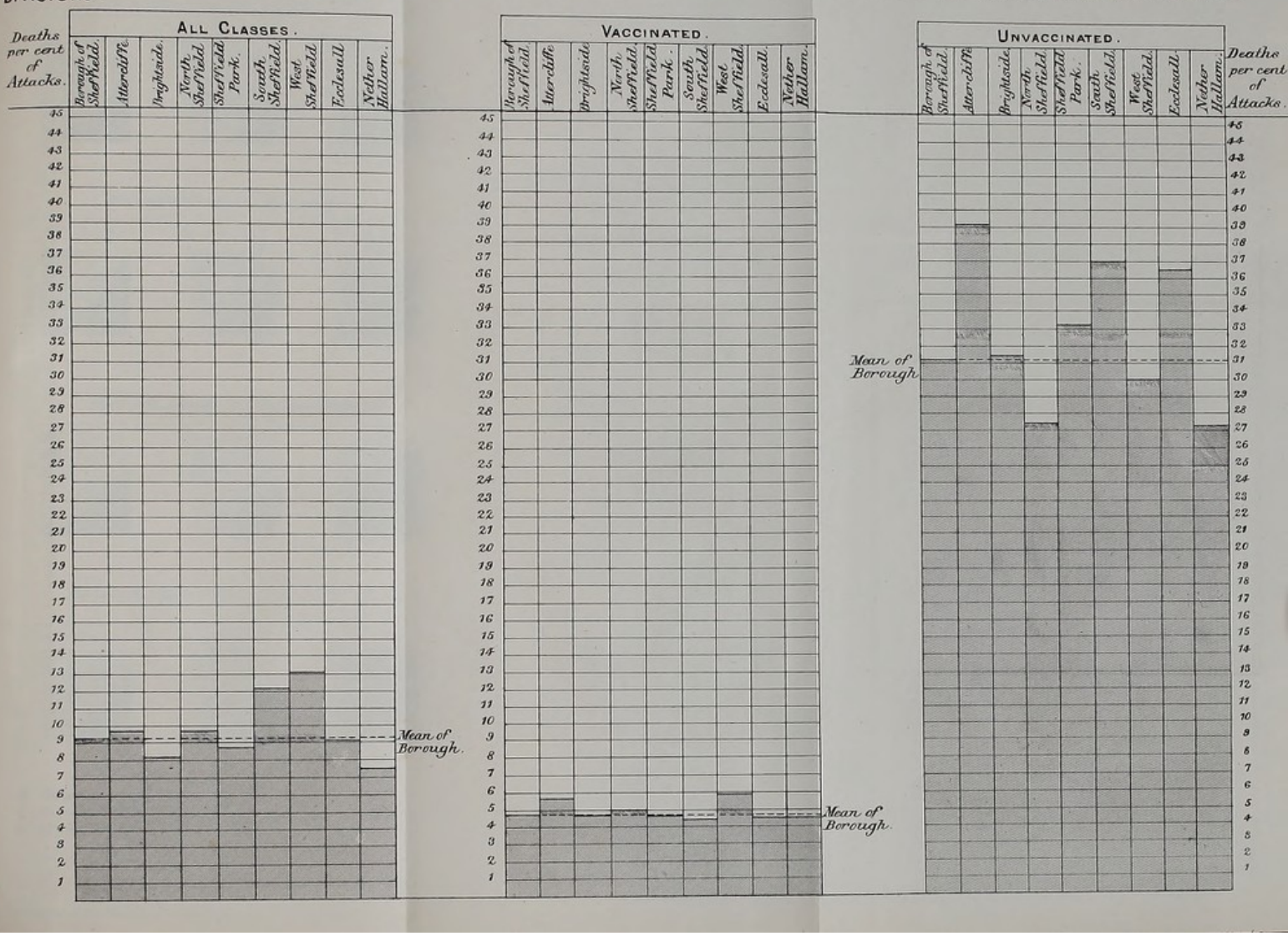
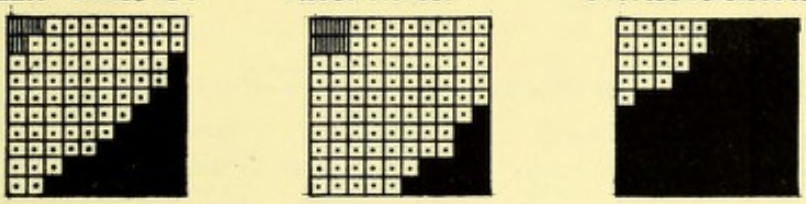


DIAGRAM J.

DIAGRAM *showing the proportion of cases of Small-pox of the Confluent and Discrete types respectively which occurred in persons at all ages of different classes in the Sheffield Small-pox Hospitals.*

Borough Hospital, Winter Street.

All Classes. *Vaccinated.* *Unvaccinated.*



Borough Hospital, Lodge Moor.

All Classes. *Vaccinated.* *Unvaccinated.*



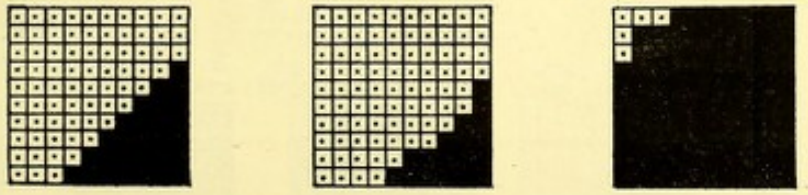
Sheffield Union Workhouse Hospital.

All Classes. *Vaccinated.* *Unvaccinated.*



Ecclesall Bierlow Union Workhouse Hospital.

All Classes. *Vaccinated.* *Unvaccinated.*



■ *Coherent or Confluent type.*
▫ *Discrete type.*
▪ *Type not recorded.*

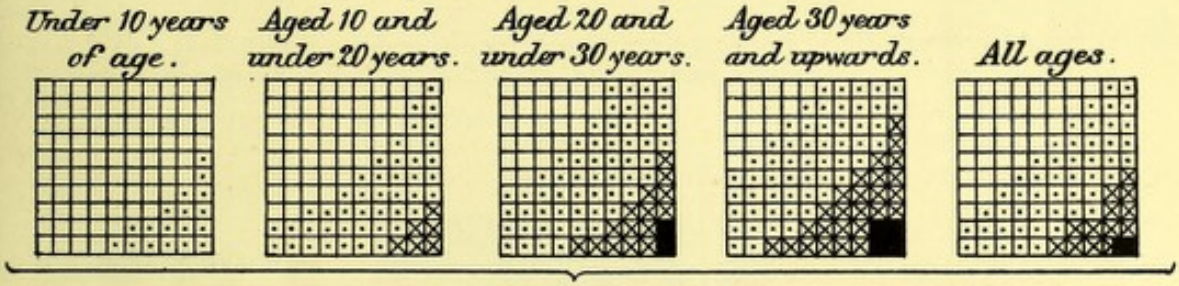
Judd & Co Lith. 73 & 75, Farringdon Rd & Doctors' Commons. 561.12/89.



DIAGRAM K.

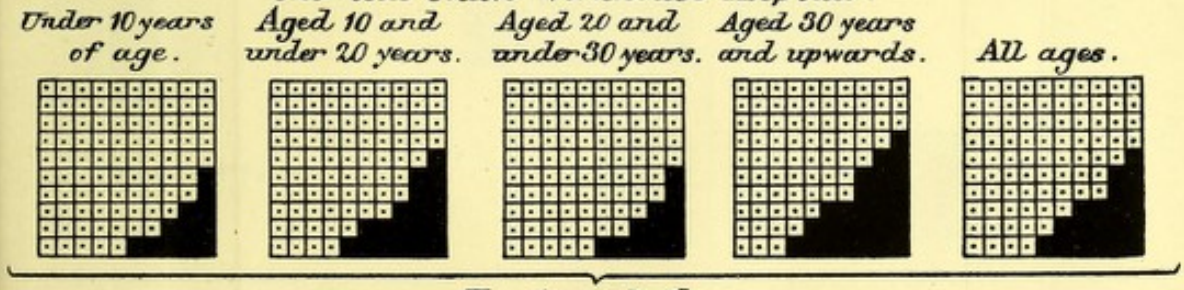
DIAGRAM *showing the proportion of cases of Small-pox of different types which occurred in persons of the "Vaccinated" and "Unvaccinated" classes respectively at all and certain specified ages in the Winter Street and Sheffield Union Workhouse Hospitals.*

Borough Hospital, Winter Street.



■ *Confluent.* ⊠ *Coherent.* ⊡ *Discrete.* □ *Varioloid.*

Sheffield Union Workhouse Hospital.



■ *Confluent (including Coherent.)*
⊡ *Discrete (including varioloid.)*

NOTE. *Cases with regard to which the Hospital records were incomplete have not been included in this diagram.*

Judd & Co Ltd Lith. 73 & 75, Farringdon Rd & Doctors' Commons. 561-12/89

DIAGRAM L.

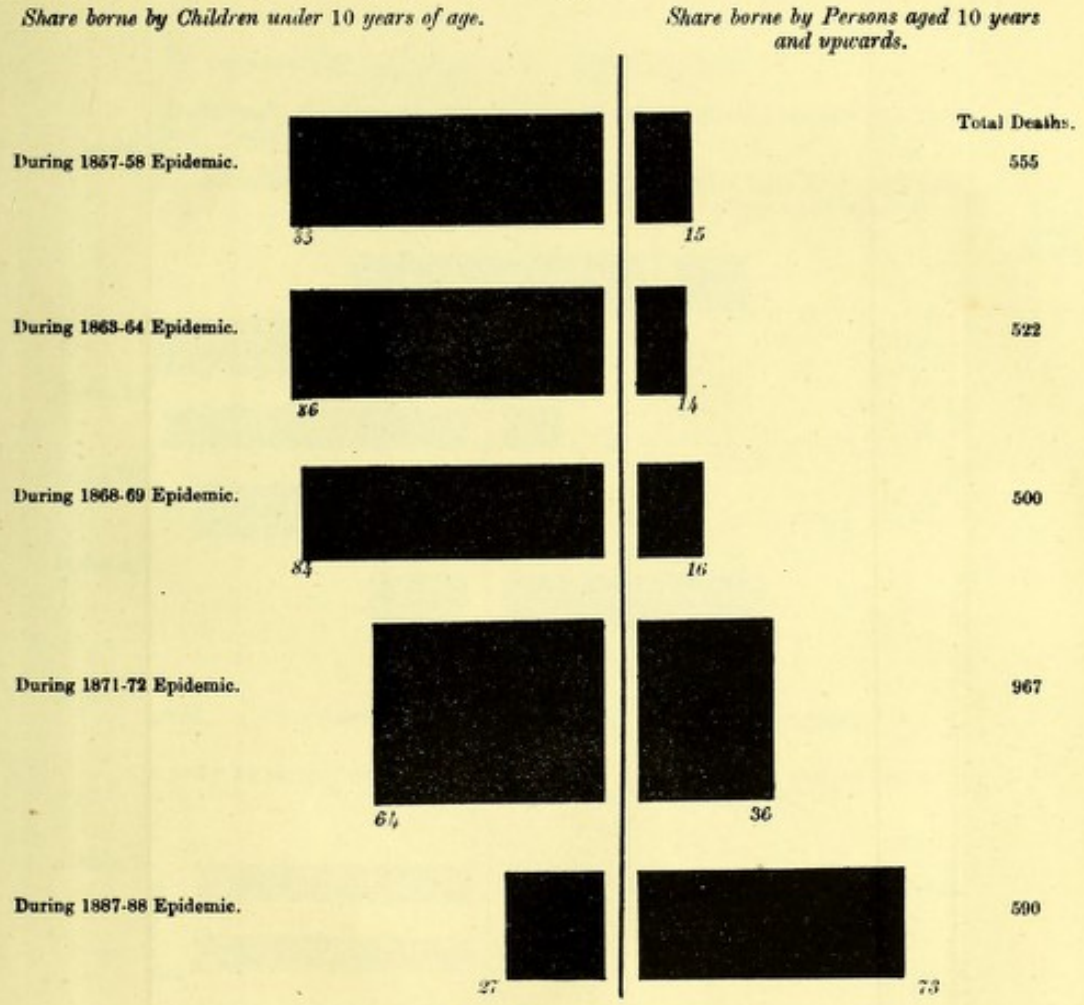
DIAGRAM *showing for the Borough of Sheffield.*

(a) *The share, during successive Epidemics, of the total Small-pox mortality borne by children under 10 and by persons aged 10 years and upwards.*

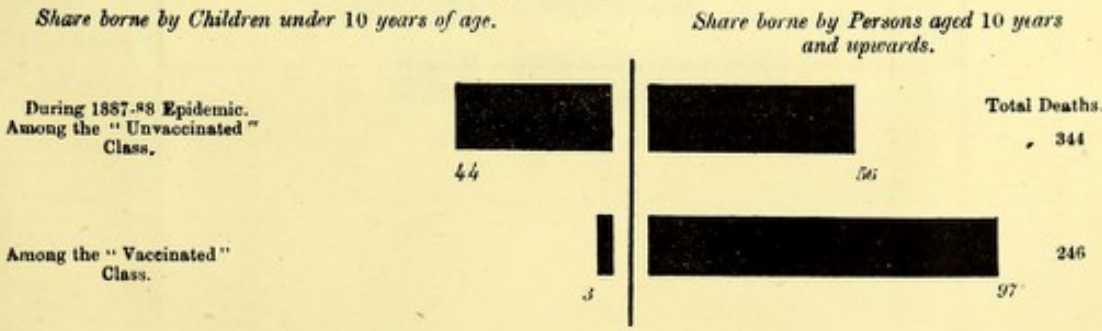
(b) *Similar facts, during 1887-88, for "Vaccinated" and "Unvaccinated" classes respectively.*

(Difference of width of horizontal bars denotes differing amounts of fatal Small-pox.)

(*a.*) Out of every 100 small-pox deaths among people of all classes in each of the five epidemics 1857-8, 1863-4, 1868-9, 1871-2, and 1887-8:—



(*b.*) Out of every 100 small-pox deaths among people of all ages in the "vaccinated" and "unvaccinated" classes respectively during 1887-88:—



To face page 248.

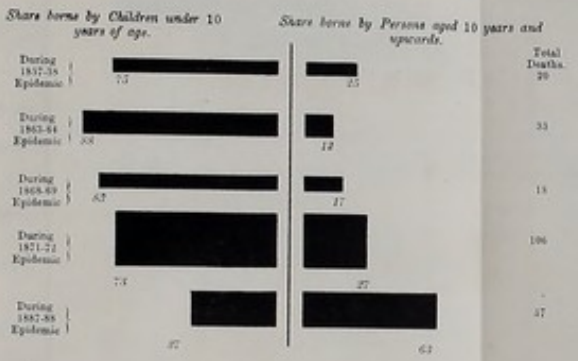
DIAGRAM M.

App. N° 4.

DIAGRAM *showing for each Sub-district of Sheffield during successive epidemics the share of Small-pox mortality borne by children under ten years and by persons aged ten years and upwards (Difference of width of the horizontal bars denotes for one or another sub-district differing amounts of fatal Small-pox. The relative width of the bars in this diagram is four times the scale used in Diagram L, which relates to the whole Borough of Sheffield.)*

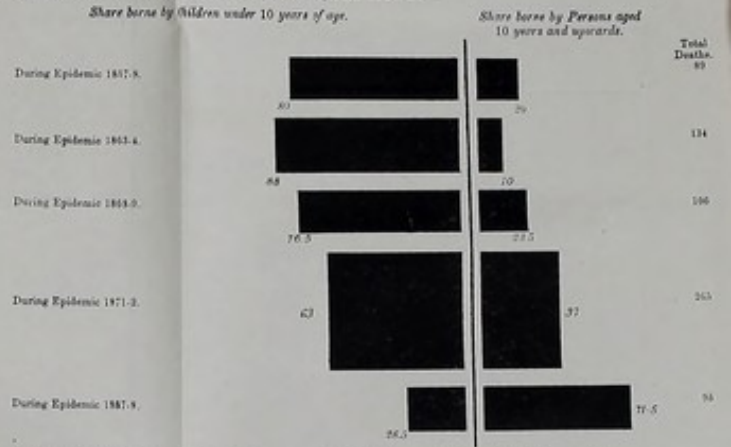
(1.) ATTERCLIFFE. (*Diagram II. (a), page 33: Sheffield report.*)

Out of every 100 small-pox deaths at all ages and among all classes in the epidemics of 1857-8, 1863-4, 1868-9, 1871-2, and 1887-8:—

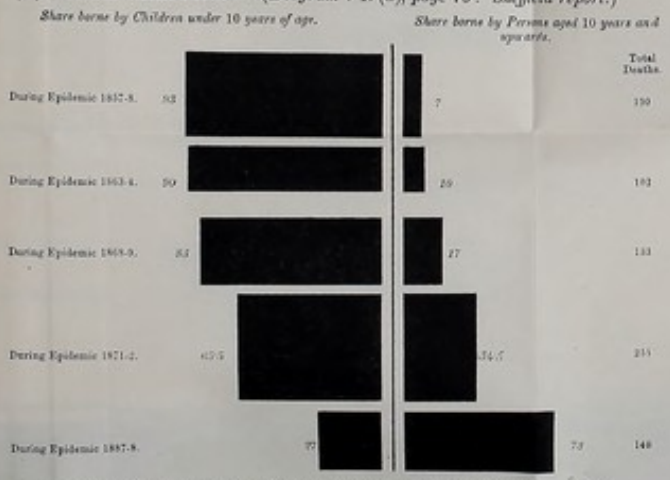


(2.) BRIGHTSIDE. (*Diagram IV. (a), page 54: Sheffield report.*)

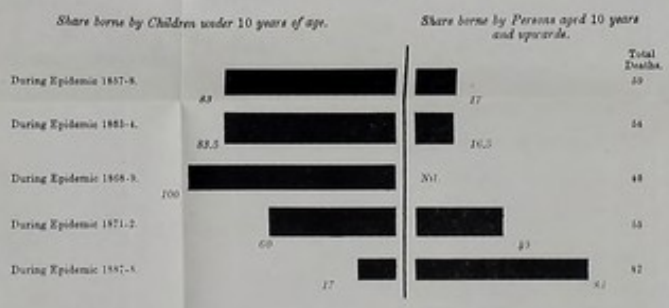
Out of every 100 small-pox deaths at all ages and among all classes in the epidemics of 1857-8, 186-4, 1868-9, 1871-2, and 1887-8:—



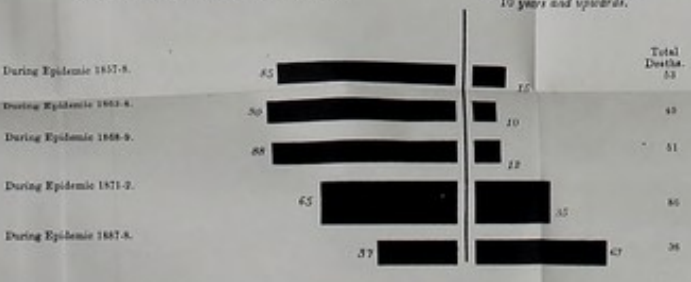
(3.) NORTH SHEFFIELD. (*Diagram VI. (a), page 75: Sheffield report.*)



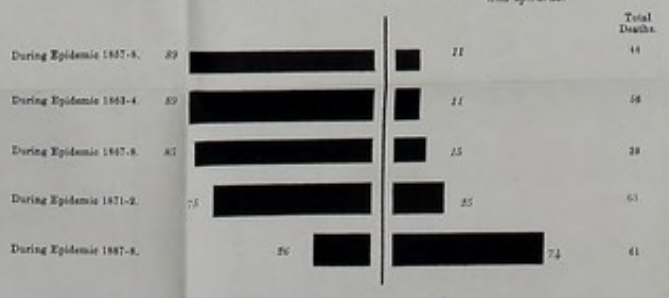
(4.) SHEFFIELD PARK. (*Diagram VIII. (a), page 89: Sheffield report.*)



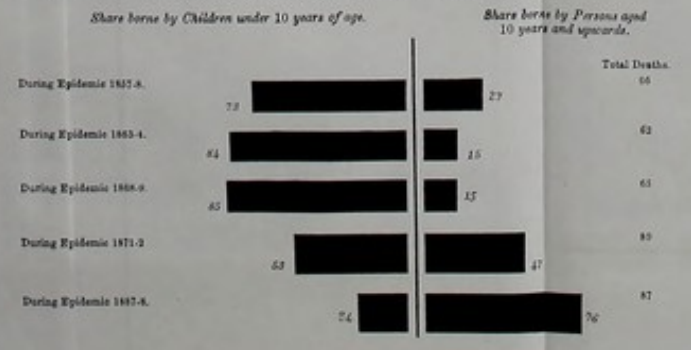
(5.) SOUTH SHEFFIELD. (*Diagram X. (a), page 103: Sheffield report.*)



(6.) WEST SHEFFIELD. (*Diagram XII. (a), page 118: Sheffield report.*)



(7.) ECCLESALL. (*Diagram XIV. (a), page 142: Sheffield report.*)



(8.) NETHER HALLAM. (*Diagram XVI. (a), page 159: Sheffield report.*)

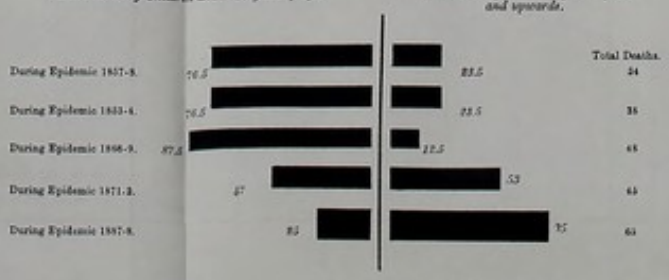
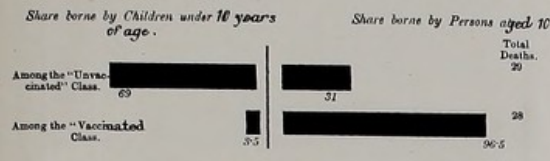


DIAGRAM N.

DIAGRAM *shewing for each sub-district of Sheffield during the epidemic of 1887-88 and for "Vaccinated" and "Unvaccinated" classes respectively the share of Small-pox mortality borne by children under ten and by persons aged ten years and upwards. (Difference of width of the horizontal bars denotes for one or another sub-district differing amounts of fatal small-pox. The relative width of the bars in this diagram is four times the scale used in Diagram I. which relates to the whole Borough of Sheffield.)*

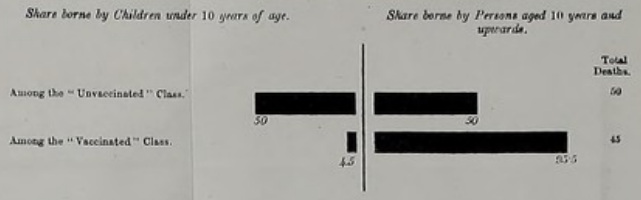
(1.) ATTERCLIFFE. (*Diagram II.* (*b*), *page* 33: *Sheffield report.*)

Out of every 100 small-pox deaths in the epidemic 1887-8, among people of all ages in vaccinated and unvaccinated classes respectively:—

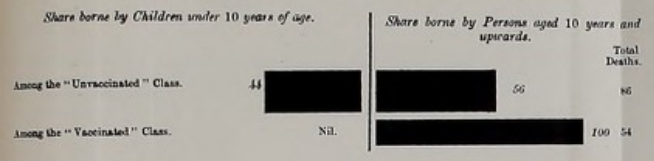


(2.) BRIGHTSIDE. (*Diagram IV.* (*b*), *page* 54: *Sheffield report.*)

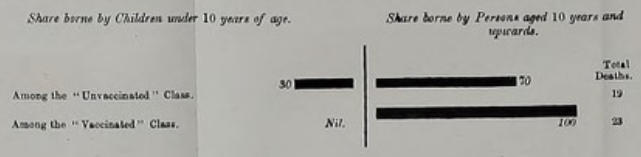
Out of every 100 small-pox deaths in the epidemic of 1887-8 among people of all ages in the "vaccinated" and "unvaccinated" classes respectively:—



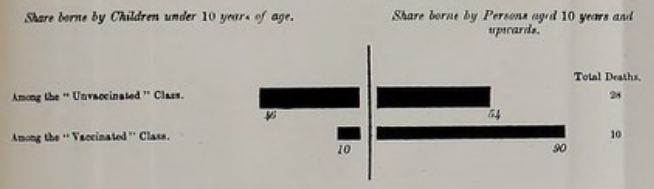
(3.) NORTH SHEFFIELD. (*Diagram VI.* (*b*), *page* 75: *Sheffield report.*)



(4.) SHEFFIELD PARK. (*Diagram VIII.* (*b*), *page* 89: *Sheffield report.*)



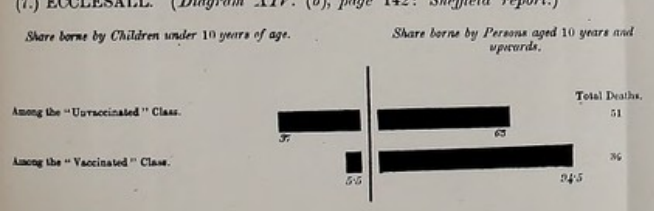
(5.) SOUTH SHEFFIELD. (*Diagram X.* (*b*), *page* 103: *Sheffield report.*)



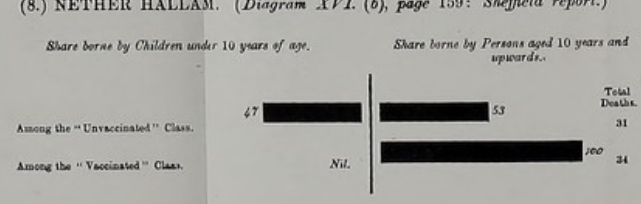
(6.) WEST SHEFFIELD. (*Diagram XII.* (*b*), *page* 118. *Sheffield report.*)



(7.) ECCLESALL. (*Diagram XIV.* (*b*), *page* 142: *Sheffield report.*)



(8.) NETHER HALLAM. (*Diagram XVI.* (*b*), *page* 159: *Sheffield report.*)



App. No. 4.

Table E.

Table showing for the Borough of Sheffield, and for each of its Sub-divisions, the number of Small-pox Attacks and Small-pox Deaths, during the whole epidemic, to the 31st March 1888, together with the rates per 1,000 of the Population in each instance. (Attack and Death of Unvaccinated Infants under 1 month of age are excluded.)

District.	All Classes.					"Vaccinated Class."					"Unvaccinated Class."				
	Estimated Population, 1887.	Totals.		Rates per 1,000 of Population.		Estimated Population, 1887.	Totals.		Rates per 1,000 of Population.		Estimated Population, 1887.	Totals.		Rates per 1,000 of Population.	
		Small-pox Attacks to 31 March 1888.	Small-pox Deaths to 31 March 1888.	Small-pox Attack.	Small-pox Death.		Small-pox Attacks.	Small-pox Deaths.	Small-pox Attack.	Small-pox Death.		Small-pox Attacks.	Small-pox Deaths.	Small-pox Attack.	Small-pox Death.
Attercliffe	36,092	566	57	15·7	1·58	35,370	495	28	14·0	·8	722	69	27	96	37
Brightside*	61,732	1,144	99	18·5	1·60	60,184*	903	48	16·5	·8	1,548	146	46	94	30
North Sheffield	39,241	1,374	140	35·0	3·57	38,260	1,082	54	28·2	1·41	981	284	78	290	80
Sheffield Park	20,451	481	42	23·5	2·05	19,981	412	19	20·6	·95	470	69	23	147	49
South Sheffield	18,077	304	38	16·8	2·10	17,661	230	10	13·0	·57	416	73	27	175	65
West Sheffield	13,373	464	61	34·7	4·56	12,811	324	19	25·3	1·48	562	140	42	250	75
Ecclesall†	77,085	927	87	12·1	1·13	75,775†	795	36	10·5	·48	1,310	132	48	100	37
Nether Hallam	47,369	815	65	17·2	1·37	45,948	694	31	15·1	·67	1,421	118	30	83	21
Upper Hallam	2,868	14	1	4·5	0·35	2,840	12	1	4·2	·35	28	1	—	30	—
Borough of Sheffield	316,288	6,088	590	19·3	1·86	308,830	5,035	246	16·3	·8	7,458	1,032	321	138	43

* Including Sheffield Union Workhouse.

† Including Ecclesall Bierlow Union Workhouse.

Table F.

Table showing for the Borough of Sheffield, and for each of its Sub-districts, the "fatality" (case mortality) during the whole epidemic, to the 31st March 1888, of Small-pox amongst "all classes," and among the "vaccinated" and "unvaccinated" classes respectively. (The case mortality of the Small-pox treated in the several hospitals is added.)

District.	"Fatality" per cent. of Attacks in each class.		
	All Classes.	Vaccinated.	Unvaccinated.
Attercliffe	9·7	5·7	39·1
Brightside	8·2	4·6	31·3
North Sheffield	9·7	5·0	27·4
Sheffield Park	8·7	4·6	35·3
South Sheffield	12·2	4·4	37·0
West Sheffield	13·1	5·9	30·0
Ecclesall	9·1	4·5	36·6
Nether Hallam	7·5	4·5	27·3
Upper Hallam	7·7	8·3	0·0
Borough of Sheffield	9·3	4·7	31·1
Fatality of cases treated in hospitals	14·2	8·1	32·7

App. No. 5.

APPENDIX V.

(*Papers handed in by Staff-Surgeon Theodore J. Preston, R.N., 30th October and 8th November* 1889.)

Table A.

Table showing, for each of the Years 1864–1888, in the whole of the Royal Navy and on each Station, the number and the ratio per 1,000 of Force of Attacks of Small-pox, the number and the ratio per 1,000 of Force of Deaths from Small-pox, the vaccinational condition, as far as known, of those attacked, and the average number of Men sick daily from Small-pox.

Years and Stations.	Attacks.	Deaths.	Vaccinated.	Unvaccinated.	Not known.	Ratio of Attacks per 1,000 of Force.	Ratio of Deaths per 1,000 of Force.	Days' Sickness on Board.	Days' Sickness in Hospital.	Average number of Men sick per Day.
1864.	462	33	274	7	181	8·8	·6	4,693	7,774	34·1
Home	199	9	150	3	46	10·1	·4	596	4,474	13·8
Mediterranean	9	—	7	1	1	1·1	—	82	275	·7
North America and West Indies	56	4	13	2	41	9·2	·6	351	806	3·1
South-east Coast of America	3	—	2	—	1	2·1	—	10	—	—
West Coast of Africa	2	—	—	—	2	1·2	—	75	—	·2
Cape of Good Hope and East Indies	3	1	—	—	3	1·1	·3	10	—	—
China	150	16	102	1	47	30·6	2·9	2,931	728	10·
Irregular	40	3	—	—	40	8·2	·6	—	—	—
1865.	164	15	113	9	42	3·2	·2	1,541	5,364	18·9
Home	18	—	17	1	—	·8	—	30	745	2·1
Mediterranean	7	—	7	—	—	·9	—	37	131	·4
North America and West Indies	3	—	3	—	—	·5	—	31	82	·3
South-east Coast of America	6	—	6	—	—	5·7	—	32	86	·3
Pacific	7	—	7	—	—	2·6	—	26	577	1·6
West Coast of Africa	6	2	—	—	6	3·5	1·1	66	—	·1
Cape of Good Hope and East Indies	2	1	1	1	—	1·1	·5	21	—	—
China	105	12	65	7	33	22·3	2·2	1,163	3,557	12·9
Irregular	10	—	7	—	3	2·3	—	135	186	·8
1866.	239	8	202	20	17	4·9	·1	4,994	1,446	17·6
Home	29	—	24	—	5	1·3	—	164	791	2·6
Mediterranean	2	—	—	1	1	·3	—	10	141	·4
Pacific	1	—	1	—	—	·4	—	1	45	·1
West Coast of Africa	1	—	—	—	1	·5	—	15	43	·1
Cape of Good Hope and East Indies	169	6	149	18	2	91·3	3·2	4,572	110	12·8
China	21	1	18	—	3	5·9	·2	151	178	·9
Irregular	16	1	10	1	5	3·1	·1	81	138	·6
1867.	251	14	80	11	160	4·9	·2	2,178	3,719	16·1
Home	30	—	13	—	17	1·3	—	247	779	2·8
Mediterranean	7	—	7	—	—	1·4	—	99	124	·6
Pacific	6	—	6	—	—	·2	—	140	8	·4
West Coast of Africa	23	2	10	11	2	13·3	·1	556	76	1·7
Cape of Good Hope and East Indies	1	—	—	—	1	·4	—	3	—	—
China	169	11	38	—	131	52·8	2·9	1,093	2,473	9·7
Irregular	15	1	6	—	9	2·2	·1	40	259	·8
1868.	83	2	48	2	33	1·6	—	1,164	850	5·5
Home	16	—	12	—	4	·6	—	83	283	1·
Mediterranean	24	1	8	—	16	5·8	·2	548	259	2·2
North America and West Indies	1	—	1	—	—	·2	—	32	—	—
South-east Coast of America	7	—	7	—	—	6·7	—	64	66	·3
Pacific	2	—	1	1	—	·7	—	19	31	·1
West Coast of Africa	2	—	2	—	—	1·1	—	63	—	·1
Cape of Good Hope and East Indies	13	—	7	1	5	4·1	—	257	26	·7
China	15	1	8	—	7	3·9	·2	83	114	·5
Irregular	3	—	2	—	1	·5	—	15	71	·2

TABLE A.—*continued.*

App. No. 5.

TABLE showing, for each of the Years 1864–1888, in the whole of the Royal Navy and on each Station, the number and the ratio per 1,000 of Force of Attacks of Small-pox, the number and the ratio per 1,000 of Force of Deaths from Small-pox, the vaccinational condition, as far as known, of those attacked, and the average number of Men sick daily from Small-pox—*continued.*

YEARS AND STATIONS.	Attacks.	Deaths.	Vaccinated.	Unvaccinated.	Not known.	Ratio of Attacks per 1,000 of Force.	Ratio of Deaths per 1,000 of Force.	Days' Sickness on Board.	Days' Sickness in Hospital.	Average number of Men sick per Day.
1869.	82	5	52	4	26	1·6	·1	1,544	984	6·9
Home	8	—	6	1	1	·3	—	394	180	1·5
Mediterranean	—	—	—	—	—	—	—	—	15	—
North America and West Indies	1	1	1?	—	—	·2	·2	2	—	—
Pacific	20	—	—	—	20	8·5	—	739	149	2·4
East Indies	13	—	10	3	—	5·6	—	228	—	·6
China	40	4	35	—	5	11·4	1·	181	595	2·1
1870.	40	1	22	—	18	·8	—	419	1,138	4·2
Home	24	—	14	—	10	1·1	—	284	523	2·2
Mediterranean	2	—	2	—	—	·4	—	15	3	—
North America and West Indies	1	—	—	—	1	·3	—	45	—	·1
Pacific	5	—	2	—	3	2·3	—	30	126	·4
East Indies	1	—	1	—	—	·5	—	8	—	—
China	7	1	3	—	4	2·8	—	37	324	·9
Irregular	—	—	—	—	—	—	—	—	162	·4
1871.	148	12	60	3	85	3·1	·2	460	3,778	11·6
Home	67	4	8	—	? 59	3·	·1	322	1,135	3·9
Mediterranean	30	5	23	1	6	7·5	1·2	83	1,192	3·4
South-east Coast of America	1	—	1	—	—	1·8	—	2	45	·1
Pacific	1	—	—	1	—	·5	—	2	55	·1
East Indies	1	—	1	—	—	·5	—	5	—	—
China	33	2	12	1	20	11·	·6	31	973	2·7
Irregular	15	1	15	—	—	1·6	·1	15	378	1·
1872.	89	11	50	2	37	1·9	·2	412	2,744	8·6
Home	62	9	38	—	24	2·6	·3	198	1,840	5·5
Mediterranean	1	—	1	—	—	·3	—	9	85	·2
Pacific	6	—	6	—	—	3·	—	89	80	4
East Indies	3	—	1	1	1	1·7	—	26	68	·2
China	1	—	—	1	—	·3	—	1	28	—
Irregular	16	2	4	—	12	2·	·2	80	614	1·9
1873.	16	1	10	4	2	·3	—	172	426	·6
Home	7	—	7	—	—	·3	—	56	247	·8
North America and West Indies	1	—	1	—	—	·3	—	23	—	—
East Indies	4	1	—	3	1	2·2	·5	56	66	·3
China	2	—	1	1	—	·7	—	8	31	·1
Irregular	2	—	1	—	1	·2	—	29	82	·3
1874.	9	1	7	—	2	·2	—	84	80	·4
Home	2	—	2	—	—	—	—	2	16	—
Mediterranean	1	—	1	—	—	·3	—	18	—	—
Pacific	1	—	1	—	—	·5	—	39	—	·1
West Coast of Africa and Cape of Good Hope.	1	—	1	—	—	·5	—	19	—	—
China	4	1	2	—	2	1·4	·3	6	64	·1
1875.	17	1	11	—	6	·3	—	94	701	2·1
Home	1	—	1	—	—	—	—	1	46	·1
Mediterranean	1	—	1	—	—	·3	—	4	72	·2
North America and West Indies	2	—	2	—	—	·8	—	3	113	·3
East Indies	1	—	1	—	—	·4	—	2	—	—
China	12	1	6	—	6	4·1	·3	84	470	1·5

App. No. 5.

TABLE A.—*continued.*

TABLE showing, for each of the Years 1864–1888, in the whole of the Royal Navy and on each Station, the number and the ratio per 1,000 of Force of Attacks of Small-pox, the number and the ratio per 1,000 of Force of Deaths from Small-pox, the vaccinational condition, as far as known, of those attacked, and the average number of Men sick daily from Small-pox—*continued.*

YEARS AND STATIONS.	Attacks.	Deaths.	Vaccinated.	Unvaccinated.	Not known.	Ratio of Attacks per 1,000 of Force.	Ratio of Deaths per 1,000 of Force.	Days' Sickness on Board.	Days' Sickness in Hospital.	Average number of Men sick per Day.
1876.	24	6	14	6	4	·53	·13	118	427	1·48
Pacific	1	—	1	—	—	·64	—	34	—	·09
East Indies	9	2	5	4	1	4·	·88	31	226	·7
China	5	1	4	—	1	1·61	·32	5	201	·56
Irregular	9	3	4	2	3	1·28	·42	48	—	·13
1877.	17	—	9	4	4	·37	—	225	372	1·63
Home	2	—	—	—	2	·09	—	32	41	·2
Mediterranean	2	—	—	—	2	·33	—	11	55	·18
East Indies	3	—	—	3	—	1·23	—	54	50	·28
China	4	—	3	1	—	1·4	—	26	168	·53
Australia	5	—	5	—	—	5·81	—	100	—	·27
Irregular	1	—	1	—	—	·18	—	2	58	·16
1878.	9	—	9	—	—	·19	—	43	299	·95
Home	4	—	4	—	—	·21	—	3	116	·32
Mediterranean	1	—	1	—	—	·12	—	7	130	·37
East Indies	3	—	3	—	—	1·36	—	35	—	·9
China	1	—	1	—	—	·36	—	3	53	·15
1879.	52	14	37	13	2	1·11	·31	242	2,656	7·93
Mediterranean	2	1	2	—	—	·13	·15	5	26	·08
Pacific	5	1	3	1	1	·15	·57	97	26	·33
West Coast of Africa and Cape of Good Hope.	39	12	27	12	—	16·25	5·	105	1,379	3·36
East Indies	2	—	2	—	—	·94	—	3	42	·12
China	3	—	2	—	1	1·43	—	25	150	·47
Irregular	1	—	1	—	—	·16	—	7	33	·1
1880.	7	1	6	1	—	·15	·02	28	168	·53
Pacific	1	—	1	—	—	·48	—	3	33	·09
West Coast of Africa	2	—	1	1	—	1·34	—	19	—	·05
East Indies	2	—	2	—	—	·9	—	3	54	·15
China	2	1	2	—	—	·68	·34	3	81	·22
1881.	25	3	25	—	—	·56	·06	181	449	1·72
Home	4	—	4	—	—	·18	—	4	183	·51
West Coast of Africa	5	—	5	—	—	3·03	—	108	—	·29
East Indies	9	2	9	—	—	3·67	·82	17	—	·04
China	7	1	7	—	—	2·43	·34	52	266	·85
1882.	10	2	2	—	8	·23	·04	98	206	·2
Home	3	1	—	—	3	·1	·05	4	69	·2
South-east Coast of America	1	—	1	—	—	2·19	—	82	—	·22
West Coast of Africa	1	—	—	—	1	·64	—	1	120	·33
China	5	1	1	—	4	1·81	·36	11	17	·07
1883.	9	—	7	—	2	·27	—	19	394	1·13
Home	1	—	—	—	1	·04	—	2	—	—
North America and West Indies	1	—	—	—	1	·4	—	—	41	·11
East Indies	2	—	2	—	—	·94	—	6	20	·07
China	4	—	4	—	—	1·69	—	5	267	·71
Irregular	1	—	1	—	—	·27	—	6	66	·19

TABLE A.—*continued.*

App. No. 5.

TABLE showing, for each of the Years 1864–1888, in the whole of the Royal Navy and on each Station, the number and the ratio per 1,000 of Force of Attacks of Small-pox, the number and the ratio per 1,000 of Force of Deaths from Small-pox, the vaccinational condition, as far as known, of those attacked, and the average number of Men sick daily from Small-pox—*continued.*

YEARS AND STATIONS.	Attacks.	Deaths.	Vaccinated.	Unvaccinated.	Not known.	Ratio of Attacks per 1,000 of Force.	Ratio of Deaths per 1,000 of Force.	Days' Sickness on Board.	Days' Sickness in Hospital.	Average number of Men sick per Day.
1884.	6	—	6	—	—	·13	—	28	187	·58
Home	2	—	2	—	—	·1	—	24	13	·1
China	4	—	4	—	—	1·03	—	4	174	·46
1885.	7	—	5	—	2	·14	—	50	236	·78
Home	2	—	—	—	2	·08	—	—	173	·47
West Coast of Africa	1	—	1	—	—	·57	—	20	—	·05
China	4	—	4	—	—	1·08	—	30	63	·25
1886.	11	3	5	—	6	·23	·06	98	150	·69
Mediterranean	3	1	1	—	2	·5	·17	8	61	·18
North America and West Indies	1	—	—	—	1	·38	—	—	21	·05
East Indies	1	1	—	—	1	·51	·51	1	10	·03
China	6	1	4	—	2	1·62	·27	89	64	·41
1887.*	1	—	1	—	—	·02	—	1	112	·3
China	1	—	1	—	—	·27	—	1	112	·3
1888.	19	1	19	—	—	·36	·01	34	850	2·41
Home	4	—	4	—	—	·16	—	4	244	·65
Mediterranean	2	—	2	—	—	·34	—	7	39	·12
China	12	1	12	—	—	3·03	·01	13	551	1·51
Irregular	1	—	1	—	—	·17	—	10	16	·07

* In the year 1887 a change was made in the method of computing the Mean Force on which the ratios contained in these tables are based by including men on short terms of leave of absence and the sick under treatment in hospital. This has increased the Force by about 3 per cent. as compared with former years, reducing to that extent the value for comparison of ratios based upon it, the larger Force lessening these ratios.

App. No. 5.

Table B.

Table showing the number of Attacks of, and of Deaths from, Small-pox in the Royal Navy for each of the Years 1860–88, with, in each case, the ratios per 1,000 of Force.

Years.	Mean Force.	Small-pox Attacks.		Small-pox Deaths.		Remarks.
		Number of Attacks.	Ratio per 1,000 of Force.	Number of Deaths.	Ratio per 1,000 of Force.	
1860	64,025	327	5·2	25	·39	Vaccination recommended by the Medical Director-General.
1861	62,485	315	5·0	24	·38	
1862	58,870	103	1·7	18	·30	
1863	54,090	121	2·2	15	·27	
1864	53,000	462	8·8	33	·62	Admiralty Order: all new entries to be vaccinated.
1865	51,210	164	3·2	15	·29	
1866	49,475	239	4·9	8	·16	
1867	51,000	251	4·9	14	·27	
1868	51,220	83	1·6	2	·03	
1869	48,820	82	1·6	5	·1	
1870	46,710	40	·8	1	·02	
1871	47,460	148	3·1	12	·25	Admiralty Order enforcing re-vaccination.
1872	46,830	89	1·9	11	·23	
1873	45,440	16	·3	1	·02	Admiralty Order: all "foreigners" to be vaccinated.
1874	44,530	9	·2	1	·02	
1875	44,360	17	·3	1	·02	
1876	45,010	24	·53	6	·13	
1877	44,940	17	·37	—	—	
1878	46,400	9	·19	—	—	
1879	44,745	52	1·11	14	·31	
1880	44,770	7	·15	1	·02	
1881	44,400	25	·56	3	·06	
1882	43,475	10	·23	2	·04	
1883	43,350	9	·27	—	—	
1884	43,000	6	·13	—	—	
1885	46,670	7	·14	—	—	
1886	46,770	11	·23	3	·06	
1887	48,410	1	·02	—	—	
1888	50,060	19	·36	1	·01	

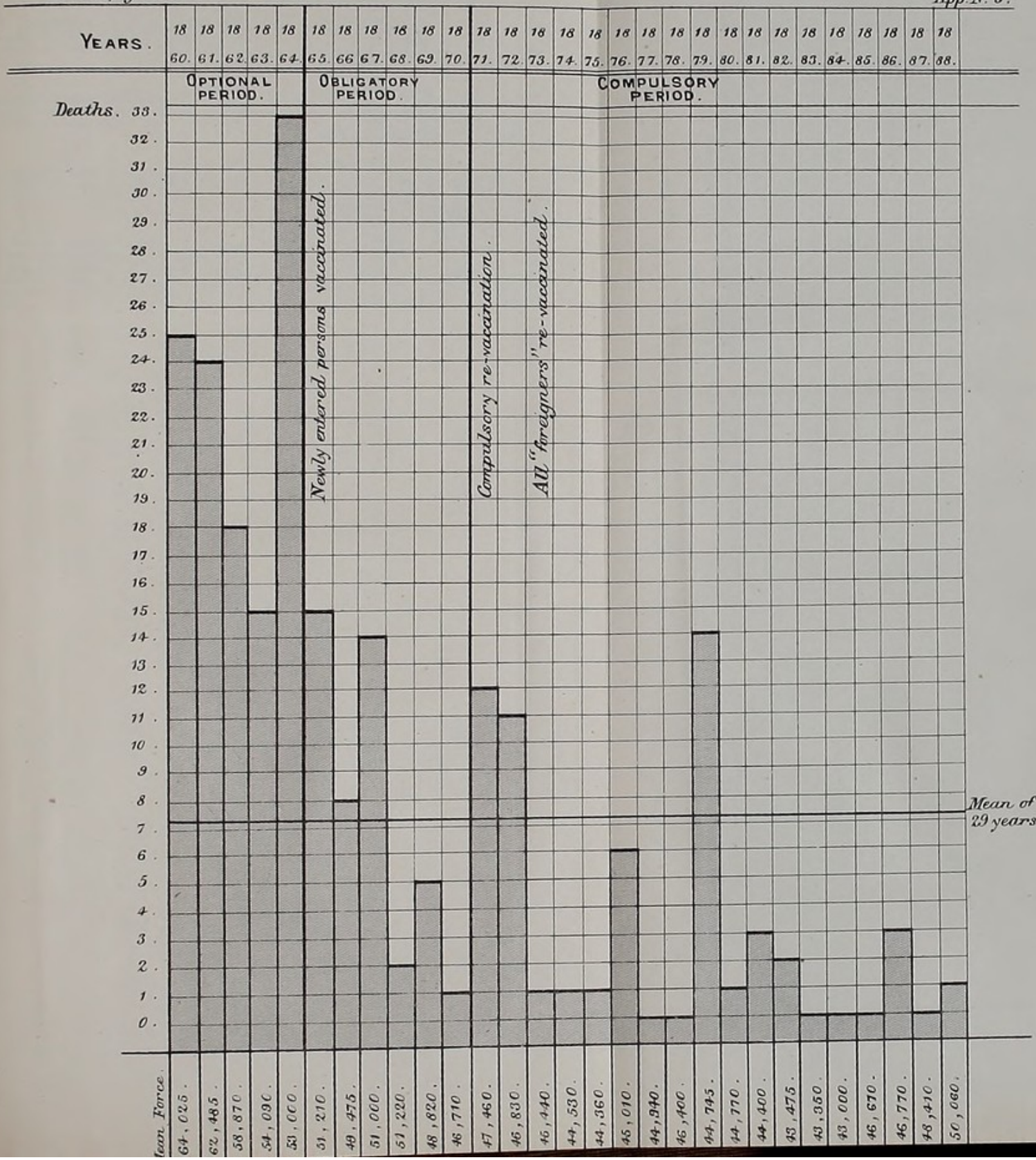
Table C.

Table showing the ratio per 1,000 of Deaths from all Causes, from Disease alone, and from Small-pox alone, in the Royal Navy, between the Years 1860 and 1888 inclusive.

Year.	Death-rate from all Causes.	Death-rate from Disease alone.	Death-rate from Small-pox only.	Year.	Death-rate from all Causes.	Death-rate from Disease alone.	Death-rate from Small-pox only.
1860	14·7	11·1	·39	1875	8·8	6·9	·02
1861	15·	11·5	·38	1876	9·24	5·99	·13
1862	15·3	9·6	·3	1877	7·05	4·91	—
1863	11·3	7·6	·27	1878	14·41	5·32	—
1864	14·	9·	·62	1879	8·58	6·23	·31
1865	11·3	8·1	·29	1880	12·57	4·62	·02
1866	10·2	7·9	·16	1881	10·94	5·27	·06
1867	11·5	8·4	·27	1882	9·49	6·87	·04
1868	8·9	6·5	·03	1883	5·88	4·05	—
1869	9·9	7·3	·1	1884	9·	5·83	—
1870	19·6	6·7	·02	1885	7·04	4·77	—
1871	8·5	6·3	·25	1886	6·88	5·04	·06
1872	8·2	5·6	·23	1887	8·32	4·89	—
1873	8·3	6·	·02	1888	5·71	3·95	·01
1874	9·4	6·7	·02				

DIAGRAM SHOWING THE ANNUAL MORTALITY FROM SMALL-POX IN THE ROYAL NAVY DURING EACH OF THE YEARS 1860 TO 1888.

To face page 254.



App. No. 5.

A Brief History of the Orders relating to Vaccination in H.M. Navy.

1808. Order in Council to Medical Superintendents of Foreign Hospitals, under the Crown, authorising them to vaccinate their patients.

1814. Printed Instructions for Surgeons in the Royal Navy issued. They are "to advise all their patients to be vaccinated."

1825. These Instructions were re-printed by order of the Admiralty, and the regulations as to vaccination re-written in stronger phrases.

1860. The Medical Director-General of the Navy issued a Circular Letter to the Medical Officers of ships in commission, directing them to advise all persons on board, not previously vaccinated, to submit to immediate vaccination.

1864. Admiralty Order:—
"No person is to be entered for the Royal Navy who has not been, or is not willing to be, vaccinated."

1871. Admiralty Circular:—
"All men and boys are to be re-vaccinated, and a notification of the result is to be placed upon their Certificate of Service."

1887. Orders at present in force, issued 1887:—
"All men and boys entering the Service are to be re-vaccinated; should no results follow on the first operation, a second vaccination is invariably to be performed.
"All men who have not been re-vaccinated between their first entry into the Service, and the age of 18, shall be re-vaccinated as soon as possible, however good their primary vaccination cicatrices may appear, or even should they present unmistakable evidence of having suffered from small-pox previous to that age."

App. No. 6.

APPENDIX VI.

(Papers handed in by Mr. Thomas W. Grimshaw, M.D., 1st November 1889.)

IRELAND.

Table A.

Table showing, for Ireland for each of the years 1864 to 1888, the estimated Population, the number of Deaths from Small-pox registered during each of the above Years, and the Rate per Million of the Living.

1. Years.	2. Estimated Population.	3. Number of Deaths from Small-pox.*	4. Rate per Million living.	5. Number of Deaths from Chicken-pox included in Column 3.
1864	5,640,527	854	151·4	12
1865	5,594,589	461	82·4	4
1866	5,522,942	194	35·1	3
1867	5,486,509	21	3·8	5
1868	5,465,914	23	4·2	2
1869	5,449,094	20	3·7	6
1870	5,418,512	32	5·9	2
1871	5,398,179	665	123·2	5
1872	5,372,890	3,248	604·5	5
1873	5,327,938	504	94·6	8
1874	5,298,979	569	107·3	3
1875	5,278,629	535	101·4	4
1876	5,277,544	24	4·5	5
1877	5,286,380	71	13·4	6
1878	5,282,246	873	165·3	9
1879	5,265,625	672	127·6	10
1880	5,202,648	389	74·8	8
1881	5,144,983	81	15·7	9
1882	5,097,853	137	26·9	8
1883	5,015,282	29	5·8	13
1884	4,962,693	4	0·8	3
1885	4,924,342	10	2·0	6
1886	4,889,498	5	1·0	3
1887	4,837,313	20	4·1	6
1888	4,777,534	8	1·7	5

* Including deaths from chicken-pox.

Table B.

Table showing by Decennial Periods the Total Number of Deaths from Small-Pox in Ireland, the Proportion of such Deaths to Deaths from All Causes, and the Average Annual Number of Deaths per Million living, from 1831 to 1880; with like details for the eight Years 1881–88.*†

1. Periods.	2. Deaths from Small-pox.	3. Proportion of Deaths from Small-pox to Deaths from all causes.	Annual Averages. 4. Deaths per Annum.	Annual Averages. 5. Deaths per Million living.
Intercensal periods*: 1831 to 1841	58,006	1 in 20	5,801	725
Intercensal periods*: 1841 to 1851	38,275	1 in 36	3,827	493
Intercensal periods*: 1851 to 1861	12,727	1 in 64	1,273	213
April 1861 to December 1870†	2,852	1 in 280	293	52
10 years 1871 to 1880†	7,550	1 in 128	755	143
8 years 1881 to 1888†	241	1 in 2,964	30	6

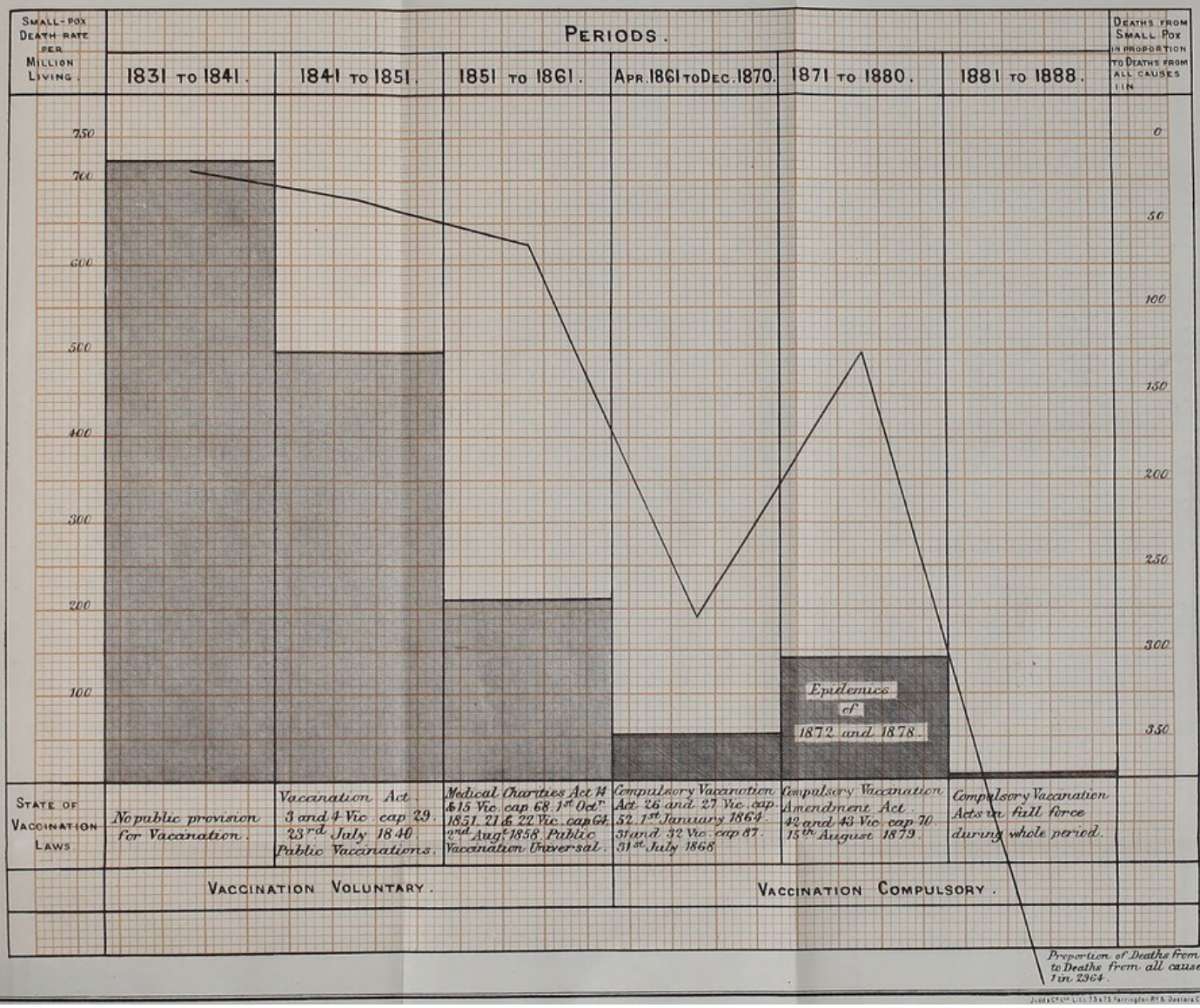
* 1831 to 1861, numbers returned on the Census forms at the *close* of each decennium.

† April 1861 to December 1863, number returned on *1871* Census forms; 1864 and following years, numbers registered under Registration Act which came into operation on 1st January 1864.

DIAGRAM ILLUSTRATING TABLE B.

DIAGRAM *Showing the Small-pox Death rate per million living during the periods 1831-41, 1841-51, 1851-61, April 1861 to December 1870, 1871-80, 1881-88, the proportion of Deaths from Small-pox to Deaths from all causes during these periods; and the Vaccination Laws in force in each period, in Ireland.*

To face page 256.



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DIAGRAM ILLUSTRATING TABLE 3.

BIRTHS AND VACCINATIONS

DIAGRAM showing the number of Births in Ireland, the number of persons Vaccinated by the Dispensary Medical Officers, and the number of deaths from Small-pox for each year from 1864 to 1888.

DEATHS FROM SMALL-POX.

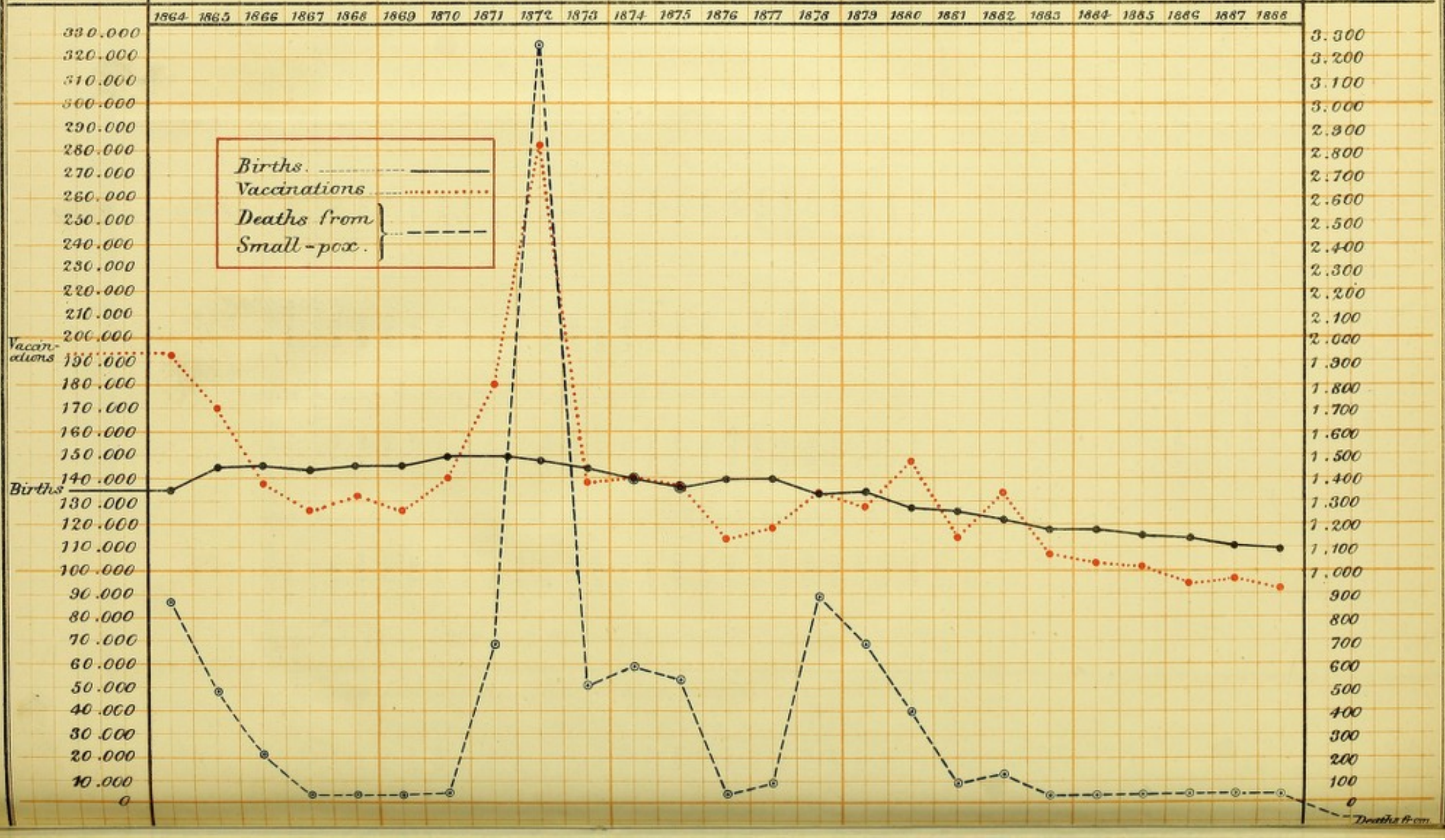


Table C.

Table showing for each year from 1864 to 1888, both years inclusive, the Number of Births in Ireland, the Number of Persons vaccinated by the Dispensary Medical Officers, the Number vaccinated who were born since the 1st January 1864, the Number vaccinated who were born before the 2nd January 1864, and the Number of Deaths from Small-pox.

1. Year.	2. Births in Ireland.	Persons vaccinated.*			6. Deaths from Small-pox. (*Including Deaths from Chicken-pox for the Years 1864-80.*)
		3. Total.	4. Born since 1st January 1864.	5. Born before 2nd January 1864.	
1864 - - -	136,414	191,810	†	†	854
1865 - -	144,970	169,142	97,160	71,982	461
1866 - - -	146,090	137,124	104,730	32,394	194
1867 - - -	144,388	125,741	107,473	18,268	21
1868 - - -	146,051	131,426	118,613	12,813	23
1869 - - -	145,659	125,672	117,912	7,760	20
1870 - - -	149,846	140,220	135,057	5,163	32
1871 - - -	151,355	179,889	139,053	40,836	665
1872 - - -	149,278	282,484	142,662	139,822	3,248
1873 - - -	144,377	138,873	119,319	19,554	504
1874 - - -	141,288	139,587	119,337	20,250	569
1875 - - -	138,320	137,340	119,675	17,665	535
1876 - - -	140,469	114,487	112,489	1,998	24
1877 - - -	139,659	117,679	115,190	2,489	71
1878 - - -	134,117	133,045	122,149	10 896	873
1879 - - -	135,328	126,911	118,427	8,484	672
1880 - - -	128,086	147,828	138,413	9,415	389
1881 - - -	125,847	113,557	109,995	3,562	72
1882 - - -	122,648	132,825	114,411	18,414	129
1883 - - -	118,163	106,071	102,040	4,031	16
1884 - - -	118,875	102,548	99,445	3,103	1
1885 - - -	115,951	102,312	99,203	3,109	4
1886 - - -	113,927	94,861	92,979	1,882	2
1887 - - -	112,400	96,489	92,939	3,550	14
1888 - - -	109,557	92,498	89,627	2,871	3
Totals, 1864 to 1888 - -	3,353,063	3,380,419	2,728,298‡	460,311‡	9,396

* The vaccination returns are made up to the 30th September in each year.

† Not published, as during a portion of the year included in vaccination returns the Acts were not in force.

‡ Exclusive of vaccinations in the year ended 30th September 1864.

DUBLIN.

App. No. 6.

TABLE D.

TABLE showing the Number of Births registered, the Number of Vaccinations performed by the Dispensary Medical Officers, and at the Cow-pox Institution, the Total Number of Public Vaccinations in the Dublin Registration District, the Number of cases of SMALL-POX admitted to the Dublin Hospitals, and the Number of Deaths from SMALL-POX registered in the Dublin Registration District from the year 1864 to the year 1888, both years inclusive.

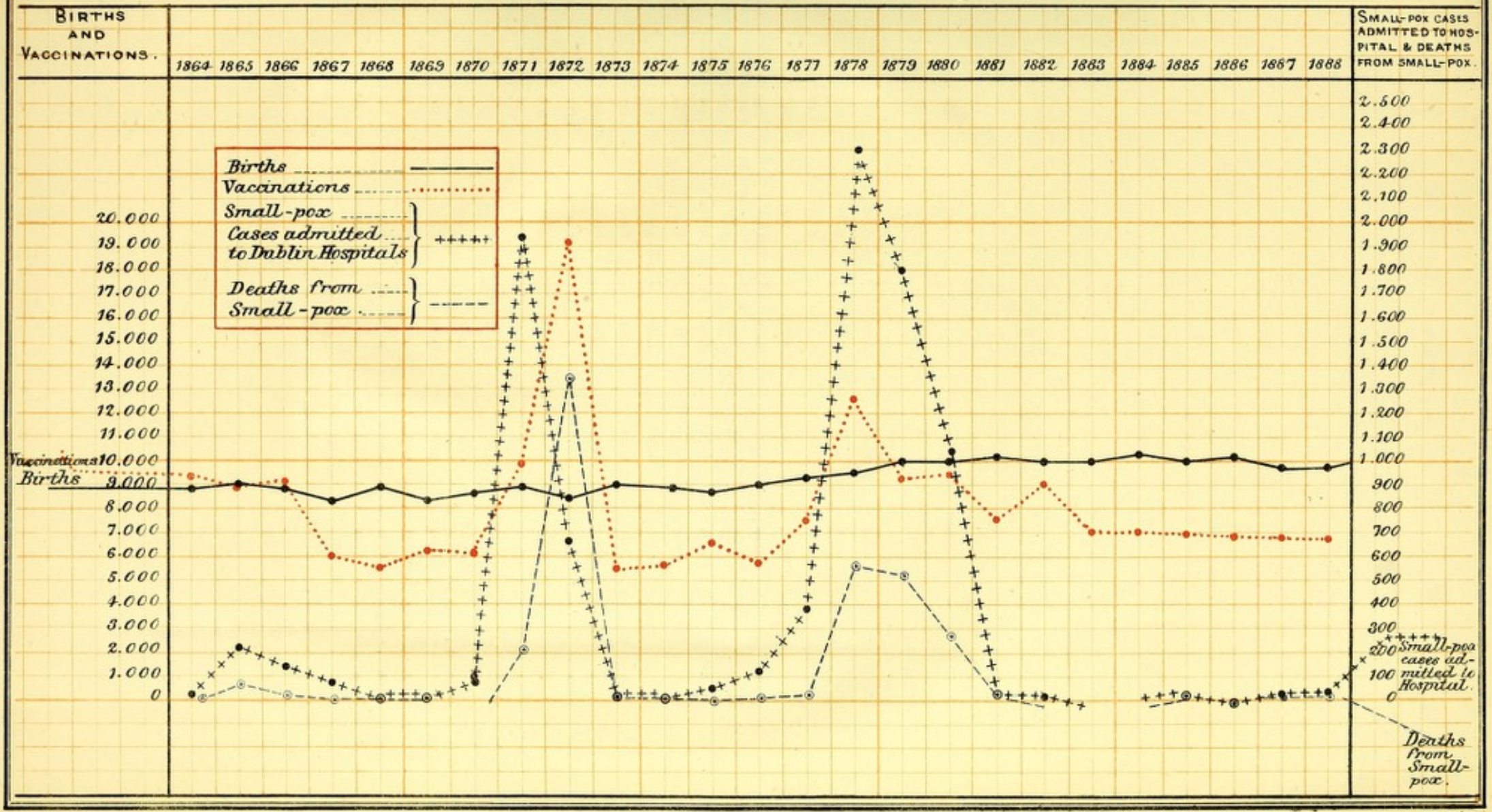
1. Year.	2. Births registered.*	Public Vaccinations. 3. Vaccinations at Dispensaries.†	4. Vaccinations at Cow-pox Institution.†	5. Total.	6. Small-pox cases admitted to Hospital.‡	7. Deaths from Small-pox.*
1864	8,753	7,572	1,784	9,356	31	42
1865	8,903	7,408	1,473	8,881	212	71
1866	8,695	4,752	1,218	8,970	139	25
1867	8,241	4,889	1,217	6,106	70	2
1868	8,846	4,236	1,266	5,502	1	1
1869	8,276	4,718	1,402	6,120	1	1
1870	8,546	4,886	1,273	6,159	89	0
1871	8,860	7,630	2,071	9,701	1,932	207
1872	8,499	15,297	3,772	19,069	652	1,350
1873	9,032	4,109	1,260	5,369	4	16
1874	8,903	4,270	1,353	5,673	3	2
1875	8,680	5,038	1,421	6,459	41	2
1876	9,006	4,266	1,416	5,682	110	9
1877	9,325	5,563	1,824	7,387	387	38
1878	9,513	10,586	2,064	12,650	2,309	550
1879	9,993	5,912	3,235	9,147	1,797	520
1880	10,060	7,024	2,174	9,198	1,004	266
1881	10,155	5,231	2,138	7,369	27	11
1882	10,073	5,077	3,783	8,860	1	—
1883	9,955	5,058	1,926	6,984	—	—
1884	10,268	4,849	2,119	6,968	—	—
1885	10,144	4,962	1,851	6,813	3	2
1886	10,199	4,902	1,822	6,724	—	—
1887	9,840	4,818	1,873	6,691	12	1
1888	9,884	4,790	1,826	6,616	32	1

* Year ends in December.

† Year ends in September.

‡ Nearly all the hospital years are made up to 31st of March as far as year 1878, which accounts for the discrepancy between column 6 and column 7.

DIAGRAM *showing the number of Births registered in the Dublin Registration District; the total number of Public Vaccinations in the Dublin Registration District; the number of Small-pox cases admitted to the Dublin Hospitals; and the number of Deaths from Small-pox registered in the Dublin Registration District from 1864 to 1888.*



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IRELAND.

TABLE E.

TABLE showing, for each of the Seven Years, 1882–88:—(*a*) the Number of Births Registered; (*b*) the Number of Successful Primary Vaccinations of Persons Born since the 1st January 1864; (*c*) the Number of Persons Certified as Insusceptible of Vaccination; (*d*) the Number of Unvaccinated Children under Three Months Old whose Deaths were Registered; and (*e*) the Number of Deaths from SMALL-POX Registered in each Superintendent Registrar's District or Poor Law Union in Ireland.

TABLE E.

TABLE showing, for each of the Seven Years, 1882-88:—(a) the Number of Births Registered; (b) the Number of Insusceptible of Vaccination; (d) the Number of Unvaccinated Children under Three Months Old whose Deaths or Poor Law Union in Ireland.

SUPERINTENDENT REGISTRAR'S DISTRICT OR UNION.	Number of Births Registered.								Vaccination: Number of Successful Primary Vaccinations.							
	1882.	1883.	1884.	1885.	1886.	1887.	1888.	Total.	1882.	1883.	1884.	1885.	1886.	1887.	1888.	Total.
Abbeyleix	356	332	376	326	314	387	309	2,480	303	337	331	293	305	331	308	2,208
Antrim	899	803	811	833	798	765	750	5,659	744	741	701	744	738	687	693	5,048
Ardee	414	392	400	356	358	329	328	2,577	332	414	329	332	322	307	287	2,323
Armagh	1,332	1,283	1,260	1,325	1,256	1,243	1,286	9,005	1,176	1,258	1,128	1,252	1,166	1,208	1,154	8,342
Athlone	756	712	829	738	723	698	686	5,142	682	673	681	694	672	568	560	4,486
Athy	655	582	576	581	560	551	480	3,994	560	628	495	516	550	501	463	3,642
Bailieborough	404	450	378	390	372	400	390	2,793	383	464	372	360	374	395	389	2,686
Ballina	566	484	588	481	450	505	477	3,551	415	295	357	462	378	563	246	2,746
Ballinasloe	467	464	440	498	442	400	376	3,086	439	369	397	442	352	274	191	2,374
Ballinrobe	635	680	594	571	538	584	539	4,141	549	489	553	570	536	515	508	3,720
Ballycastle	376	333	340	306	310	337	314	2,325	390	343	298	305	285	317	279	2,217
Ballymahon	307	315	297	305	279	309	289	2,101	298	294	254	262	261	296	254	1,919
Ballymena	1,706	1,659	1,596	1,629	1,618	1,617	1,556	11,381	1,610	1,582	1,447	1,499	1,364	1,473	1,412	10,387
Ballymoney	751	716	753	709	735	733	704	5,161	735	683	663	675	647	679	728	4,810
Ballyshannon	561	505	541	492	485	495	453	3,532	477	351	477	465	472	316	417	2,975
Ballyvaghan	117	101	97	92	88	72	79	646	126	82	77	67	94	59	107	612
Balrothery	524	446	489	435	455	420	389	3,167	440	428	445	451	420	393	401	2,868
Baltinglass	382	393	352	432	363	387	358	2,667	325	411	352	344	377	379	339	2,527
Banbridge	1,212	1,187	1,221	1,202	1,242	1,184	1,153	8,381	1,127	1,109	1,120	1,089	1,176	1,045	1,012	7,687
Bandon	569	536	515	527	490	462	466	3,565	504	476	462	476	408	441	455	3,223
Bantry	466	361	418	419	416	417	386	2,883	420	329	332	382	376	413	354	2,606
Bawnboy	550	461	512	469	417	450	440	3,277	390	453	419	479	381	518	370	3,210
Belfast	7,594	7,484	7,847	8,087	8,190	8,225	8,491	55,938	6,125	6,327	6,614	6,133	6,582	6,916	7,304	46,001
Belmullet	377	362	404	374	367	336	330	2,610	525	459	794	421	191	564	367	3,321
Borrisokane	190	218	187	189	170	156	169	1,279	163	184	208	156	148	140	136	1,135
Boyle	921	853	887	842	798	790	774	5,865	763	772	613	1,023	708	730	606	5,215
Cahersiveen	670	612	661	607	561	605	519	4,275	571	624	550	676	435	575	219	3,650
Callan	392	369	389	321	363	335	342	2,511	244	451	348	264	274	214	293	2,088
Carlow	897	906	883	841	873	830	754	6,004	784	851	771	774	729	654	650	5,213
Carrickmacross	432	450	393	399	385	333	383	2,705	444	349	451	380	396	282	301	2,603
Carrick-on-Shannon	573	572	581	527	495	535	496	3,779	519	484	583	555	469	474	440	3,524
Carrick-on-Suir	524	540	489	481	476	440	437	3,387	485	468	482	491	430	387	414	3,067
Cashel	549	545	537	536	462	495	440	3,554	367	549	505	453	554	435	333	3,191
Castlebar	705	731	672	701	576	675	568	4,608	546	717	646	946	524	571	443	4,393
Castleblayney	776	692	705	689	598	709	629	4,780	738	696	624	648	571	564	568	4,409
Castlecomer	293	329	340	311	309	299	271	2,143	280	308	315	287	212	276	250	1,928
Castlederg	295	303	327	308	280	284	265	2,062	368	273	312	302	263	262	216	1,996
Castlereagh	963	865	869	867	951	925	811	6,141	956	938	1,004	1,157	813	1,018	573	6,459
Castletown	375	358	325	311	304	279	282	2,234	354	312	289	297	279	256	257	2,044
Cavan	1,002	980	993	935	971	885	889	6,655	1,033	915	885	822	862	821	759	6,097
Celbridge	359	369	362	331	322	321	331	2,395	222	323	180	261	230	191	235	1,642
Claremorris	880	849	826	806	832	786	781	5,832	835	808	862	776	772	735	628	5,417
Clifden	582	500	551	475	484	390	468	3,450	491	741	54	632	391	289	636	3,354
Clogheen	508	454	435	427	415	393	392	2,904	423	412	428	397	333	332	349	2,674
Clogher	445	395	382	381	360	386	368	2,717	476	415	318	385	343	329	351	2,617

* The numbers are given as returned by the Registrars; subsequent investigation showed that

TABLE E.

Successful Primary Vaccinations of Persons Born since the 1st January 1864; (c) the Number of Persons Certified as were Registered; and (e) the Number of Deaths from SMALL-POX Registered in each Superintendent Registrar's District

tistics.																						
Number of Persons Insusceptible of Vaccination.*								Number of *Unvaccinated* Children under Three Months Old whose Deaths were Registered during the Year								Number of Deaths from Small-pox.								SUPERINTENDENT REGISTRAR'S DISTRICT OR UNION.
82.	1883.	1884.	1885.	1886.	1887.	1888.	Total.	1882.	1883.	1884.	1885.	1886.	1887.	1888.	Total.	1882.	1883.	1884.	1885.	1886.	1887.	1888.	Total.	
9	10	11	9	13	4	3	59	26	20	14	23	25	27	24	130	—	—	—	—	—	—	—	—	Abbeyleix.
3	—	3	6	5	—	—	17	48	49	33	49	46	41	47	313	—	—	—	—	—	2	—	2	Antrim.
1	—	—	—	1	—	—	2	19	26	30	14	22	14	17	142	—	—	—	—	—	—	—	—	Ardee.
5	4	1	1	1	4	—	17	67	65	71	89	64	61	78	495	10	—	—	—	—	—	—	10	Armagh.
2	1	—	1	16	—	—	20	38	36	34	39	34	37	29	247	—	—	—	—	—	—	—	—	Athlone.
—	—	1	2	2	1	1	7	33	45	39	25	34	26	33	235	—	—	—	—	—	—	—	—	Athy.
—	3	1	—	—	—	—	4	18	17	24	19	21	15	17	131	—	—	—	—	—	—	—	—	Bailieborough.
5	—	—	1	2	—	—	8	15	21	27	13	13	17	25	131	2	—	—	—	—	—	—	2	Ballina.
—	—	6	—	—	—	1	7	13	23	15	15	15	16	21	118	—	—	—	—	—	—	—	—	Ballinasloe.
2	—	—	—	—	—	1	3	33	10	18	11	18	17	21	128	—	—	—	—	—	—	—	—	Ballinrobe.
—	—	—	—	2	—	5	7	18	15	9	1	8	11	10	88	—	—	—	—	—	—	—	—	Ballycastle.
—	—	1	5	1	—	—	7	19	12	12	9	14	21	14	101	—	—	—	—	—	—	—	—	Ballymahon.
1	—	—	—	—	3	—	4	94	99	86	74	82	92	34	572	—	—	—	—	—	—	—	—	Ballymena.
1	—	—	—	2	—	—	4	37	27	32	40	38	35	41	250	—	—	—	—	1	—	—	1	Ballymoney.
—	1	—	—	—	—	—	3	25	19	23	10	8	13	12	110	—	—	—	—	—	—	—	—	Ballyshannon.
5	—	—	—	—	—	—	5	4	5	2	3	6	3	3	26	—	—	—	—	—	—	—	—	Ballyvaghan.
—	—	—	1	—	—	2	28	27	28	25	25	14	14	161	—	—	—	—	—	—	—	—	Balrothery.
—	—	—	—	—	—	3	30	25	22	54	28	22	19	200	—	—	—	—	—	—	—	—	Baltinglass.
1	1	1	1	2	2	10	71	69	69	74	53	55	66	457	—	—	—	—	—	—	—	—	Banbridge.
3	4	1	3	1	2	16	29	24	25	26	30	15	21	170	1	—	—	—	—	—	—	1	Bandon.
—	—	—	1	—	1	3	16	19	15	29	23	21	32	148	—	—	—	—	—	—	—	—	Bantry.
—	—	—	—	—	—	11	19	25	18	17	20	18	24	141	—	—	—	—	—	—	—	—	Bawnboy.
8	7	10	3	10	10	64	474	509	476	551	532	624	620	3,786	82	12	—	—	—	—	—	94	Belfast.
6	3	—	—	—	—	9	35	23	16	10	16	16	29	145	—	—	—	—	—	—	—	—	Belmullet.
4	4	2	—	—	—	10	5	11	9	11	8	8	10	62	—	—	—	—	—	—	—	—	Borrisokane.
—	—	4	1	—	—	5	23	38	25	38	29	37	17	207	—	—	—	—	—	—	—	—	Boyle.
1	—	—	—	—	—	2	47	29	34	33	46	31	26	246	—	—	—	—	—	—	—	—	Cahersiveen.
—	—	—	—	—	—	—	22	20	22	18	18	25	21	146	—	—	—	—	—	—	—	—	Callan.
1	—	—	—	1	—	10	59	59	57	46	83	73	47	424	—	—	—	—	—	—	—	—	Carlow.
—	—	—	—	2	—	2	26	14	18	15	20	20	26	139	—	—	—	—	—	—	—	—	Carrickmacross.
1	4	2	—	—	1	11	29	32	15	22	15	24	30	167	—	—	—	—	—	—	—	—	Carrick-on-Shannon.
—	—	—	—	—	—	—	49	47	43	37	33	30	31	270	—	—	—	—	—	—	—	—	Carrick-on-Suir.
—	—	1	—	3	2	6	24	24	34	43	27	28	30	210	—	—	—	—	—	—	—	—	Cashel.
2	1	3	2	1	7	17	36	27	31	27	25	18	14	178	—	—	—	—	—	—	—	—	Castlebar.
—	—	1	—	—	—	1	46	42	42	24	38	32	31	255	—	—	—	—	—	—	—	—	Castleblayney.
—	—	—	—	—	—	—	13	26	18	27	31	11	23	149	—	—	—	—	—	—	—	—	Castlecomer.
—	—	—	—	—	—	—	8	10	13	14	7	8	7	67	—	—	—	—	—	—	—	—	Castlederg.
—	—	—	—	—	1	1	33	27	24	22	29	33	26	194	—	—	—	—	—	—	—	—	Castlereagh.
—	—	—	—	7	—	7	13	7	13	8	11	7	9	68	—	—	—	—	—	—	—	—	Castletown.
36	47	31	21	23	11	218	32	56	41	34	45	40	50	298	—	—	—	—	—	—	—	—	Cavan.
—	3	3	—	—	—	6	23	9	7	23	12	18	19	111	—	—	—	—	—	—	—	—	Celbridge.
2	1	—	—	2	1	27	63	74	65	47	70	50	57	426	—	—	—	—	—	—	—	—	Claremorris.
—	1	—	2	—	7	10	17	13	20	10	18	17	14	109	—	—	—	—	—	—	—	—	Clifden.
—	—	—	—	—	—	—	18	27	21	24	21	17	16	144	—	—	—	—	—	—	—	—	Clogheen.
—	—	—	3	1	2	7	17	13	13	16	12	32	12	115	—	—	—	—	—	—	—	—	Clogher.

*In some cases the Returns under this heading were made under a misconception as to its meaning.

TABLE E.—*continued.*

App. No. 6.

TABLE showing, for each of the Seven Years, 1882-88:—(*a*) the Number of Births Registered; (*b*) the Number of Suc- Insusceptible of Vaccination; (*d*) the Number of Unvaccinated Children under Three Months Old whose Deaths or Poor Law Union in Ireland—*continued.*

SUPERINTENDENT REGISTRAR'S DISTRICT OR UNION.	Number of Births Registered.								Vaccinat							
									Number of Successful Primary Vaccinations.							
	1882.	1883.	1884.	1885.	1886.	1887.	1888.	Total.	1882.	1883.	1884.	1885.	1886.	1887.	1888.	Tota
Clonakilty	569	596	548	529	552	560	511	3,865	478	569	540	490	509	444	416	3,4
Clones	371	367	342	347	353	370	332	2,502	352	306	349	285	308	328	321	2,2
Clonmel	581	548	562	552	486	546	459	3,734	433	439	383	427	382	383	370	2,8
Colemine	827	804	850	861	794	822	781	5,679	789	782	753	650	630	809	574	4,9
Cookstown	612	571	633	586	592	627	530	4,171	514	479	546	544	505	487	498	3,5
Cootehill	565	595	565	538	569	548	420	3,750	559	632	482	546	491	494	494	3,7
Cork	3,764	3,606	3,543	3,456	3,457	3,340	3,283	24,458	2,941	2,924	2,576	2,614	2,499	2,518	2,373	18,4
Corrofin	138	118	121	114	131	107	128	857	198	86	88	176	77	143	70	8
Croom	331	320	317	285	263	246	246	2,008	260	340	282	242	215	281	190	1,8
Delvin	228	201	213	192	191	203	202	1,430	226	247	174	205	188	182	163	1,3
Dingle	574	595	578	571	581	540	552	3,991	601	542	551	500	479	516	464	3,6
Donaghmore†	146	146	138	145	122	*	*	697*	106	155	131	125	110	*	*	6
Donegal	493	460	459	439	429	452	429	3,134	402	430	388	480	357	422	343	2,8
Downpatrick	1,033	1,074	1,008	1,029	1,003	1,030	1,013	7,370	1,054	1,013	1,039	944	942	922	927	6,8
Drogheda	770	688	738	689	701	665	690	4,941	695	685	578	576	593	629	742	4,4
Dromore, West	349	374	326	336	311	316	283	2,295	302	378	187	292	179	240	281	1,8
Dublin, North	4,429	4,523	4,528	4,573	4,637	4,532	4,615	31,807	2,793	2,670	2,862	2,854	3,000	2,779	2,813	19,7
Dublin, South	5,723	5,650	5,604	5,639	5,609	5,454	5,418	39,088	4,459	4,232	4,347	4,565	4,147	3,989	4,102	29,8
Dundalk	1,046	1,039	1,015	1,019	1,010	973	918	7,010	954	1,007	918	970	820	943	823	6,4
Dunfanaghy	457	454	414	412	380	354	379	2,850	304	371	219	300	334	449	347	2,4
Dungannon	793	716	751	775	725	726	724	5,210	743	740	650	746	642	703	690	4,9
Dungarvan	464	485	464	453	418	463	393	3,060	417	436	443	423	408	322	369	2,8
Dunmanway	451	418	424	398	399	370	354	2,814	435	363	416	356	373	364	330	2,6
Dunshaughlin	248	215	209	188	192	191	170	1,413	169	203	178	125	146	148	157	1,1
Edenderry	378	401	414	352	390	364	327	2,626	360	322	392	337	338	316	342	2,4
Ennis	553	511	526	481	540	483	505	3,599	471	473	460	387	434	411	411	3,0
Enniscorthy	831	783	787	748	733	694	709	5,285	650	596	643	546	579	425	624	4,0
Enniskillen	820	812	828	821	842	798	804	5,805	765	702	744	734	730	686	678	5,1
Ennistimon	464	473	468	494	451	462	435	3,247	402	480	435	441	413	416	386	2,9
Fermoy	625	646	643	599	572	546	540	4,163	509	556	580	516	471	440	385	3,5
Galway	977	1,031	1,034	1,035	1,007	982	946	7,012	1,002	1,221	1,376	987	882	860	879	7,2
Glennamaddy	485	483	490	467	465	462	449	3,301	440	331	355	446	404	434	348	2,7
Glenties	858	790	814	736	708	682	741	5,389	865	761	818	725	639	558	711	5,0
Glin	368	369	329	340	300	298	265	2,269	318	415	273	271	271	241	255	2,0
Gorey	463	437	447	398	401	403	377	2,926	328	339	347	312	284	297	318	2,2
Gort	298	281	303	273	246	276	230	1,907	302	286	305	211	329	336	139	1,9
Gortin	264	270	261	272	248	236	237	1,808	300	287	240	244	209	203	261	1,9
Granard	642	638	645	612	534	561	543	4,195	684	617	699	565	567	537	521	4,3
Inishowen	765	738	736	679	645	620	639	4,912	698	771	751	697	623	650	654	4,8
Irvinestown	321	305	340	349	280	334	280	2,209	263	281	275	284	233	299	225	1,8
Kanturk	631	536	606	640	524	561	566	4,064	545	532	536	479	366	491	462	3,4
Kells	381	352	376	335	329	299	314	2,386	375	388	326	329	294	265	348	2,3
Kenmare	518	498	487	406	443	364	409	3,125	614	488	475	338	409	369	342	3,0
Kilkeel	482	456	481	484	472	447	449	3,271	408	490	451	401	398	413	403	2,9
Kilkenny	697	633	668	601	644	595	544	4,382	629	561	594	540	511	448	532	3,7

* The Union of Donaghmore was dissolved on 30th September 1886 and the area comprise
† The numbers are given as returned by the Registrars; subsequent investigation showed tha

TABLE E.—*continued.*

App. No. 6

cessful Primary Vaccinations of Persons Born since the 1st January 1864; (c) the Number of Persons Certified as were Registered; and (e) the Number of Deaths from SMALL-POX Registered in each Superintendent Registrar's District

tistics.																								
Number of Persons Insusceptible of Vaccination.†								Number of *Unvaccinated* Children under Three Months old, whose Deaths were registered during the Year								Number of Deaths from Small-pox.								SUPERINTENDENT REGISTRAR'S DISTRICT or UNION.
2.	1883.	1884.	1885.	1886.	1887.	1888.	Total.	1882.	1883.	1884.	1885.	1886.	1887.	1888.	Total.	1882.	1883.	1884.	1885.	1886.	1887.	1888.	Total.	
3	—	—	—	1	—	—	13	26	25	20	23	27	18	23	162	—	—	—	—	—	—	—	—	Clonakilty.
)	15	9	9	6	8	8	65	15	28	19	30	24	15	20	151	—	—	—	—	—	—	—	—	Clones.
-	—	1	—	2	—	2	5	38	45	40	33	43	46	42	287	2	—	—	—	—	—	—	2	Clonmel.
1	—	3	2	—	—	—	6	43	39	55	38	31	39	43	289	—	—	—	—	—	—	—	—	Coleraine.
1	5	16	4	3	7	8	44	29	32	32	29	26	27	35	210	1	—	—	—	—	—	—	1	Cookstown.
-	—	—	—	—	—	—	—	15	24	12	16	27	11	15	120	—	—	—	—	—	—	—	—	Cootehill.
3	4	18	3	10	15	3	61	228	219	237	185	210	211	201	1,491	—	—	—	—	—	—	—	—	Cork.
-	—	—	—	—	—	1	1	12	9	8	5	6	7	11	58	—	—	—	—	—	—	—	—	Corrofin.
4	1	—	—	—	—	—	5	22	22	17	7	18	13	9	108	—	—	—	—	—	—	—	—	Croom.
-	—	—	2	—	—	—	2	5	18	12	5	11	10	5	66	—	—	—	—	—	—	—	—	Delvin.
-	—	1	—	2	1	—	4	67	35	34	22	29	30	26	243	—	—	—	—	—	—	—	—	Dingle.
5	2	4	—	—	*	*	9	9	10	9	8	4	*	*	40	—	—	—	—	—	*	*	—	Donaghmore.*
-	1	1	—	—	—	—	2	19	12	15	12	24	14	10	106	—	—	—	—	—	—	—	—	Donegal.
1	3	8	6	—	2	6	26	38	39	40	48	60	50	60	335	1	—	—	—	—	—	—	1	Downpatrick.
2	—	1	—	2	1	—	6	38	50	51	54	56	37	49	335	—	—	—	—	—	1	—	1	Drogheda.
3	1	—	3	—	2	—	9	15	14	16	7	10	5	13	80	—	—	1	—	—	—	—	1	Dromore, West.
4	5	1	2	8	3	2	30	265	283	314	315	305	382	346	2,208	—	—	—	—	—	—	1	1	Dublin, North.
3	2	3	1	4	4	2	29	471	546	628	577	564	564	488	3,838	—	—	—	2	—	1	—	3	Dublin, South.
-	3	1	—	—	1	1	6	48	46	47	46	54	40	50	331	—	—	—	—	—	—	—	—	Dundalk.
9	—	—	—	—	—	—	9	23	11	15	26	24	32	17	148	—	—	—	—	—	—	2	2	Dunfanaghy.
-	—	—	—	1	—	1	2	40	35	48	44	39	29	40	275	—	—	—	—	—	—	—	—	Dungannon.
1	1	—	—	—	—	—	2	33	38	35	36	38	40	26	246	—	—	—	—	—	—	—	—	Dungarvan.
2	1	1	—	2	2	1	9	26	15	14	15	16	16	20	122	—	—	—	—	—	—	—	—	Dunmanway.
2	9	14	10	7	4	4	60	15	19	7	7	2	8	8	66	—	—	—	—	—	—	—	—	Dunshaughlin.
-	—	—	—	—	—	—	—	23	21	27	17	18	16	21	143	—	—	—	—	—	—	—	—	Edenderry.
1	—	1	—	—	2	—	4	18	18	23	20	26	20	17	142	—	—	—	—	—	—	—	—	Ennis.
-	4	2	2	2	4	2	16	44	39	53	39	41	50	48	314	—	—	—	—	—	—	—	—	Enniscorthy.
5	3	6	3	3	7	3	30	37	47	41	34	44	41	43	287	—	—	—	2	—	—	—	2	Enniskillen.
-	—	—	—	—	—	—	—	17	19	27	23	13	21	20	140	—	—	—	—	—	—	—	—	Ennistimon.
1	—	—	2	2	—	—	5	48	42	39	44	44	44	30	291	—	—	—	—	—	—	—	—	Fermoy.
-	—	—	—	—	2	4	6	56	63	74	45	76	63	63	440	—	—	—	—	—	—	—	—	Galway.
-	—	1	—	—	—	—	1	8	14	12	8	8	9	11	70	—	3	—	—	—	—	—	3	Glennamaddy.
-	—	1	—	1	5	7	14	42	57	33	31	38	32	31	264	—	—	—	—	—	—	—	—	Glenties.
1	—	1	4	—	7	8	21	20	22	16	29	21	12	15	135	—	—	—	—	—	—	—	—	Glin.
4	2	—	1	1	1	—	9	22	25	17	23	18	25	22	156	—	—	—	—	—	—	—	—	Gorey.
1	—	—	—	—	—	—	1	6	13	11	11	11	8	7	67	—	—	—	—	—	—	—	—	Gort.
-	—	2	4	1	2	3	12	12	11	9	13	9	3	7	64	—	—	—	—	—	—	—	—	Gortin.
3	5	10	6	2	3	4	32	25	32	33	32	31	14	19	186	—	—	—	—	—	—	—	—	Granard.
5	11	2	—	—	—	—	15	33	34	41	33	34	39	36	250	—	—	—	—	—	—	—	—	Inishowen.
-	—	1	—	—	—	—	1	17	14	17	12	10	12	14	96	—	—	—	—	—	—	—	—	Irvinestown.
-	—	—	—	—	10	1	16	26	27	27	37	28	18	24	187	—	—	—	—	—	—	—	—	Kanturk.
-	3	8	1	3	—	2	18	18	20	17	12	10	17	12	106	—	—	—	—	—	—	—	—	Kells.
-	2	—	—	—	—	—	3	26	17	11	26	16	6	13	115	—	—	—	—	—	—	—	—	Kenmare.
-	1	2	—	1	1	—	6	11	16	14	17	16	26	19	119	—	—	—	—	—	—	—	—	Kilkeel.
-	42	32	—	—	—	—	94	57	60	35	52	53	37	32	326	—	—	—	—	—	—	—	—	Kilkenny.

rein distributed through the Unions of Abbeyleix, Roscrea, and Urlingford.
some cases the Returns under this heading were made under a misconception as to its meaning.

App. No. 6.

TABLE E.—*continued.*

TABLE showing, for each of the Seven Years, 1882-88:—(*a*) the Number of Births Registered; (*b*) the Number of Successful Primary Vaccinations; (*c*) the Number of Insusceptible of Vaccination; (*d*) the Number of Unvaccinated Children under Three Months Old whose Deaths were Registered, in each Superintendent Registrar's District or Poor Law Union in Ireland—*continued.*

SUPERINTENDENT REGISTRAR'S DISTRICT OR UNION.	Number of Births Registered.								Vaccination: Number of Successful Primary Vaccinations.							
	1882.	1883.	1884.	1885.	1886.	1887.	1888.	Total.	1882.	1883.	1884.	1885.	1886.	1887.	1888.	Total.
Killadysert	319	300	306	272	250	251	253	1,949	331	307	304	272	210	211	189	1,824
Killala	226	221	233	222	214	207	181	1,504	146	222	215	196	158	232	70	1,239
Killarney	1,106	1,138	1,169	1,070	1,035	1,033	1,034	7,587	979	1,107	1,389	1,213	1,077	825	902	7,492
Kilmacthomas	229	208	213	206	176	157	167	1,350	204	178	168	181	176	140	130	1,177
Kilmallock	748	721	668	699	693	646	623	4,798	707	630	627	659	605	603	613	4,445
Kilrush	864	809	823	814	784	771	684	5,549	850	1,003	752	672	659	573	465	4,974
Kinsale	541	493	482	476	506	476	446	3,420	490	474	418	438	388	454	382	3,044
Larne	1,069	953	1,089	989	966	902	962	6,980	1,013	886	925	836	793	782	708	6,033
Letterkenny	346	306	307	295	279	277	298	2,108	320	281	294	283	271	309	295	2,053
Limavady	596	564	601	546	551	517	515	3,890	585	533	582	529	506	487	495	3,717
Limerick	1,919	1,746	1,825	1,732	1,761	1,644	1,707	12,334	1,692	1,412	1,447	1,465	1,508	1,153	1,219	9,896
Lisburn	1,437	1,284	1,291	1,395	1,295	1,330	1,338	9,370	1,179	1,160	1,032	1,270	1,039	1,216	1,163	8,079
Lismore	381	399	373	347	335	336	316	2,487	361	357	340	312	298	312	320	2,300
Lisnaskea	496	389	371	395	395	369	401	2,786	416	355	329	324	389	314	335	2,453
Listowel	840	851	849	782	762	669	740	5,493	646	427	1,149	841	702	589	649	5,003
Londonderry	1,510	1,458	1,528	1,455	1,432	1,518	1,521	10,422	1,085	1,353	1,158	1,223	1,423	1,567	1,196	9,005
Longford	599	596	550	599	541	541	516	3,922	512	519	569	565	536	456	538	3,635
Loughrea	522	475	482	489	493	454	447	3,362	516	407	524	539	441	426	374	3,228
Lurgan	1,624	1,662	1,769	1,677	1,717	1,679	1,618	11,746	1,449	1,419	1,423	1,511	1,493	1,394	1,416	10,105
Macroom	721	743	685	601	657	595	630	4,632	703	784	651	614	595	645	545	4,537
Magherafelt	1,071	1,022	1,065	943	1,047	979	1,000	7,127	1,013	918	988	896	897	951	854	6,517
Mallow	696	573	588	612	614	565	532	4,120	511	619	567	513	571	680	569	3,970
Manorhamilton	700	671	649	649	618	615	619	4,521	658	576	683	635	541	582	585	4,260
Middleton	616	565	583	548	571	490	485	3,858	570	517	446	440	510	443	356	3,282
Millford	601	533	554	543	491	561	517	3,800	590	549	547	527	470	551	483	3,767
Millstreet	341	256	322	249	265	254	246	1,933	299	183	564	246	252	224	335	2,123
Mitchelstown	401	393	375	366	355	337	344	2,571	365	354	333	327	304	287	304	2,274
Mohill	548	513	494	491	506	510	506	3,568	669	482	479	446	450	438	379	3,343
Monaghan	662	612	670	621	602	623	585	4,375	693	601	527	584	527	551	514	3,997
Mountbellew	452	423	385	376	300	372	393	2,791	450	405	423	395	306	389	434	2,804
Mountmellick	729	716	712	717	665	703	633	4,875	626	623	671	600	605	647	512	4,284
Mullingar	742	749	706	738	674	677	652	4,938	634	700	706	596	737	618	621	4,612
Naas	948	856	930	860	840	841	752	6,027	693	725	660	728	618	632	670	4,676
Navan	387	360	389	361	348	394	337	2,576	352	278	284	305	251	290	217	1,977
Nenagh	654	670	662	586	631	618	583	4,414	529	508	501	524	459	564	482	3,567
Newcastle	739	710	698	655	646	618	595	4,661	787	634	725	720	574	643	525	4,608
Newport*	437	425	422	381	*	*	*	1,665*	380	467	520	333	*	*	*	1,700*
New Ross	880	806	803	778	773	768	706	5,514	606	963	782	626	564	509	567	4,707
Newry	1,535	1,350	1,502	1,445	1,392	1,410	1,378	10,012	1,321	1,279	1,272	1,332	1,232	1,249	1,210	8,915
Newtownards	1,147	1,102	1,122	1,121	1,150	1,091	1,061	7,794	1,071	1,060	1,014	990	1,036	967	979	7,117
Oldcastle	453	429	415	447	387	363	385	2,870	416	382	389	343	343	338	256	2,467
Omagh	920	816	822	800	775	749	720	5,602	850	772	932	874	772	727	677	5,604
Oughterard	473	532	533	473	392	473	394	3,270	872	275	513	249	359	380	775	3,423
Parsonstown	677	679	686	657	680	627	640	4,646	542	709	577	589	536	568	527	4,048
Portumna	258	259	239	247	224	199	194	1,620	277	223	152	253	207	146	138	1,396

* The Union of Newport was dissolved on the 8th August, 1885, and the boundaries

† The numbers are given as returned by the Registrars; subsequent investigation showed that

TABLE E.—*continued.*

cessful Primary Vaccinations of Persons Born since the 1st January 1864; (c) the Number of Persons Certified as were Registered; and (e) the Number of Deaths from SMALL-POX Registered in each Superintendent Registrar's District

istics.																					
Number of Persons insusceptible of Vaccination.†								Number of *Unvaccinated* Children under Three Months Old whose Deaths were Registered during the Year.								Number of Deaths from Small-pox.								SUPERINTENDENT REGISTRAR'S DISTRICT OR UNION.
2.	1883.	1884.	1885.	1886.	1887.	1888.	Total.	1882.	1883.	1884.	1885.	1886.	1887.	1888.	Total.	1882.	1883.	1884.	1885.	1886.	1887.	1888.	Total.	
-	—	—	2	—	—	—	2	20	11	13	19	14	12	20	109	—	—	—	—	—	—	—	—	Killadysert.
-	3	1	—	3	—	4	11	9	10	4	9	4	6	13	55	—	—	—	—	—	—	—	—	Killala.
-	6	3	—	2	2	1	16	56	53	61	62	46	58	53	389	—	—	—	—	—	—	—	—	Killarney.
-	—	2	—	—	—	—	2	16	9	10	11	16	8	7	77	—	—	—	—	—	—	—	—	Kilmacthomas.
-	—	2	—	—	—	—	3	55	62	59	59	55	41	48	370	—	—	—	—	—	—	—	—	Kilmallock.
-	—	3	—	—	1	1	5	41	47	40	37	37	38	53	273	—	—	—	—	—	—	—	—	Kilrush.
-	3	3	3	—	—	1	10	30	17	25	25	31	27	30	185	—	—	—	—	—	—	—	—	Kinsale.
-	—	—	1	2	—	—	5	53	44	36	55	43	39	35	285	2	—	—	—	—	—	—	2	Larne.
-	—	—	—	—	—	1	1	14	11	11	14	14	8	7	79	—	—	—	—	—	—	—	—	Letterkenny.
-	—	3	2	—	—	2	7	19	35	36	23	24	18	22	172	—	—	—	—	—	—	—	—	Limavady.
-	2	—	1	—	—	3	11	124	118	140	120	117	102	131	852	—	—	—	—	—	—	—	—	Limerick
-	2	2	1	1	—	2	10	71	90	70	105	86	84	85	591	6	1	—	—	—	—	—	7	Lisburn.
-	1	—	2	1	3	—	9	17	26	21	22	20	7	23	136	—	—	—	—	—	—	—	—	Lismore.
-	8	2	7	6	4	3	31	16	12	13	13	30	22	24	130	—	—	—	—	—	—	—	—	Lisnaskea.
-	—	—	4	—	—	3	11	54	31	30	22	42	27	52	264	—	—	—	—	—	—	—	—	Listowel.
-	1	—	—	—	—	1	2	85	75	77	91	103	87	92	610	1	—	—	—	—	10	—	11	Londonderry.
-	5	4	7	7	9	4	45	27	29	12	20	19	27	18	152	—	—	—	—	—	—	—	—	Longford.
-	27	9	2	4	5	4	57	17	24	19	19	22	22	24	147	—	—	—	—	—	—	—	—	Loughrea.
-	—	—	—	2	2	4	14	91	120	117	111	107	81	103	730	1	—	—	—	—	—	—	1	Lurgan.
-	—	—	—	—	—	—	—	50	30	25	18	32	30	43	227	—	—	—	—	—	—	—	—	Macroom.
-	—	—	1	1	—	—	2	53	55	52	52	63	43	59	377	—	—	—	—	—	—	—	—	Magherafelt.
-	—	—	—	—	—	—	—	42	25	31	33	29	25	16	201	—	—	—	—	—	—	—	—	Mallow.
-	—	—	3	—	—	—	3	34	32	30	17	21	23	35	192	—	—	—	—	—	—	—	—	Manorhamilton.
-	11	9	10	22	15	13	85	31	27	34	22	41	30	23	208	—	—	—	—	—	—	—	—	Middleton.
-	2	—	—	—	—	—	4	25	24	18	17	15	30	25	154	—	—	—	—	—	—	—	—	Millford.
-	—	1	1	2	—	—	10	20	7	12	14	17	4	13	87	—	—	—	—	—	—	—	—	Millstreet.
-	4	9	4	10	2	8	46	24	21	20	27	27	15	18	152	—	—	—	—	—	—	—	—	Mitchelstown.
-	—	—	2	—	—	—	2	24	37	9	18	19	31	27	165	—	—	—	—	—	—	—	—	Mohill.
-	2	10	15	—	1	—	28	43	24	46	33	30	34	31	241	—	—	—	—	—	—	—	—	Monaghan.
-	6	—	4	—	—	2	16	16	24	17	10	17	9	10	103	—	—	—	—	—	—	—	—	Mountbellew.
-	—	3	6	3	2	4	47	32	60	38	36	32	38	43	288	—	—	—	—	—	—	—	—	Mountmellick.
-	29	19	15	14	25	10	117	53	50	53	64	56	37	59	331	—	—	—	—	—	—	—	—	Mullingar.
-	3	1	4	—	4	1	15	39	32	47	32	30	35	29	244	—	—	—	—	—	—	—	—	Naas.
-	2	—	—	—	—	—	2	16	15	14	21	10	19	16	111	—	—	—	—	—	—	—	--	Navan.
-	5	6	8	5	8	4	39	22	29	28	22	24	12	18	155	—	—	—	—	—	—	—	—	Nenagh.
-	—	—	—	—	—	—	—	33	40	34	47	36	27	35	252	—	—	—	—	—	—	—	—	Newcastle.
-	3	—	—	•	•	•	3	34	21	6	8	•	•	•	69	—	—	—	—	—	—	—	—	Newport.*
-	—	1	4	1	—	—	7	53	41	44	36	41	38	33	286	—	—	—	—	—	—	—	—	New Ross.
-	2	1	—	—	—	2	15	76	70	93	96	63	76	66	542	—	—	—	—	—	—	—	—	Newry.
-	1	10	—	—	1	1	14	52	64	56	55	88	61	62	438	3	—	—	—	—	—	—	3	Newtownards.
-	—	—	—	—	2	—	2	22	27	23	26	18	19	29	164	—	—	—	—	—	—	—	—	Oldcastle.
-	—	—	1	—	—	—	1	50	58	37	39	32	44	40	300	—	—	—	—	—	—	—	—	Omagh.
-	1	—	1	—	—	—	4	10	27	16	8	17	19	13	110	—	—	—	—	—	—	—	—	Oughterard.
-	—	—	—	4	14	2	22	33	37	34	32	26	33	30	225	—	—	—	—	—	—	—	—	Parsonstown.
-	—	1	—	—	—	—	5	14	8	10	29	8	1	9	79	—	—	—	—	—	—	—	—	Portumna.

the Union of Westport were extended so as to include the Newport area.
some cases the Returns under this heading were made under a misconception as to its meaning.

App. No. 6.

TABLE E.—*continued.*

TABLE showing, for each of the Seven Years, 1882–88:—(*a*) the Number of Births Registered; (*b*) the Number of Successful Primary Vaccinations; (*c*) the Number of Insusceptible of Vaccination; (*d*) the Number of Unvaccinated Children under Three Months Old whose Deaths were Registered, in each Superintendent Registrar's District or Poor Law Union in Ireland—*continued.*

SUPERINTENDENT REGISTRAR'S DISTRICT OR UNION.	Number of Births Registered.								Vaccination: Number of Successful Primary Vaccinations.							
	1882.	1883.	1884.	1885.	1886.	1887.	1888.	Total.	1882.	1883.	1884.	1885.	1886.	1887.	1888.	Total.
Rathdown	1,294	1,276	1,223	1,272	1,294	1,176	1,231	8,766	1,101	1,120	1,037	1,076	1,076	882	1,054	7,346
Rathdrum	687	665	669	696	669	678	648	4,703	451	536	454	480	428	397	483	3,229
Rathkeale	351	376	336	332	353	302	292	2,342	350	350	285	326	332	289	276	2,308
Roscommon	484	473	444	421	432	402	394	3,050	411	431	454	393	453	375	371	2,888
Roscrea	370	373	330	371	320	374	390	2,528	302	293	345	334	313	323	351	2,311
Scarriff	294	301	312	270	267	263	238	1,945	318	294	240	284	239	212	228	1,815
Shillelagh	337	341	311	353	340	313	306	2,301	281	301	237	250	213	323	336	1,961
Skibbereen	669	695	672	676	711	660	652	4,765	652	683	639	691	704	635	341	4,295
Skull	300	307	283	256	289	254	223	1,912	242	350	206	175	244	167	64	1,448
Sligo	981	892	912	954	897	930	862	6,428	704	982	889	780	883	861	722	5,820
Strabane	860	773	777	761	780	812	792	5,555	750	748	696	627	764	659	746	4,990
Stranorlar	341	355	328	365	324	332	291	2,336	343	357	309	337	276	341	327	2,291
Strokestown	446	377	405	391	373	369	311	2,672	399	258	447	344	276	214	217	2,155
Swineford	1,418	1,424	1,346	1,277	1,220	1,382	1,114	9,131	1,593	1,576	1,190	1,433	1,119	1,136	1,024	9,071
Thomastown	417	379	386	358	373	317	356	2,586	401	352	322	337	311	288	294	2,305
Thurles	636	625	601	648	569	610	559	4,248	516	596	469	555	459	539	467	3,498
Tipperary	986	894	877	866	802	807	753	5,985	913	807	750	801	681	691	633	5,276
Tobercurry	629	533	583	548	476	439	430	3,638	420	369	538	511	346	396	403	2,983
Tralee	1,215	1,205	1,073	1,098	1,031	1,082	1,009	7,713	1,013	1,332	965	844	1,165	864	893	7,076
Trim	406	360	397	367	334	327	294	2,475	330	406	347	301	299	235	322	2,241
Tuam	867	1,000	799	869	771	824	795	5,925	669	706	661	817	651	657	655	4,876
Tulla	250	238	258	227	221	224	221	1,639	232	235	178	233	202	207	212	1,499
Tullamore	559	535	544	544	535	538	537	3,832	528	542	526	486	518	479	551	3,670
Urlingford	211	198	239	190	205	184	220	1,438	221	204	193	209	143	214	166	1,350
Waterford	1,391	1,371	1,370	1,296	1,324	1,230	1,136	9,118	1,078	1,021	1,087	996	963	1,055	924	7,124
Westport	655	683	672	621	919	990	959	5,499	559	751	681	609	785	848	709	4,942
Wexford	911	890	856	889	871	838	823	6,078	780	806	801	689	75	772	842	5,456
Youghal	402	379	437	376	379	388	325	2,686	368	353	333	287	306	287	241	2,175
Total	192,648	118,163	118,875	115,951	113,927	112,400	109,557	811,521	107,613	105,997	105,021	102,680	97,137	96,866	93,529*	709,834

* In the last quarter of the year 1888 the Registrars

† The numbers are given as returned by the Registrars; subsequent investigation showed that

TABLE E.—*continued.*

sful Primary Vaccinations of Persons Born since the 1st January 1864; (c) the Number of Persons Certified as re Registered; and (e) the Number of Deaths from SMALL-POX Registered in each Superintendent Registrar's District

istics.																								
Number of Persons Insusceptible of Vaccination.†								Number of *Unvaccinated* Children under Three Months Old, whose Deaths were registered during the Year.								Number of Deaths from Small-pox.								SUPERINTENDENT REGISTRAR'S DISTRICT OR UNION.
.	1883.	1884.	1885.	1886.	1887.	1888.	Total.	1882.	1883.	1884.	1885.	1886.	1887.	1888.	Total	1882.	1883.	1884.	1885.	1886.	1887.	1888.	Total.	
	—	3	—	—	2	1	23	92	113	84	99	101	79	87	655	1	—	—	—	—	—	—	1	Rathdown.
	3	2	2	—	—	—	7	34	29	30	15	28	33	27	196	—	—	—	—	—	—	—	—	Rathdrum.
	—	2	—	—	—	1	3	16	26	26	15	24	24	22	153	—	—	—	—	—	—	—	—	Rathkeale.
	—	—	—	—	—	—	—	30	21	19	21	29	17	26	163	—	—	—	—	—	—	—	—	Roscommon.
	—	—	—	1	3	—	4	25	13	14	17	12	21	20	122	—	—	—	—	—	—	—	—	Roscrea.
	—	—	—	—	—	—	—	13	10	15	10	6	17	9	80	—	—	—	—	—	—	—	—	Scarriff.
	—	—	—	—	3	—	3	22	5	25	14	18	19	25	128	—	—	—	—	—	—	—	—	Shillelagh.
	—	—	2	—	1	—	3	27	23	23	20	22	34	28	177	—	—	—	—	—	—	—	—	Skibbereen.
	—	—	—	2	—	2	4	8	12	2	34	7	9	8	80	—	—	—	—	—	—	—	—	Skull.
	—	—	2	1	1	1	13	34	46	26	34	24	32	39	235	—	—	—	—	—	—	—	—	Sligo.
	8	9	1	—	—	3	22	49	42	44	58	34	48	41	316	—	—	—	—	—	—	—	—	Strabane.
	—	—	2	—	—	—	3	18	13	26	16	14	16	12	115	—	—	—	—	—	—	—	—	Stranorlar.
	—	—	—	—	3	4	7	21	17	24	14	12	23	13	124	—	—	—	—	—	—	—	—	Strokestown.
	1	—	—	—	—	—	1	72	83	60	64	71	68	85	504	—	—	—	—	—	—	—	—	Swineford.
	—	—	1	—	—	2	5	24	11	24	21	21	24	28	153	—	—	—	—	—	—	—	—	Thomastown..
	1	—	1	2	3	—	8	32	28	36	41	34	28	26	225	—	—	—	—	—	—	—	—	Thurles.
	1	2	1	1	1	4	10	51	37	36	44	52	38	40	298	—	—	—	—	—	—	—	—	Tipperary.
	—	—	—	—	—	—	—	38	39	39	33	11	9	6	180	—	—	—	—	—	—	—	—	Tobercurvy.
	1	—	—	—	—	—	2	60	63	61	59	51	36	56	377	—	—	—	—	—	—	—	—	Tralee.
	—	—	—	—	—	—	—	15	16	25	18	21	12	19	126	—	—	—	—	—	—	—	—	Trim.
	—	—	1	—	—	—	5	15	48	37	34	30	42	46	252	—	—	—	—	—	—	—	—	Tuam.
	3	—	—	—	—	—	9	3	17	5	8	9	6	6	54	—	—	—	—	—	—	—	—	Tulla.
	—	—	—	5	—	—	5	28	24	22	30	32	35	31	202	—	—	—	—	1	—	—	1	Tullamore.
	—	2	—	—	—	—	3	15	10	21	14	12	7	17	96	—	—	—	—	—	—	—	—	Urlingford.
	1	5	5	1	10	—	22	87	91	105	99	104	85	95	666	16	—	—	—	—	—	—	16	Waterford.
	—	—	—	—	—	—	—	34	25	31	26	55	53	42	266	—	—	—	—	—	—	—	—	Westport.
	1	1	—	—	2	2	6	57	59	47	54	48	44	54	363	—	—	—	—	—	—	—	—	Wexford.
	—	—	—	—	—	—	1	21	21	20	22	20	13	16	133	—	—	—	—	—	—	—	—	Youghal.
	365	383	278	248	287	239	2,271	5,575	6,713	6,558	6,469	6,514	6,261	6,575	45,456	129	16	1	4	2	14	3	169	Total.

ported 2,953 cases in which Vaccination was postponed.
some cases the Returns under this heading were made under a misconception as to its meaning.

App. No. 6.

TABLE F.

TABLE showing, by Superintendent Registrars' Districts or Poor Law Unions, the Total Number of Births registered in Ireland during the Seven Years 1882–88; Vaccination Statistics for the same Period; and the Difference between the Number of Births registered and the Number of Persons accounted for as regards Vaccination; with the Number of Deaths from SMALL-POX registered during those Years.

Superintendent Registrars' Districts or Poor Law Unions.	Total Number of Births Registered during the 7 Years, 1882–88.	Vaccination Statistics.				Extent to which the Total of Columns 2, 3, and 4, falls short of the Registered Births.		Total Number of Deaths from Small-pox Registered during the Years 1882–88.
		Number of Primary Successful Vaccinations, 1882–88.	Number of Persons Insusceptible of Vaccination, 1882–88.	Number of Unvaccinated Children under Three Months old, whose Deaths were Registered during the Years 1882–88.	Total of Columns 2, 3, and 4.	Number. *	Rate per cent. *	
	(1.)	(2.)	(3.)	(4.)	(5.)	(6.)	(7.)	(8.)
Abbeyleix	2,480	2,208	59	159	2,426	54	2·2	—
Antrim	5,659	5,048	17	313	5,378	281	5·0	2
Ardee	2,577	2,323	2	142	2,467	110	4·3	—
Armagh	9,005	8,342	17	495	8,854	151	1·7	10
Athlone	5,142	4,486	20	247	4,753	389	7·6	—
Athy	3,994	3,642	7	235	3,884	110	2·8	—
Bailieborough	2,793	2,686	4	131	2,821	*28*	*1·0*	—
Ballina	3,551	2,746	8	131	2,885	666	18·8	2
Ballinasloe	3,096	2,374	7	118	2,499	597	19·3	—
Ballinrobe	4,141	3,720	3	128	3,851	290	7·0	—
Ballycastle	2,325	2,217	7	88	2,312	13	·6	—
Ballymahon	2,101	1,919	7	101	2,027	74	3·5	—
Ballymena	11,381	10,387	4	572	10,963	418	3·7	—
Ballymoney	5,161	4,810	4	250	5,064	97	1·9	1
Ballyshannon	3,532	2,975	3	110	3,088	444	12·6	—
Ballyvaghan	646	612	5	26	643	3	0·5	—
Balrothery	3,167	2,958	2	161	3,121	46	1·5	—
Baltinglass	2,667	2,527	3	200	2,730	*63*	*2·4*	—
Banbridge	8,381	7,687	10	457	8,154	227	2·7	—
Bandon	3,565	3,222	16	170	3,408	157	4·4	1
Bantry	2,883	2,606	3	148	2,757	126	4·4	—
Bawnboy	3,277	3,210	11	141	3,362	*83*	*2·6*	—
Belfast	55,938	46,001	64	3,786	49,851	6,087	10·9	94
Belmullet	2,610	3,321	9	145	3,475	*865*	*33·1*	—
Borrisokane	1,270	1,135	10	62	1,207	63	5·0	—
Boyle	5,865	5,215	5	207	5,427	438	7·5	—
Cahersiveen	4,275	3,680	2	246	3,928	347	8·1	—
Callan	2,511	2,088	—	146	2,234	277	11·0	—
Carlow	6,004	5,223	10	424	5,657	347	5·8	—
Carrickmacross	2,746	2,606	2	139	2,747	*1*	—	—
Carrick-on-Shannon	3,779	3,524	11	167	3,702	77	2·0	—
Carrick-on-Suir	3,387	3,067	—	270	3,337	50	1·5	—
Cashel	3,554	3,016	6	210	3,232	322	9·1	—
Castlebar	4,608	4,393	17	178	4,588	20	0·4	—
Castleblayney	4,780	4,409	1	255	4,665	115	2·4	—
Castlecomer	2,143	1,928	—	149	2,077	66	3·1	—
Castlederg	2,062	1,996	—	67	2,063	*1*	—	—

* Wherever the numbers in columns 6 and 7 are given in *italics*, they denote that, instead of the total of columns 2, 3, and 4 being below the number of births, it exceeds that number to the extent stated.

App. No. 6.

TABLE F.—*continued.*

TABLE showing, by Superintendent Registrars' Districts or Poor Law Unions, the Total Number of Births registered in Ireland during the Seven Years 1882–88; Vaccination Statistics for the same Period; and the Difference between the Number of Births registered and the Number of Persons accounted for as regards Vaccination; with the Number of Deaths from SMALL-POX registered during those Years—*continued.*

Superintendent Registrars' Districts or Poor Law Unions.	Total Number of Births Registered during the 7 Years, 1882–88.	Vaccination Statistics.				Extent to which the Total of Columns 2, 3, and 4 falls short of the Registered Births.		Total Number of Deaths from Small-pox Registered during the Years, 1882–88.
		Number of Primary Successful Vaccinations, 1882–88.	Number of Persons Insusceptible of Vaccination, 1882–88.	Number of Unvaccinated Children under Three Months old, whose Deaths were Registered during the Years 1882–88.	Total of Columns 2, 3, and 4.	Number. *	Rate per Cent. *	
	(1.)	(2.)	(3.)	(4.)	(5.)	(6.)	(7.)	(8.)
Castlereagh	6,141	6,439	1	194	6,634	*493*	*8·0*	—
Castletown	2,234	2,084	7	68	2,159	75	3·4	—
Cavan	6,655	6,097	218	298	6,613	42	0·6	—
Celbridge	2,335	1,642	6	111	1,759	576	24·7	—
Claremorris	5,832	5,477	27	424	5,928	*96*	*1·6*	—
Clifden	3,430	3,934	10	109	4,053	*623*	*18·2*	—
Clogheen	2,994	2,674	—	144	2,818	176	5·9	—
Clogher	2,717	2,617	7	115	2,739	*22*	*0·8*	—
Clonakilty	3,805	3,446	13	162	3,621	184	4·8	—
Clones	2,502	2,249	65	151	2,465	37	1·5	—
Clonmel	3,734	2,817	5	287	3,109	625	16·7	2
Coleraine	5,679	4,978	6	289	5,273	406	7·1	—
Cookstown	4,171	3,573	44	210	3,827	344	8·2	1
Cootehill	3,750	3,718	—	120	3,838	*88*	*2·3*	—
Cork	24,458	18,445	61	1,491	19,997	4,461	18·2	—
Corrofin	857	838	1	58	897	*40*	*4·7*	—
Croom	2,008	1,810	5	108	1,923	85	4·2	—
Delvin	1,430	1,385	2	66	1,453	*23*	*1·6*	—
Dingle	3,991	3,653	4	243	3,900	91	2·3	—
Donaghmore†	697	627	9	40	676	21	3·0	—
Donegal	3,134	2,822	2	106	2,930	204	6·5	—
Downpatrick	7,370	6,861	26	335	7,222	148	2·0	1
Drogheda	4,941	4,498	6	335	4,839	102	2·1	1
Dromore, West	2,295	1,859	9	80	1,948	347	15·1	1
Dublin, North	31,867	19,764	30	2,208	22,002	9,865	31·0	1
Dublin, South	39,088	29,841	29	3,838	33,708	5,380	13·8	3
Dundalk	7,010	6,435	6	331	6,772	238	3·4	—
Dunfanaghy	2,830	2,474	9	148	2,631	199	7·0	2
Dungannon	5,210	4,914	2	275	5,191	19	0·4	—
Dungarvan	3,080	2,818	2	246	3,066	14	0·5	—
Dunmanway	2,814	2,637	9	122	2,768	46	1·6	—
Dunshaughlin	1,413	1,126	60	66	1,252	161	11·4	—
Edenderry	2,626	2,407	—	143	2,550	76	2·9	—
Ennis	3,599	3,047	4	142	3,193	406	11·3	—
Enniscorthy	5,285	4,073	16	314	4,403	882	16·7	—
Enniskillen	5,805	5,129	30	287	5,446	359	6·2	2
Ennistimon	3,247	2,973	—	140	3,113	134	4·1	—
Fermoy	4,163	3,517	5	291	3,813	350	8·4	—

* Wherever the numbers in columns 6 and 7 are given in *italics*, they denote that, instead of the total of columns 2, 3, and 4 being below the number of births, it exceeds that number to the extent stated.

† The union of Donaghmore was dissolved on 30th September 1886, and the area comprised therein distributed through the unions of Abbeyleix, Roscrea, and Urlingford.

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TABLE F.—*continued.*

TABLE showing, by Superintendent Registrars' Districts or Poor Law Unions, the Total Number of Births registered in Ireland during the Seven Years 1882–88; Vaccination Statistics for the same Period; and the Difference between the Number of Births registered and the Number of Persons accounted for as regards Vaccination; with the Number of Deaths from SMALL-POX registered during those Years—*continued.*

Superintendent Registrars' Districts or Poor Law Unions.	Total Number of Births Registered during the 7 Years, 1882–88.	Vaccination Statistics.				Extent to which the Total of Columns 2, 3, and 4 falls Short of the Registered Births.		Total Number of Deaths from Small-pox Registered during the Years 1882–88.
		Number of Primary Successful Vaccinations, 1882–88.	Number of Persons Insusceptible of Vaccination, 1882–88.	Number of Unvaccinated Children under Three Months old, whose Deaths were Registered during the Years 1882–88.	Total of Columns 2, 3, and 4.	Number. *	Rate per Cent. *	
	(1.)	(2.)	(3.)	(4.)	(5.)	(6.)	(7.)	(8.)
Galway	7,012	7,207	6	440	7,653	*641*	*9·1*	—
Glennamaddy	3,301	2,758	1	70	2,829	472	14·3	3
Glenties	5,389	5,077	14	264	5,355	34	0·6	—
Glin	2,269	2,044	21	135	2,200	69	3·0	—
Gorey	2,926	2,225	9	156	2,390	536	18·3	—
Gort	1,907	1,908	1	67	1,976	*69*	*3·6*	—
Gortin	1,808	1,813	12	64	1,889	*81*	*4·3*	—
Granard	4,195	4,190	32	186	4,408	*213*	*5·1*	—
Inishowen	4,912	4,844	15	250	5,109	*197*	*4·0*	—
Irvinestown	2,209	1,860	1	96	1,957	252	11·4	—
Kanturk	4,064	3,411	16	187	3,614	450	11·1	—
Kells	2,386	2,335	18	106	2,459	*73*	*3·1*	—
Kenmare	3,125	3,026	3	115	3,144	*19*	*0·6*	—
Kilkeel	3,271	2,964	6	119	3,089	182	5·6	—
Kilkenny	4,382	3,716	94	326	4,136	246	5·6	—
Killadysert	1,940	1,824	2	109	1,935	5	0·3	—
Killala	1,504	1,239	11	55	1,305	199	13·2	—
Killarney	7,587	7,492	16	389	7,897	*310*	*4·1*	—
Kilmacthomas	1,350	1,177	2	77	1,256	94	7·0	—
Kilmallock	4,798	4,415	3	370	4,788	10	0·2	—
Kilrush	5,549	4,974	5	273	5,252	297	5·4	—
Kinsale	3,420	3,044	10	185	3,239	181	5·3	—
Larne	6,980	6,033	5	285	6,323	657	9·4	2
Letterkenny	2,108	2,053	1	79	2,133	*25*	*1·2*	—
Limavady	3,890	3,717	7	172	3,896	*6*	*0·2*	—
Limerick	12,334	9,896	11	852	10,759	1,575	12·8	—
Lisburn	9,370	8,079	10	591	8,680	690	7·4	7
Lismore	2,487	2,300	9	136	2,445	42	1·7	—
Lisnaskea	2,786	2,453	51	130	2,634	152	5·5	—
Listowel	5,493	5,003	11	264	5,278	215	3·9	—
Londonderry	10,422	9,005	2	610	9,617	805	7·7	11
Longford	3,922	3,635	45	152	3,832	90	2·3	—
Loughrea	3,362	3,218	57	147	3,422	*60*	*1·8*	—
Lurgan	11,746	10,105	14	730	10,849	897	7·6	1
Macroom	4,632	4,537	—	237	4,774	*142*	*3·1*	—
Magherafelt	7,127	6,517	2	377	6,896	231	3·2	—
Mallow	4,120	3,970	—	201	4,171	*51*	*1·2*	—
Manorhamilton	4,521	4,260	3	192	4,455	66	1·5	—
Middleton	3,858	3,282	85	208	3,575	283	7·3	—
Millford	3,800	3,707	4	154	3,865	*65*	*1·7*	—

* Wherever the numbers in columns 6 and 7 are given in *italics*, they denote that, instead of the total of columns 2, 3, and 4 being below the number of births, it exceeds that number to the extent stated.

TABLE F.—*continued.*

TABLE showing, by Superintendent Registrars' Districts or Poor Law Unions, the Total Number of Births registered in Ireland during the Seven Years 1882–88; Vaccination Statistics for the same Period; and the Difference between the Number of Births registered and the Number of Persons accounted for as regards Vaccination; with the Number of Deaths from SMALL-POX registered during those Years—*continued.*

Superintendent Registrars' Districts or Poor Law Unions.	Total Number of Births Registered during the 7 Years, 1882–88.	Vaccination Statistics.				Extent to which the Total of Columns 2, 3, and 4 falls short of the Registered Births.		Total Number of Deaths from Small-pox Registered during the Years 1882–88.
		Number of Primary Successful Vaccinations, 1882–88.	Number of Persons Insusceptible of Vaccination, 1882–88.	Number of Unvaccinated Children under Three Months old, whose Deaths were Registered during the Years 1887–88.	Total of Columns 2, 3, and 4.	Number. *	Rate per cent. *	
	(1.)	(2.)	(3.)	(4.)	(5.)	(6.)	(7.)	(8.)
Millstreet	1,933	2,123	10	87	2,220	*287*	*14·8*	—
Mitchelstown	2,571	2,274	46	152	2,472	99	3·8	—
Mohill	3,568	3,563	2	165	3,730	*162*	*4·5*	—
Monaghan	4,375	3,997	28	241	4,266	109	2·5	—
Mountbellew	2,791	2,804	16	103	2,923	*132*	*4·7*	—
Mountmellick	4,875	4,284	47	288	4,619	256	5·3	—
Mullingar	4,938	4,612	117	381	5,110	*172*	*3·5*	—
Naas	6,027	4,675	15	244	4,934	1,093	18·1	—
Navan	2,576	1,977	2	111	2,090	486	18·9	—
Nenagh	4,414	3,567	39	155	3,761	653	14·8	—
Newcastle	4,661	4,608	—	252	4,860	*199*	*4·3*	
Newport†	1,665	1,900	3	69	1,972	*307*	*18·4*	—
New Ross	5,514	4,707	7	286	5,000	514	9·3	—
Newry	10,012	8,915	15	542	9,472	540	5·4	—
Newtonwnards	7,794	7,117	14	438	7,569	225	2·9	3
Oldcastle	2,870	2,487	2	164	2,653	217	7·6	—
Omagh	5,602	5,604	1	300	5,905	*303*	*5·4*	—
Oughterard	3,270	3,423	4	110	3,537	*267*	*8·2*	—
Parsonstown	4,646	4,048	22	225	4,295	351	7·6	—
Portumna	1,620	1,396	5	79	1,480	140	8·6	—
Rathdown	8,766	7,346	23	655	8,024	742	8·5	1
Rathdrum	4,703	3,229	7	196	3,432	1,271	27·0	—
Rathkeale	2,342	2,208	3	153	2,364	*22*	*0·9*	—
Roscommon	3,050	2,888	—	163	3,051	*1*	—	—
Roscrea	2,528	2,321	4	122	2,447	81	3·2	—
Scariff	1,945	1,815	—	80	1,895	50	2·6	—
Shillelagh	2,301	1,961	3	128	2,092	209	9·1	—
Skibbereen	4,765	4,295	3	177	4,475	290	6·1	—
Skull	1,912	1,448	4	80	1,532	380	19·9	—
Sligo	6,428	5,890	13	235	6,138	290	4·5	—
Strabane	5,555	4,990	22	316	5,328	227	4·1	—
Stranorlar	2,326	2,281	3	115	2,399	*73*	*3·1*	—
Strokestown	2,672	2,155	7	124	2,286	386	14·4	—
Swineford	9,131	9,071	1	504	9,576	*445*	*4·9*	—
Thomastown	2,586	2,375	5	153	2,533	53	2·0	—
Thurles	4,248	3,493	8	225	3,726	522	12·3	—
Tipperary	5,985	5,276	10	298	5,584	401	6·7	—
Tobercurry	3,638	2,974	—	180	3,154	484	13·3	—

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† The union of Newport was dissolved on the 8th August 1885, and the boundaries of the union of Westport were extended so as to include the Newport area.

App. No. 6.

TABLE F.—*continued.*

TABLE showing, by Superintendent Registrars' Districts or Poor Law Unions, the Total Number of Births registered in Ireland during the Seven Years 1882–88; Vaccination Statistics for the same Period; and the Difference between the Number of Births registered and the Number of Persons accounted for as regards Vaccination; with the Number of Deaths from SMALL-POX registered during those Years—*continued.*

Superintendent Registrars' Districts or Poor Law Unions.	Total Number of Births Registered during the 7 Years, 1882–88.	Vaccination Statistics.				Extent to which the Total of Columns 2, 3, and 4 falls short of the Registered Births.		Total Number of Deaths from Small-pox Registered during the Years 1882–88.
		Number of Primary Successful Vaccinations, 1882–88.	Number of Persons Insusceptible of Vaccination, 1882–88.	Number of Unvaccinated Children under Three Months old, whose Deaths were Registered during the Years 1882–88.	Total of Columns 2, 3, and 4.	Number. *	Rate per Cent. *	
	(1.)	(2.)	(3.)	(4.)	(5.)	(6.)	(7.)	(8.)
Tralee	7,713	7,076	2	377	7,455	258	3·3	—
Trim	2,475	2,251	—	126	2,377	98	4·0	—
Tuam	5,925	4,876	5	252	5,133	792	13·4	—
Tulla	1,639	1,499	9	54	1,562	77	4·7	—
Tallamore	3,832	3,670	5	202	3,877	*45*	*1·2*	1
Urlingford	1,438	1,350	3	96	1,449	*11*	*0·8*	—
Waterford	9,118	7,124	22	666	7,812	1,306	14·3	16
Westport	5,499	4,942	—	266	5,208	291	5·3	—
Wexford	6,078	5,456	6	363	5,825	253	4·2	—
Youghal	2,686	2,175	1	33	2,309	377	14·0	—
	811,521	709,834	2,271	45,456	757,561†	53,960	6·6	169

* Wherever the numbers in columns 6 and 7 are given in *italics*, they denote that, instead of the total of columns 2, 3, and 4 being below the number of births, it exceeds that number to the extent stated.

† In the last quarter of the year 1888 the Registrars reported 2,953 cases in which vaccination was postponed.

TABLE G.

TABLE showing the Number of Cases of SMALL-POX admitted and the number of Deaths from the disease in Cork Street Hospital, Dublin, 1871–86.

Years.	—	Discrete.			Confluent.			Malignant.			Total.		
		Total.	Died.	Per Cent. Mortality.	Total.	Died.	Per Cent. Mortality.	Total.	Died.	Per Cent. Mortality.	Total.	Died.	Per Cent. Mortality.
1871 to 1886	Vaccinated	2,105	16	0·8	802	184	22·9	243	168	69·1	3,150	368	11·7
	Unvaccinated	112	7	6·3	443	307	69·3	155	140	90·3	710	454	63·9
	Total	2,217	23	1·0	1,245	491	39·4	398	308	77·4	3,860	822	21·3
	Per cent. vaccinated in each class	94·9			64·4			61·1			81·6		

TABLE H.

TABLE showing the Causes of Deaths in the Years 1864–88 in the Dublin Registration District, with the Annual Death-rate per 1,000 living.

Names of Diseases.	Number of Deaths registered, 1864–73.										
	1864 (52 weeks).	1865 (52 weeks).	1866 (52 weeks).	1867 (52 weeks).	1868 *(53 weeks).	1869 (52 weeks).	1870 (52 weeks).	1871 (52 weeks).	1872 (52 weeks).	1873 *(53 weeks).	Yearly Average, 1864–73.
ZYMOTIC DISEASES.											
Small-pox	42	71	25	2	1	1	—	207	1,350	16	172
Measles	12	164	54	405	49	139	53	26	202	66	119
Scarlatina	126	100	109	259	424	510	448	253	178	231	264
Diphtheria	40	28	35	19	20	18	22	22	26	38	27
Whooping-cough	82	126	194	178	250	29	136	212	66	230	151
Fever	305	526	537	359	313	286	371	398	321	274	378
Dysentery	45	45	35	17	26	23	19	19	12	6	24
Diarrhœa	205	314	313	329	408	248	320	252	196	206	278
Cholera	4	17	1,186	38	12	6	13	12	5	5	130
Other zymotic diseases	327	308	345	312	359	285	297	319	206	284	310
Total	1,278	1,699	2,831	1,909	1,862	1,556	1,679	1,759	2,622	1,378	1,853
CONSTITUTIONAL DISEASES.											
Phthisis or pulmonary consumption	907	1,062	984	1,049	957	957	974	977	1,095	1,050	1,009
Other constitutional diseases	727	839	680	805	733	647	644	650	670	615	701
Total	1,634	1,901	1,664	1,854	1,690	1,604	1,618	1,627	1,756	1,665	1,701
LOCAL DISEASES.											
Diseases of the Brain and nervous system	1,070	1,093	1,122	1,209	1,138	978	1,021	1,046	1,074	1,093	1,084
Heart and circulatory organs	326	369	372	377	375	383	367	344	353	443	371
Respiratory organs	1,507	1,734	1,388	1,064	1,302	1,568	1,387	1,546	1,306	1,605	1,481
Digestive organs	250	309	322	291	271	335	311	317	263	305	297
Urinary organs	105	110	142	100	98	129	93	126	124	147	117
Organs of generation	22	21	23	26	18	13	18	19	10	22	19
Organs of locomotion	14	25	16	19	17	20	21	26	15	17	19
Integumentary system	25	8	7	9	11	10	8	7	8	14	11
Total	3,318	3,467	3,392	3,695	3,230	3,367	3,226	3,431	3,213	3,646	3,399
DEVELOPMENTAL DISEASES	752	831	846	869	931	853	861	1,032	1,022	1,091	909
VIOLENT DEATHS	190	165	194	194	196	194	218	183	222	224	197
CAUSES NOT SPECIFIED OR ILL DEFINED	183	88	107	86	95	101	126	151	138	208	128
Total deaths	7,345	8,151	9,034	8,607	8,004	7,675	7,728	8,144	8,973	8,212	8,187
Mean temperature of the air (Fahrenheit)	48°9	50°3	49°2	49°0	50°8	49°8	49°0	49°4	49°5	48°8	49°5
Rainfall in inches	25·49	28·25	26·80	24·05	24·10	28 02	‡	28·25	35·81	25·74	27·51
Death-rate per 1,000	23·3	25·9	28·7	27·4	25·4	24·4	24·6	25·9	28·5	26·1	25·0

Names of Diseases.	Number of Deaths registered, 1874–88.†															
	1874 (52 weeks).	1875 (52 weeks).	1876 (52 weeks).	1877 (52 weeks).	1878 (52 weeks).	1879 *(53 weeks).	1880 (52 weeks).	1881 (52 weeks).	1882 (52 weeks).	1883 (52 weeks).	Yearly Average, 1874–83.	1884 *(53 weeks).	1885 (52 weeks).	1886 (52 weeks).	1887 (52 weeks).	1888 (52 weeks).
ZYMOTIC DISEASES.																
Small-pox	2	2	9	38	550	320	266	11	—	—	140	—	2	—	1	1
Measles	97	122	133	461	116	248	271	155	567	27	220	23	295	9	514	90
Scarlatina	834	176	194	122	132	392	544	120	37	179	273	369	173	184	269	170
Fever	352	247	260	280	333	337	392	361	248	310	312	255	237	193	192	224
Whooping-cough	40	139	195	106	281	98	376	82	81	333	173	132	191	246	159	273
Diphtheria	44	45	25	23	29	40	36	31	31	14	33	39	27	30	36	32
Cholera	5	2	11	1	10	2	17	4	6	7	7	11	4	12	14	6
Diarrhœa, dysentery	216	297	251	173	325	185	441	148	247	257	252	345	190	283	460	212
Other zymotic diseases§	—	—	—	—	—	—	—	—	172	140	156	369	192	143	229	222
PARASITIC DISEASES§	—	—	—	—	—	—	—	—	11	7	9	16	17	10	15	6
DIETETIC DISEASES§	—	—	—	—	—	—	—	—	29	33	31	28	25	25	32	35
CONSTITUTIONAL DISEASES.																
Phthisis or pulmonary consumption	862	977	931	1,030	945	1,092	1,137	1,151	1,182	1,339	1,064	1,301	1,273	1,279	1,269	1,136
Other constitutional diseases§	—	—	—	—	—	—	—	—	729	846	787	865	869	913	895	777
DEVELOPMENTAL DISEASES§	—	—	—	—	—	—	—	—	565	708	636	708	692	704	701	676
LOCAL DISEASES.																
Diseases of Brain and nervous system§	—	—	—	—	—	—	—	—	1,480	1,462	1,471	1,452	1,406	1,454	1,550	1,238
Organs of special sense§	—	—	—	—	—	—	—	—	4	3	3	6	6	3	6	9
Circulatory system§	—	—	—	—	—	—	—	—	515	647	581	627	571	597	662	622
Respiratory system	1,398	1,878	1,712	1,889	2,046	2,702	2,060	2,205	2,114	2,131	2,014	1,792	2,035	1,766	2,169	1,769
Digestive system§	—	—	—	—	—	—	—	—	459	477	468	503	429	502	559	474
Lymphatic system, &c.§	—	—	—	—	—	—	—	—	1	3	2	7	5	7	4	7
Urinary system§	—	—	—	—	—	—	—	—	150	154	142	147	190	202	170	174
Generative system§	—	—	—	—	—	—	—	—	29	17	23	21	18	27	25	22
Accidents of childbirth§	—	—	—	—	—	—	—	—	50	23	36	28	48	37	26	37
Dis. of locomotive system§	—	—	—	—	—	—	—	—	22	43	32	53	34	25	27	22
Dis. of integumentary system§	—	—	—	—	—	—	—	—	17	30	23	35	14	13	24	25
VIOLENT DEATHS	194	210	216	220	241	218	214	206	257	238	219	226	230	238	233	202
DEATHS FROM ILL-DEFINED AND UNSPECIFIED CAUSES§	—	—	—	—	—	—	—	—	796	762	779	664	603	600	554	433
DEATHS FROM ALL CAUSES	8,190	8,482	8,097	8,795	9,269	11,235	11,308	9,824	9,699	10,161	9,466	9,802	10,022	9,491	10,777	8,894
Mean temperature of the air (Fahrenheit)	49°1	49°6	49°6	49°5	49°4	46°5	48°1	47°2	48°2	47°5	48°5	48°6	49°6	47°2	47°5	47°2
Rainfall in inches	27·13	32·79	31·49	29·91	28·19	28·83	36·06	28·36	34·84	29·63	30·72	21·74	25·04	31·36	16·31	28·60
Death-rate per 1,000	26·0	27·0	25·7	28·0	29·5	35·7	35·9	27·0	27·8	29·1	29·2	27·9	28·4	26·9	30·5	25·2

* The numbers for the years 1868, 1873, 1879, and 1884 respectively embrace the returns for 53 weeks, this arrangement being occasionally necessary in order that the annual series may correspond with the calendar year.
† The numbers for the years 1874–80 are those for the district as then constituted.
‡ Rain gauge was out of order for part of December 1870.
§ Owing to modifications in classification of diseases adopted in the beginning of the year 1882, the number of deaths in years 1874–81, referable to these headings in their present significations, cannot conveniently be stated.

App. No. 6.

IRELAND.

Table J.

Table showing for Ireland, by Age-Periods the Average Annual Number of Deaths from Small-pox registered during each Quinquennium of the 20 Years, 1864–83; the Number in each of the 5 Years, 1884–88; and the Rate per Million living represented by the Average Annual Number for the 25 Years, 1864–88.

Periods.	All Ages.	0–5.	5–10.	10–15.	15–25.	25–45.	45 and upwards.
Average annual number of deaths, 1864–68	331	164	42	18	54	28	5
Per-centage at each age-period	100·	52·7	13·5	5·8	17·4	9·0	1·6
Average annual number of deaths, 1869–73	894	239	125	75	223	214	27
Per-centage at each age-period	100·	25·7	14·0	8·4	25·0	23·9	3·0
Average annual number of deaths, 1874–78	414	163	55	40	118	83	15
Per-centage at each age-period	100·	24·9	13·3	9·7	28·5	20·0	3·6
Average annual number of deaths, 1879–83	256	66	25	16	64	69	16
Per-centage at each age-period	100·	25·8	9·8	6·3	25·0	26·9	6·2
1884	1	—	—	—	1	—	—
1885	4	—	—	—	3	—	1
1886	2	—	1	—	—	1	—
1887	14	1	2	—	4	4	3
1888	3	1	1	—	—	1	—
Average annual number of deaths, 1884–88	390	113	50	59	94	89	13
Per-centage at each age-period	100·	29·7	13·2	7·9	24·7	21·1	3·4
Rate per million living	72	184	80	48	93	65	11

Table K.

Table showing the Number of Deaths, and the Ages and Vaccinational Condition of Persons who died from Small-pox in Ireland during the 8 years, 1881–88.

Vaccinational Condition.	All Ages.	0–5.	5–10.	10–15.	15–25.	25–45.	45 and upwards.
Vaccinated	74	8	3	7	21	31	4
Unvaccinated	36	10	2	—	14	10	—
No statement	131	23	6	10	44	33	15
Total	241	41	11	17	79	74	19

Table L.

Table showing for Ireland, by Age-Periods the Average Annual Number of Deaths from Fever* registered during each Quinquennium of the 25 years, 1864–88; with the mean yearly Number, and the Average Annual Rate per Million living for those 25 Years.

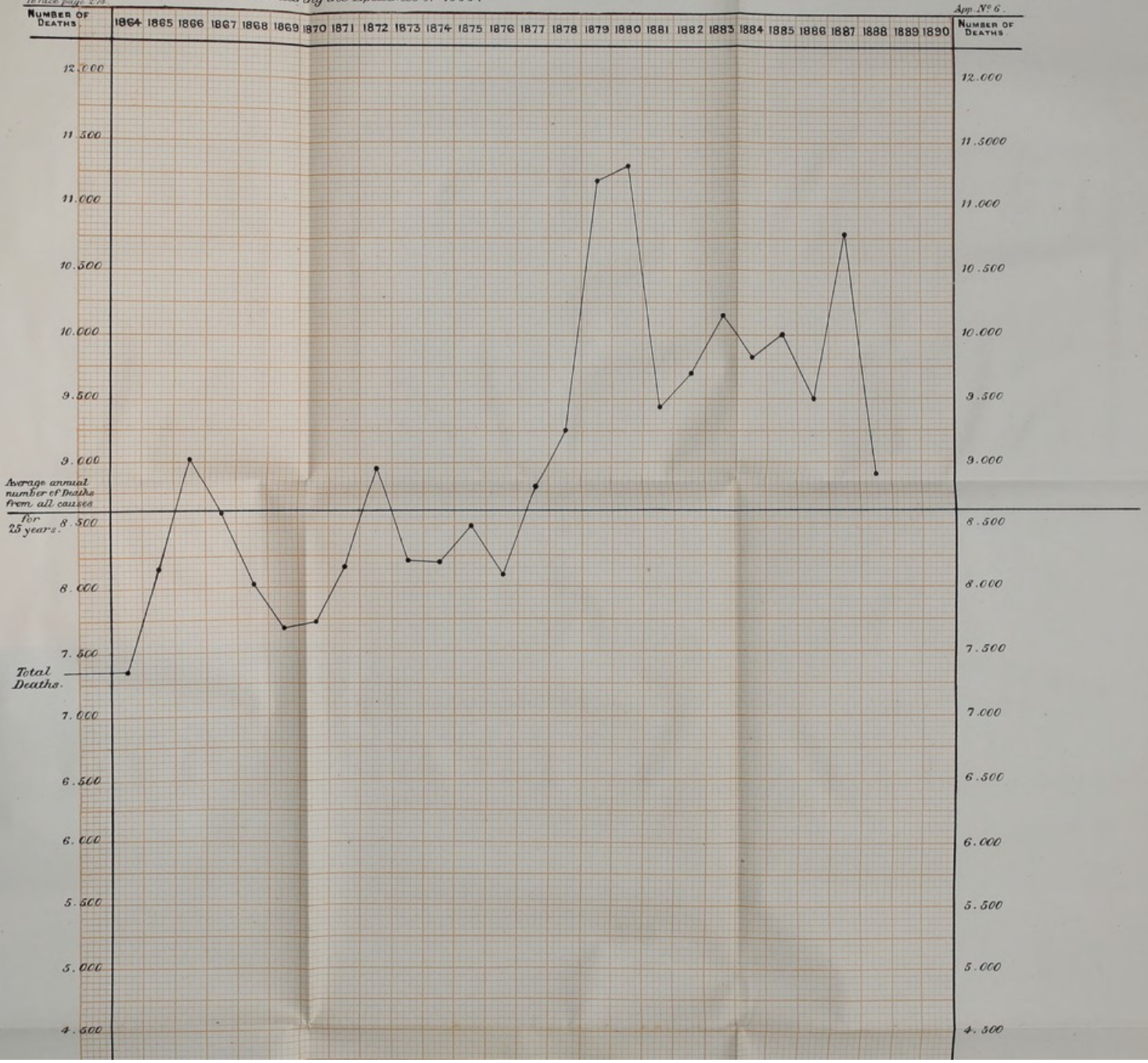
* Typhus, typhoid, and simple continued fever.

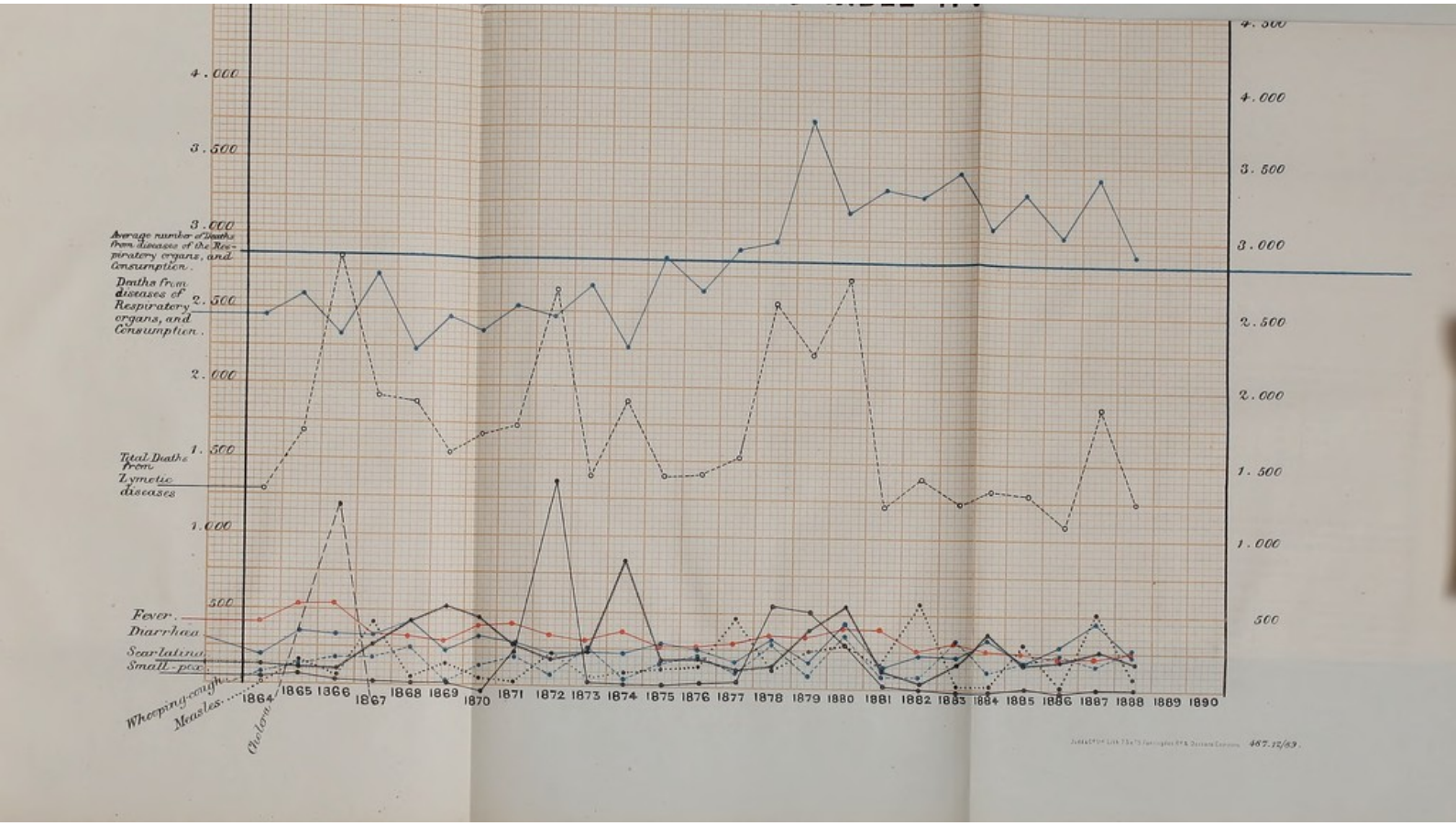
Periods.	All Ages.	0–5.	5–10.	10–15.	15–25.	25–45.	45 and upwards.
Average annual number of deaths, 1864–68	4,392	347	322	288	827	1,061	1,547
Per-centage at each age-period	100·	7·9	7·3	6·6	18·8	24·2	35·2
Average annual number of deaths, 1869–73	3,203	297	280	281	682	727	936
Per-centage at each age-period	100·	9·2	8·8	8·8	21·3	22·7	29·2
Average annual number of deaths, 1874–78	2,890	246	249	248	704	662	780
Per-centage at each age-period	100·	8·5	8·6	8·6	24·3	22·8	27·2
Average annual number of deaths, 1879–83	2,582	190	238	242	625	632	646
Per-centage at each age-period	100·	7·7	9·2	9·4	24·2	24·5	25·0
Average annual number of deaths, 1884–88	1,613	131	143	154	407	393	385
Per-centage at each age-period	100·	8·1	8·9	9·5	25·2	24·4	23·9
Average annual number of deaths, 1864–88	2,938	244	246	243	649	695	861
Per-centage at each age-period	100·	8·3	8·4	8·2	22·1	23·7	29·3
Rate per million living	555	397	392	390	641	563	739

DIAGRAM ILLUSTRATING TABLE H.

DIAGRAM *showing for the Dublin Registration District the total number of Deaths for each year from 1864-88 both inclusive; the average number of deaths for the 25 years 1864-88; the average number of deaths from Diseases of the Respiratory organs, and Consumption (1864-88), and the number for each year; the annual number of deaths from all Zymotic diseases, and from Fever, Diarrhœa, Scarlatina, Small-pox, Whooping-Cough and Measles respectively (1864-88); and the number of deaths from Cholera during the Epidemic of 1866.*

To face page 274.




4.000
3.500
3.000
2.500
2.000
1.500
1.000
500
Average number of Deaths from diseases of the Respiratory organs, and Consumption.
Deaths from diseases of Respiratory organs, and Consumption.
Total Deaths from Zymotic diseases
Fever.
Diarrhœa
Scarlatina
Small-pox.
Whooping-cough.
Measles.
Cholera.
1864 1865 1866 1867 1868 1869 1870 1871 1872 1873 1874 1875 1876 1877 1878 1879 1880 1881 1882 1883 1884 1885 1886 1887 1888 1889 1890

App. No. 6.

Table M.

Table showing the Number of Deaths from Infantile Syphilis registered in Ireland in the years 1864–88.

Years.	Ages.				Total.		General Total.	Death-rate per Million Living under 5 Years of Age.
	Under 1 Year.		1 and under 5 Years.					
	Males.	Females.	Males.	Females.	Males.	Females.		
1864 - -	51	44	7	5	58	49	107	154·2
1865 - -	51	78	7	5	58	83	141	203·3
1866 - -	37	31	3	4	40	35	75	114·8
1867 - -	46	30	7	5	53	35	88	134·7
1868 - -	32	37	6	4	38	41	79	120·9
1869 - -	32	31	2	2	34	33	67	102·6
1870 - -	28	34	—	2	28	36	64	98·0
1871 - -	31	24	5	6	36	30	66	101·0
1872 - -	30	20	2	1	32	21	53	81·1
1873 - -	20	30	1	7	30	37	67	102·6
1874 - -	26	19	3	3	29	22	51	78·1
1875 - -	27	25	3	3	30	28	58	88·8
1876 - -	20	20	—	3	29	23	52	90·3
1877 - -	22	16	3	5	25	21	46	79·9
1878 - -	17	20	3	3	20	23	43	74·7
1879 - -	29	27	1	5	30	32	62	107·6
1880 - -	28	27	3	2	31	29	60	104·2
1881 - -	23	31	4	2	27	33	60	104·2
1882 - -	27	18	1	4	28	22	50	86·8
1883 - -	22	20	4	4	26	24	50	86·8
1884 - -	27	23	2	3	29	26	55	95·5
1885 - -	24	19	2	7	26	26	52	90·3
1886 - -	26	26	2	1	28	27	55	95·5
1887 - -	15	13	3	3	18	16	34	59·0
1888 - -	31	12	1	3	32	15	47	81·6

Table N.

Blindness from Small-pox in Ireland.

Year.	Total of the Blind in Ireland.		Total Number of Deaths from Small-pox in preceding 10 Years.	Cases in which Blindness was ascribed to Small-pox.	
	Number.	Ratio to Population.		Number.	Ratio to Total Number of the Blind.
1851 - -	7,487	1 in 864	38,275	—	—
1861 - -	6,879	1 in 843	12,727	725	1 in 9·5
1871 - -	6,347	1 in 852	2,852	526	1 in 12
1881 - -	6,111	1 in 847	7,550	359	1 in 17

APPENDIX VII.

App. No. 7.

LETTER FROM MR. F. X. F. MACCABE, FORWARDING PARTICULARS OF THE CASES OF COMPLAINT REFERRED TO IN QUESTIONS 3,059-62.

Local Government Board, Dublin,
27th January 1890.

SIR,

WHEN giving evidence before the Royal Commission on Vaccination, in answer to Question No. 3,062, I stated that I could lay before the Commission the particulars of four cases of complaint respecting injurious effects produced by vaccination.

In now forwarding the particulars I beg leave to mention that the four complaints referred to are the only ones of which any record can be found concerning the quality of the lymph—in three out of the four cases—supplied by the Cow Pock Institution in Dublin, an Institution which has since become the vaccine department of the Irish Local Government Board.

I have, &c.
(Signed) F. X. F. MACCABE,
Medical Commissioner.

To
Bret Ince, Esquire, Secretary,
Royal Commission on Vaccination.

(*Enclosure.*)

SUMMARY of FACTS connected with COMPLAINTS respecting the effects of (principally) IRISH VACCINE LYMPH SUPPLIES.

Complainant.	Number.	Union.	Summary of facts.
Fras. Geoghegan - -	11,048/71 -	North Dublin -	Complained of the fearful state his child was left in by vaccination. The Medical Officer (North City Dispensary), informed the Commissioners that he vaccinated eight other children with the same lymph as that with which Geoghegan's child was vaccinated and that he inspected them afterwards and found all of them in good health and without any appearance of being similarly affected in the way complained of.
Observations: Dr. Willson who vaccinated states all the children of this family are liable to skin affections and in one of these he had to postpone vaccination for three years on that account.			
Thos. Smyth - - -	21,315/71 -	Banbridge - -	Complained that his child was vaccinated with impure lymph and alleged that disease was thereby introduced into its system from the effects of which it died. The Poor Law Commissioners obtained a Report from the Medical Officer of the District (Tandragee) who denied that he used impure lymph as he was very careful in selecting it and also obtains supplies from the National Vaccination Establishment and stated that if disease was introduced into the child's system it must have been subsequent to the operation. A copy of the Medical Officer's Report was forwarded to the complainant who thanked the Commissioners for their attention in the matter which was allowed to drop.
Observations: 12 days after vaccination the child, a twin, grew worse and worse and lingered in intense pain for about 9 days (21 days after vaccination). Complainant (a Mr. Smyth) believes "impure and diseased lymph" was used, the whole system became poisoned and a tumour formed "in the side from the effect of which it died." An assistant of Dr. Crawford performed the operation of vaccination in this case. This Dr. Crawford admits and it is contrary to our regulations.			
Dr. Phelan, Graigne - -	2,565/75 -	Thomastown -	Reported the case of a child alleged by him to have died from the effect of vaccination. The Local Government Board Inspector held an Inquiry on oath into the circumstances of the case and reported that after a careful consideration of the history of the child's life he was of opinion that vaccination was not either directly or indirectly the cause of the death of the child.
Observations: Child died from cerebral affection following dentition attended with convulsions. Dr. Phelan (the complainant) who was present at the inquiry concurred in the opinion formed by the Medical Inspector who held the inquiry that vaccination had not contributed in any way to the death; he withdraws his opinion and admits that he formed a hasty conclusion on insufficient evidence.			
Ellen Burke, Kilkee - -	12,876/88 -	Kilrush - -	Complaint in reference to the death of her husband on whom the operation of vaccination was performed by the Porter of the Dispensary.
Observations: A Medical Inspector was sent down to inquire into the whole of the facts and the evidence taken (on oath) at the inquiry together with his report and the certificate of death left no doubt that the man's death was due to well-marked *Enteric fever*. He happened to have been re-vaccinated coincidently with the appearance of the first symptoms of his illness. The Medical Officer was severely censured for permitting the Porter to vaccinate in this case.			

APPENDIX VIII.

(*Papers handed in by Brigade-Surgeon William Nash, M.D., 8th and 13th November* 1889.) App. No. 8.

TABLE A.

TABLE SHOWING THE RATIO PER 1,000 OF RESULTS OF VACCINATION AND RE-VACCINATION AMONGST *Soldiers* AND *Recruits* DURING THE TEN YEARS 1879–88.

Year.	Result.	Recruits.		Soldiers not Recruits.		Soldiers and Recruits.	
		Primary Vaccination.	Re-vaccination.	Primary Vaccination.	Re-vaccination.	Primary Vaccination.	Re-vaccination.
1879	Perfect vaccine pustule	—	—	—	—	550	379
	Modified „	—	—	—	—	278	378
	Failure	—	—	—	—	172	243
1880	Perfect vaccine pustule	—	—	—	—	503	417
	Modified „	—	—	—	—	271	338
	Failure	—	—	—	—	226	245
1881	Perfect vaccine pustule	—	—	—	—	488	427
	Modified „	—	—	—	—	276	315
	Failure	—	—	—	—	236	258
1882	Perfect vaccine pustule	—	—	—	—	460	396
	Modified „	—	—	—	—	335	346
	Failure	—	—	—	—	205	258
1883*	Perfect vaccine pustule	520	417	52	259	512	403
	Modified „	341	329	474	442	343	339
	Failure	139	254	474	299	145	258
1884	Perfect vaccine pustule	507	428	333	252	505	415
	Modified „	298	326	222	396	297	331
	Failure	195	246	445	352	198	254
1885	Perfect vaccine pustule	577	466	603	407	580	464
	Modified „	213	292	242	325	215	294
	Failure	210	242	155	268	205	242
1886	Perfect vaccine pustule	607	465	609	412	607	462
	Modified „	146	273	43	306	143	275
	Failure	247	262	348	282	250	263
1887	Perfect vaccine pustule	595	470	304	414	501	463
	Modified „	209	256	241	264	220	257
	Failure	196	274	455	322	279	289
1888	Perfect vaccine pustule	662	471	539	339	622	446
	Modified „	144	267	215	269	167	268
	Failure	194	262	246	392	211	286

* The first year distinction was made between soldiers and recruits.
N.B.—The term "primary vaccination" as used in connexion with *soldiers* and *recruits* embraces all those men who at the time of operation bear no marks.

TABLE B.

TABLE SHOWING THE RATIO PER 1,000 OF RESULTS OF VACCINATION AND RE-VACCINATION AMONGST *Women* AND *Children* DURING THE SEVEN YEARS 1882–88.

Years.	Result.	Women.		Children.	
		Primary Vaccination.	Re-vaccination.	Primary Vaccination.	Re-vaccination.
1882	Perfect vaccine pustule	—	389	918	865
	Modified „	—	370	—	—
	Failure	—	241	82	135
1883	Perfect vaccine pustule	750	542	906	751
	Modified „	125	239	—	—
	Failure	125	219	94	249
1884	Perfect vaccine pustule	—	541	891	745
	Modified „	—	256	—	—
	Failure	—	203	109	255
1885	Perfect vaccine pustule	—	664	913	873
	Modified „	—	188	—	—
	Failure	—	148	87	127
1886	Perfect vaccine pustule	—	490	899	793
	Modified „	—	337	—	—
	Failure	—	173	101	207
1887	Perfect vaccine pustule	—	603	859	779
	Modified „	—	174	—	—
	Failure	—	223	141	221
1888	Perfect vaccine pustule	800	568	880	756
	Modified „	100	121	—	—
	Failure	100	311	120	244

App. No. 8.

TABLE C.

TABLE SHOWING THE AVERAGE ANNUAL STRENGTH OF THE BRITISH ARMY, THE NUMBER OF ADMISSIONS AND DEATHS FROM SMALL-POX, TOGETHER WITH THE RATIO PER 1,000 FOR THE TWENTY-NINE YEARS 1860-88.

Year.	Average Annual Strength.	Number.		Ratio per 1,000.		Remarks.	Year.	Average Annual Strength.	Number.		Ratio per 1,000.		Remarks.
		Admissions.	Deaths.	Admissions.	Deaths.				Admissions.	Deaths.	Admissions.	Deaths.	
1860	203,017	329	30	1·6	·15		1875	169,235	20	3	·1	·02	
1861	195,281	331	43	1·7	·22		1876	169,197	45	2	·3	·01	
1862	196,349	184	59	·9	·10		1877	174,884	72	6	·4	·03	
1863	196,239	228	18	1·2	·09		1878	185,006	89	15	·5	·08	
1864	191,057	325	36	1·7	·19		1879	164,642	39	3	·2	·02	32 attacks and 3 deaths in India.
1865	184,503	270	27	1·5	·15		1880	159,622	14	2	·1	·01	12 attacks in India.
1866	175,323	101	7	·6	·04		1881	173,331	38	3	·2	·02	23 attacks in United Kingdom; 15 in India.
1867	174,614	109	6	·6	·03		1882	174,557	64	5	·4	·03	Epidemic in India (44 attacks).
1868	173,031	153	3	·9	·02		1883	168,383	120	12	·7	·07	Epidemic in India (105 attacks, 84 in Bengal alone)
1869	163,905	176	18	1·1	·11		1884	167,686	114	9	·7	·05	Epidemic in India (77 attacks), and in Egypt 25 attacks.
1870	155,945	66	9	·4	·06		1885	177,928	86	7	·5	·04	Egypt, 52 attacks; India, 12; United Kingdom, 19.
1871	171,455	329	36	1·9	·21		1886	188,739	84	4	·4	·02	Egypt, 51 attacks, 3 deaths; India, 22 attacks and 1 death.
1872	171,956	191	24	1·1	·14		1887	194,037	75	7	·4	·04	Epidemic in India (40 attacks); Egypt (26 attacks).
1873	169,744	98	13	·6	·08		1888*	199,597	140	15	·7	·07	Epidemic in India (106 attacks); Egypt (14 attacks).
1874	169,014	57	8	·3	·05								

* Approximate.

TABLE D.

TABLE SHOWING THE ADMISSIONS AND DEATHS FROM SMALL-POX AMONG SOLDIERS DURING THE TWENTY-NINE YEARS 1860-88 IN THE UNITED KINGDOM, COLONIES, INDIA, AND EGYPT RESPECTIVELY, TOGETHER WITH THE RATIO PER 1,000 OF THE STRENGTH.

Year.	United Kingdom.					Colonies.					India.					Egypt.				
				Ratio per 1,000.					Ratio per 1,000.					Ratio per 1,000.					Ratio per 1,000.	
	Strength.	Admissions.	Deaths.	Admissions.	Deaths.	Strength.	Admissions.	Deaths.	Admissions.	Deaths.	Strength.	Admissions.	Deaths.	Admissions.	Deaths.	Strength.	Admissions.	Deaths.	Admissions.	Deaths.
1860	97,703	140	7	1·4	·07	40,859	31	4	·8	·10	64,455	158	19	2·4	·29	—	—	—	—	—
1861	88,935	51	4	·6	·04	44,266	51	4	1·1	·09	57,082	226	35	4·0	·61	—	—	—	—	—
1862	78,173	64	3	·8	·04	51,888	80	12	1·5	·23	63,713	39	5	·6	·08	—	—	—	—	—
1863	75,945	123	6	1·6	·08	48,143	26	—	·5	—	67,525	55	12	·8	·18	—	—	—	—	—
1864	73,232	111	10	1·5	·14	47,941	77	7	1·6	·15	65,102	136	19	2·1	·29	—	—	—	—	—
1865	72,369	84	6	1·1	·08	43,766	54	5	1·2	·11	62,589	132	16	2·1	·25	—	—	—	—	—
1866	70,292	58	1	·5	·01	40,868	30	—	·7	—	58,901	33	6	·6	·10	—	—	—	—	—
1867	73,429	54	1	·5	·01	39,038	30	—	·8	—	56,896	44	5	·8	·09	—	—	—	—	—
1868	78,261	70	2	·9	·02	38,493	40	1	1·0	·02	52,887	40	—	·7	—	—	—	—	—	—
1869	73,764	9	—	·1	—	32,011	12	—	·4	—	55,988	154	18	2·7	·32	—	—	—	—	—
1870	75,305	24	1	·3	·01	23,917	19	3	·8	·12	54,583	22	5	·4	·09	—	—	—	—	—
1871	92,067	213	21	2·3	·22	19,891	101	14	5·1	·70	56,974	14	1	·2	·02	—	—	—	—	—
1872	92,218	131	13	1·4	·14	18,736	1	—	·05	—	59,348	56	11	·9	·18	—	—	—	—	—
1873	88,957	10	1	·1	·01	19,580	6	1	·3	·05	59,327	82	11	1·4	·18	—	—	—	—	—
1874	86,837	7	—	·1	—	20,007	4	—	·2	—	60,067	46	8	·8	·13	—	—	—	—	—
1875	88,147	5	1	·05	·01	20,009	1	—	·05	—	59,344	14	2	·2	·03	—	—	—	—	—
1876	87,758	25	2	·3	·02	20,915	—	—	—	—	58,641	20	—	·3	—	—	—	—	—	—
1877	92,143	28	4	·3	·04	22,305	1	—	·04	—	57,821	43	2	·7	·03	—	—	—	—	—
1878	101,129	19	1	·2	·01	25,161	3	1	·1	·04	56,109	67	13	1·2	·23	—	—	—	—	—
1879	80,709	6	—	·1	—	30,282	1	—	·03	—	49,537	32	3	·6	·06	—	—	—	—	—
1880	83,895	3	—	·04	—	23,178	5	1	·2	·04	50,136	6	1	·1	·02	—	—	—	—	—
1881	84,742	23	2	·3	·02	27,291	—	—	—	—	58,588	15	1	·3	·02	—	—	—	—	—
1882	86,847	14	1	·2	·01	29,581	2	—	·1	—	57,344	44	4	·8	·07	6,198	3	—	·5	—
1883	81,677	6	—	·1	—	19,830	6	—	·3	—	56,190	105	9	1·9	·16	7,897	8	3	1·0	·37
1884	83,125	10	—	·1	—	20,123	1	—	·05	—	53,252	77	8	1·4	·14	6,468	25	1	3·8	·15
1885	87,105	19	3	·2	·03	20,650	2	—	·1	—	57,165	12	—	·2	—	9,593	52	4	5·4	·42
1886	92,691	11	—	·1	—	20,812	—	—	—	—	61,757	22	1	·4	·02	11,062	51	3	4·6	·27
1887	101,114	7	1	·1	·01	21,404	2	—	·1	—	63,942	40	2	·6	·03	5,272	26	4	4·9	·76
1888	101,695	14	1	·1	·01	23,907	6	—	·3	—	68,795	106	10	1·5	·14	3,346	14	4	4·2	1·19

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Table E.

Table showing the number of Admissions and Deaths among Soldiers from Small-pox, with the per-centage of Death to Attack, in the United Kingdom, Colonies, India, and Egypt during the twenty-nine Years 1860-88.

Year.	United Kingdom.			Colonies.			India.			Egypt.			Remarks.
	Admissions.	Deaths.	Per-centage of Deaths to Attacks.	Admissions.	Deaths.	Per-centage of Deaths to Attacks.	Admissions.	Deaths.	Per-centage of Deaths to Attacks.	Admissions.	Deaths.	Per-centage of Deaths to Attacks.	
1860	140	7	5·0	31	4	12·9	158	19	12·0	—	—	—	In the Afghan Campaign, 1879–80, 6 admissions and 1 death from small-pox occurred, and during the Nile Expedition, 1884–5, 41 cases with 5 deaths were reported.
1861	51	4	7·8	51	4	7·8	226	35	15·5	—	—	—	
1862	64	3	4·7	80	12	15·0	39	5	12·8	—	—	—	
1863	123	6	4·9	26	—	—	55	12	21·8	—	—	—	
1864	111	10	9·0	77	7	9·1	136	19	14·0	—	—	—	
1865	84	6	7·1	54	5	9·3	132	16	12·1	—	—	—	
1866	38	1	2·6	30	—	—	33	6	18·2	—	—	—	
1867	34	1	2·9	30	—	—	44	5	11·4	—	—	—	
1868	70	2	2·9	40	1	2·5	40	—	—	—	—	—	
1869	9	—	—	12	—	—	154	18	11·7	—	—	—	
1870	24	1	4·2	19	3	15·8	22	5	22·7	—	—	—	
1871	213	21	9·9	101	14	13·9	14	1	7·1	—	—	—	
1872	131	13	9·9	1	—	—	56	11	19·6	—	—	—	
1873	10	1	10·0	6	1	16·7	82	11	13·4	—	—	—	
1874	7	—	—	4	—	—	46	8	17·4	—	—	—	
1875	5	1	20·0	1	—	—	14	2	14·3	—	—	—	
1876	25	2	8·0	—	—	—	20	—	—	—	—	—	
1877	28	4	14·3	1	—	—	43	2	4·6	—	—	—	
1878	19	1	5·3	3	1	33·3	67	13	19·4	—	—	—	
1879	6	—	—	1	—	—	32	3	9·4	—	—	—	
1880	3	—	—	5	1	20·0	6	1	16·6	—	—	—	
1881	23	2	8·7	—	—	—	15	1	6·6	—	—	—	
1882	14	1	7·1	2	—	—	44	4	9·1	3	—	—	
1883	6	—	—	6	—	—	105	9	8·6	8	3	37·5	
1884	10	—	—	1	—	—	77	8	10·4	25	1	4·0	
1885	19	3	15·8	2	—	—	12	—	—	52	4	7·7	
1886	11	—	—	—	—	—	22	1	4·5	51	3	5·9	
1887	7	1	14·3	2	—	—	40	2	5·0	26	4	15·4	
1888	14	1	7·1	6	—	—	106	10	9·4	14	4	28·6	
Average	—	—	7·1	—	—	8·9	—	—	12·3	—	—	10·6	

(*See Question* 3564.)

Table F.

Table showing the Admissions and Deaths from Small-pox amongst the Troops in the United Kingdom during the thirteen Years 1847–59, together with the ratio per 1,000 of the strength.

Year.	Strength.	Admissions.	Deaths.	Ratio per 1,000.	
				Admissions.	Deaths.
1847	57,767	106	6	1·8	·10
1848	62,649	166	10	2·6	·16
1849	53,659	135	17	2·5	·32
1850	53,771	73	4	1·3	·07
1851	50,178	68	4	1·3	·08
1852	56,417	169	12	3·0	·21
1853	50,161	99	11	2·0	·22
1854	29,128	118	13	4·0	·45
1855	31,301	147	12	4·7	·38
1856	70,756	82	3	1·1	·04
1857	49,705	59	5	1·2	·10
1858	49,007	158	9	3·2	·18
1859	71,715	175	7	2·4	·10

App. No. 9.

APPENDIX IX.

(Papers handed in by Mr. Richard Thorne Thorne, M.B., F.R.C.P., 20th November 1889.)

Order of the Local Government Board, of the 31st October 1874.

To the [Guardians of the Poor of the several Unions in England and Wales;
To the Guardians of the Poor of the several Parishes, Townships, and Places in England and Wales under separate Boards of Guardians;
To the Vaccination Officers for the said Unions, Parishes, Townships, and Places respectively;
And to all others whom it may concern.

Whereas by Section 5 of "The Vaccination Act, 1871," it is provided as follows:—

"Subject to the provisions of this Act, the Poor "Law Board shall have the same powers with "respect to Guardians and Vaccination Officers "in matters relating to Vaccination as they have "with respect to Guardians and Officers of "Guardians in matters relating to the relief of "the Poor, and may make Rules, Orders, and "Regulations accordingly, and all enactments "relating to such powers, and to such Orders, "Rules, and Regulations, shall apply mutatis "mutandis; and the Poor Law Board shall also "from time to time frame, provide, and distribute appropriate books and forms for the use "of Vaccination Officers, Public Vaccinators, "and Medical Practitioners, under the principal "Act [The Vaccination Act of 1867] and this "Act."

And whereas by a General Order bearing date the 23rd day of January 1872, addressed to the Guardians of the Poor of the several Unions in England and Wales, and the Guardians of the Poor of the several Parishes, Townships, and Places in England and Wales under separate Boards of Guardians, the Local Government Board prescribed Regulations with respect to the appointment of Vaccination Officers by Boards of Guardians, and also as to the tenure of office, execution of duties, and remuneration of such officers;

And whereas by Article 10 of the above-recited Order the Vaccination Officers so appointed are required to duly observe and execute all instructions and directions issued or given to them from time to time by the Local Government Board; and the Local Government Board, on the 21st day of December 1871, issued Instructions to such officers under the hand of one of their Secretaries;

And whereas by Section 1 of "The Vaccination Act, 1874," it is enacted that the powers conferred by Section 5 of "The Vaccination Act, 1871," shall be deemed to extend to and include the making of Rules, Orders, and Regulations, prescribing the duties of Guardians and their Officers in relation to the institution and conduct of the proceedings to be taken for enforcing the provisions of the Vaccination Acts, 1867 and 1871, and the payment of the costs and expenses relating thereto; and that Rules, Orders, and Regulations under "The Vaccination Act, 1874," shall be deemed to be made under Section 5 of the Vaccination Act, 1871.

And whereas it is expedient that the above-recited Order and Instructions issued by the Local Government Board should be rescinded, and that the Regulations herein-after contained should be substituted in lieu thereof:

Now therefore, We, the Local Government Board, in pursuance of the powers given by the Statutes in that behalf, hereby Order as follows:—

The above-recited General Order dated the 23rd day of January 1872, and the Instructions above-recited, dated the 21st day of December 1871, shall be and are hereby rescinded;

The following Regulations shall henceforth be observed as regards the appointment of Vaccination Officers by Boards of Guardians, the tenure of office and the duties and remuneration of such officers, the institution and conduct of the proceedings to be taken for enforcing the provisions of the Vaccination Acts, and the payment of the costs and expenses relating thereto; that is to say,—

I.—*Appointment of Vaccination Officers.*

Art. 1.—Where the Guardians of any Union or Parish have not already appointed any Vaccination Officer under the provisions of the Vaccination Acts, they shall do so forthwith.

Where the number of Vaccination Officers already appointed or hereafter appointed in any Union or Parish shall at any time, in the opinion of the Guardians or of the Local Government Board, be insufficient for the purpose of securing the due execution of the Vaccination Acts in such Union or Parish, the Guardians shall, in accordance with their own view or on the requisition of the Local Government Board, appoint a sufficient number of such Officers.

Whenever, in consequence of an extensive outbreak of Small Pox, or for other cause, it may appear to the Guardians to be requisite to provide temporary assistance for any Vaccination Officer in the discharge of his duties, the Guardians may, with the consent of the Local Government Board, appoint an Assistant or Assistants to the Vaccination Officer, for such time as the Guardians may deem necessary.

Art. 2.—Every appointment of a Vaccination Officer, or Assistant Vaccination Officer, hereafter made by the Guardians, shall be made by a majority of the Guardians voting on the question, and in the same manner as that in which the Guardians are required to appoint other Officers or Assistants.

Art. 3.—Every such appointment shall, within seven days after it is made, be reported to the Local Government by the Clerk to the Guardians.

Art. 4.—In the event of a vacancy in the office of Vaccination Officer occurring at any time hereafter, the Guardians shall report it to the Local Government Board, and shall make a fresh appointment without delay, unless the Local Government Board shall otherwise direct.

II.—*Tenure of Office of Vaccination Officers.*

Art. 5.—Every Vaccination Officer appointed under this Order shall continue to hold the office until he die, or resign, or be removed by the Guardians with the consent of the Local Government Board, or by the Local Government Board.

Art. 6.—Where a Vaccination Officer is appointed for a particular District, and any change in the extent of the District may be deemed necessary, and he shall decline to acquiesce therein, the Guardians may, with the consent of the Local Government Board, but not otherwise, and after six months' notice in writing, signed by their Clerk, given to such Vaccination Officer, determine his office.

Art. 7.—No person shall be appointed as a Vaccination Officer who does not agree to give one month's notice previous to resigning the office, or to forfeit such sum as may be agreed upon as liquidated damages.

Art. 8.—If any such Officer give notice of an intended resignation to take effect on a future day, such resignation shall take effect on that day; and the Guardians may elect a successor at any time subsequent to such notice.

III.—*Remuneration of Vaccination Officers.*

Art. 9.—The Guardians shall pay to any Vaccination Officer such salary or remuneration, and such only, as the Local Government Board may direct or approve, whether for ordinary duties or for occasional services; and such salary or remuneration may be increased or reduced as that Board may from time to time direct or approve.

Art. 10.—The salary or remuneration of every such Officer shall be payable up to the day on which he ceases to hold the office and no longer, subject to any deduction which the Guardians may be entitled to make under Art. 7, and shall be considered as accruing from day to day, and be apportionable in respect of time accordingly, in pursuance of the provisions of "The Apportionment Act, 1870."

Art. 11.—The salary or remuneration assigned to such Officer shall be payable quarterly, according to the usual Feast Days in the year, namely, Lady Day, Midsummer Day, Michaelmas Day, and Christmas Day; but the Guardians may pay to him at the expiration of every calendar month such proportion as they may think fit on account of the salary or remuneration to which he may become entitled at the termination of the quarter.

Art. 12.—Every such Officer shall make out his Account at the end of each quarter, and within three days from the quarter day submit it to the Guardians, together with the Books which he may be required to keep, and the Certificates in his possession; and until such Account, Books, and Certificates have been so submitted, and until he has shown that the steps required of him by the Instructions contained in the Schedule to this Order have been taken by him with respect to every case entered on the Monthly Lists furnished to him by the Registrars of Births and Deaths, the Guardians may postpone the payment of the balance of the salary or remuneration which may then remain due.

The Vaccination Officer shall also produce the said Books and Certificates to the Guardians, when required by them to do so, at any other times than those above specified.

IV.—*Duties of Vaccination Officers.*

Art 13.—No Vaccination Officer shall perform the duties of his office by deputy, unless, with the permission of the Local Government Board given on the application of the Guardians, he shall be allowed to intrust their performance to some other person approved of by such Guardians.

Art. 14.—Every Vaccination Officer in performing his duties under the Vaccination Acts shall obey all lawful orders of the Guardians which are applicable to his office, and in conformity with the provisions of this Order.

Art. 15.—The Vaccination Officer in performing the duties of his office shall duly observe the Instructions contained in the Schedule to this Order.

V.—*Institution and Conduct of Proceedings.*

Art. 16.—The Guardians shall, in all cases in which the provisions of the Vaccination Acts for enforcing Vaccination have been neglected, cause proceedings to be taken against the persons in default, and for this purpose shall give directions authorising the Vaccination Officer to institute and conduct such proceedings; but no such directions shall authorise the Vaccination Officer to take further proceedings under Section 31 of the Vaccination Act of 1867 in any case in which an order has already been obtained, and summary proceedings taken under that section, until he shall have brought the circumstances of the case under the notice of the Guardians and received their special directions thereon.

Art. 17.—The Vaccination Officer shall take such proceedings as may be necessary under the Vaccination Acts, in any case in which the Local Government Board may direct him to do so.

VI.—*Costs of Proceedings.*

Art. 18.—The Guardians shall pay the reasonable costs and expenses incurred by any Vaccination Officer appointed by them in any proceedings taken by him for enforcing the provisions of the Vaccination Acts, and shall charge the same in their Accounts in the manner required by law, and the Vaccination Officer shall pay to the Treasurer of the Guardians, to their credit, all sums of money recovered or received by him from any defendants in respect of such costs or expenses, or in respect of any penalty under the said Acts.

VII.—*Interpretation.*

Art. 19.—The word "Unions" in this Order shall include not only Unions of Parishes formed under the provisions of "The Poor Law Amendment Act, 1834," but also Unions of Parishes incorporated or united for the relief or maintenance of the Poor under any other Act of Parliament.

The Schedule above referred to.

1. The duties of the Vaccination Officer will be to act as Registrar of Vaccination for the district to which he is appointed; to see that all children resident therein are duly vaccinated; and generally to carry into effect, under direction of the Guardians, but subject to the regulations contained in this Order, all such provisions of the Vaccination Acts as are not expressly assigned to the execution of other officers.

2. He will receive from the Registrars of Births and Deaths, and shall be responsible for the safe custody of, the "Monthly Lists" of births and deaths which will be sent to him under the provisions of the Act of 1871. On the lists of births he shall duly enter, in columns which are provided for the purpose, all certificates which he may receive of the successful vaccination of the children whose names are entered on the lists, or of their insusceptibility to vaccination, or of their having already had small-pox. All such entries must be made immediately on the receipt of the respective certificates. He shall compare each monthly list of deaths with the corresponding and with preceding lists of births, and as regards any children included in the death-return whose names are on the birth-lists, but for whom he has not received one of the certificates above referred to, he shall enter the death in the column provided. And when on his personal inquiries, or by information from the Vaccination Officer of another district, or on other reliable authority, he shall have ascertained that a child included in the birth-lists for his district has died in some other district, he shall write off the case in like way. His work in these respects will be much facilitated by his keeping an alphabetical index to his birth-lists.

3. He shall enter at the end of each quarter on blank "birth-list" sheets which will be supplied him for the purpose on his applying to the District Registrar, certificates which he may have received during the quarter, of the successful vaccination, or insusceptibility to vaccination, of children whose births had not been registered at all, or whose district of birth-registration he has been unable to ascertain.

4. The monthly lists of births, together with the supplemental sheets referred to in section 3, shall in the first instance be kept stitched or otherwise fastened together, in a stiff cover so as to preserve them from damage or dirt, and shall from time to time be bound into volumes as the Guardians may direct, and shall constitute the "Vaccination Register" of the district.

5. If any list of births or deaths be not received from a Registrar within one week from the time it is due, the Vaccination Officer shall report this to the Guardians at the next Board meeting, with a view to the Registrar being immediately called upon for an explanation, and if need be, to communication with the Local Government Board. A Vaccination Officer who shall lose any of these lists shall be bound to obtain another from the Registrar of Births and Deaths at his own cost.

6. The steps that the Vaccination Officer will be required to take in discharge of his duty to see that all children entered on the birth-lists are duly vaccinated, will vary, according as the vaccination district in which the parent resides is one in which continuous weekly public vaccination is maintained, or one in which the public performance of vaccination is only periodical.

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(i.) As regards districts in which there is continuous weekly public Vaccination:—

(*a.*) He shall keep his birth lists examined from week to week, and in each case of default which may arise, shall, *immediately on such default arising*, intimate the fact to the parent. For this purpose a notice in the annexed Form A., or to the like effect, may be used; and such notice may, if he think fit, be sent by post. He should make a mark ✓ in the margin of his Vaccination Register in each case in which this intimation of default has been given. If the intimation be not attended to within a reasonable time, say 15 days, or if in the case of a notice sent by post, the person to whom it was addressed has not been found by the post office, the Vaccination Officer shall at once proceed to make *personal* inquiries with a view to obtaining the requisite certificate or taking the necessary proceedings.

(*b.*) If on these personal inquiries the parent be found in default, an exact date should be specified by which he must have complied with the law; and a notice in the annexed Form B., or to the like effect, should be given.

(*c.*) Failing compliance, the Vaccination Officer shall proceed according to the directions given him under Art. 16 of this Order.

(ii.) As regards districts in which the public vaccination is periodical:—

(*a.*) He shall, *previous to each vaccination period*, examine his birth lists, and extract therefrom the names of all parents who would fall into default, provided their children were not vaccinated before the termination of the next ensuing attendances, in order that intimation to this effect may be given to such parents *a few days before the attendances commence*, with warning of the penalties which will result from non-compliance. The annexed Form C., or a Form to the like effect, may be used for this purpose. He should make a mark ✓ in the margin of his Vaccination Register against each case in which this intimation has been given.

(*b.*) And failing compliance, he shall without delay inquire personally into the circumstances of the case, and take such further steps as may be required according to the directions given him under Art. 16 of this Order.

7. He shall keep a book to be called "The Vaccination Officer's Report Book," in such form as shall from time to time be framed and provided by the Local Government Board, in which he shall forthwith enter the names, with the other particulars required, of parents of whom personal inquiries may have been made, as above, with the dates of such inquiries. He shall note in this book any further action taken in any case, and make any remarks which the case calls for. He shall take care to make the necessary reference in Column V. of his "Vaccination Register" to each case thus entered in the Report Book.

8. When on his inquiries the Vaccination Officer finds that a child has been successfully vaccinated, but the vaccination not duly certified, or that any other certificate due as of postponement, &c. has not been transmitted., he shall ascertain with whom the default rests, having regard to the requirements of the Vaccination Act, 1867, sections 21, 23, 30, and the Vaccination Act, 1871, section 7, and shall forthwith take the necessary steps for obtaining the certificate required.

9. He shall forthwith enter all certificates of postponement in the Report Book, with the date of the certificate, the name of the practitioner who signed it, and the period for which it was given, with a view to any inquiries which may be necessary at the expiration of that period; taking care to make the necessary reference in Column V. of his "Vaccination Register" to each case so entered. When certificates of postponement are delivered to him on the form of "Notice of requirement," he shall see that the parent is always supplied with a new form of the notice of requirement, with the particulars of attendance, &c., duly filled in. The forms of "Notice of requirement" can be obtained by him on his applying to the District Registrar.

10. When the Vaccination Officer shall find that any parent, respecting whose child he has not received a certificate of successful vaccination, has removed from the district, he shall take pains to ascertain the Vaccination Officer's district to which such removal has taken place, and shall give notice to the Vaccination Officer of that district, with a view to the vaccination of the child, and the due return of the certificate to himself. And whenever a certificate respecting a child whose birth was registered in the district of some other Vaccination Officer is sent to him, he shall take pains to ascertain the district in which the birth took place, and forward the certificate accordingly.

11. He shall submit to the Guardians, in duplicate, at the end of every half-year, a summary of the vaccinations of his District, in the form prescribed and issued half-yearly by the Local Government Board, the duplicate to be transmitted to the Local Government Board.

12. The Vaccination Officer shall at all times use his best endeavours to ascertain whether children resident in his district, but not having been born in it, or (if so born) not having had their births registered in it, are unvaccinated, and shall, in such cases, take the requisite steps for procuring their vaccination.

13. He shall, on outbreaks of small-pox, make any house to house visitations which the Local Government Board or the Guardians may direct in reference to vaccination, and carry out any special instructions they may issue on the subject.

14. As the Guardians' officer for the administration of the Vaccination Acts, he shall see that the Registrars of Births and Deaths in his district are kept informed of the arrangements for public vaccination as settled by the contracts, and of all alterations legally made in such arrangements, as well as of his own place of abode, in order that the entries required to be made in these respects by the Registrars on the notices of requirement of vaccination delivered by them to parents may be correct. For this purpose it is recommended that the Guardians have the particulars of the arrangements, and the name and address of the Vaccination Officer, printed in red ink on the notice forms with which each Registrar is supplied.

15. He shall also see that public notifications of the arrangements for Public Vaccination are duly given; and in districts in which Public Vaccination is periodical, shall see that such notices are distributed and placarded through the districts a week or ten days before the commencement of each period.

16. He shall, as far as possible, attend the public Vaccination Stations during vaccinating hours, and report to the Guardians any insufficiency of accommodation at these stations, or any failure of parents to bring for inspection the children on whom vaccination has been performed, or any other matter concerning the business of the station on which the Guardians may require his report.

17. He shall also undertake the distribution of the certificates, books, and other forms issued by the Local Government Board, to the Public Vaccinators and Medical Practitioners in his district.

18. He shall be responsible for the safe custody of the "Registers of successful Vaccinations" which were kept by the Registrars of Births and Deaths under the Acts of 1853 and 1867. The Registers kept under the Act of 1853 may, if the Guardians permit, be deposited in the Union Offices; but all Registers which contain entries of birth subsequent to December 31, 1867, must be retained by the Vaccination Officer. He shall duly and forthwith enter in these Registers the certificates which he may receive or obtain of the successful vaccination of children whose births are therein recorded. He shall write the word "dead" against the names of any of the children whose births are entered in these Registers, whom he may ascertain either by the monthly death lists, or by his own inquiries, to have died without having been vaccinated. And he shall

write, *in pencil*, against the respective names, any information (as of removal from district, certificate of postponement, and its date, &c.) which does not finally dispose of the case.

FORM A.

VACCINATION ACTS, 1867 & 1871.

To _____

I HEREBY remind you that I have not received the Certificate now due respecting the Vaccination of your Child, _____ and I beg that you will take the steps necessary to have such Certificate forwarded to me without delay.

(Signed)

Vaccination Officer for

_____

Dated _____

Address of Vaccination Officer _____

*** The Public Vaccinator for your District attends at his Station at _____

_____

for the gratuitous performance of Vaccination every _____ at _____ o'clock. If the Child be vaccinated there, the Public Vaccinator is responsible for the transmission of the Certificate to me, otherwise it devolves UPON YOURSELF to send me the Certificate.

FORM B.

VACCINATION ACTS, 1867 & 1871.

To _____

WHEREAS you are in default under the above Acts respecting your Child, _____

I hereby require you [to have the said Child vaccinated within fourteen days from the date hereof, and do all other things the law requires touching the said Vaccination*], *or* [to transmit to me within seven days from the date hereof the requisite Certificate concerning the Vaccination of the said Child*], failing which it will be my duty to take the proper steps for securing the enforcement of the law.

(Signed)

Vaccination Officer for

Dated _____

Address of Vaccination Officer _____

App. No. 9.

* Strike out the words which do not apply to the case.

*** The Public Vaccinator for your District attends at his Station at _____

for the gratuitous performance of Vaccination every _____ at _____ o'clock. If the Child be vaccinated there, the Public Vaccinator is responsible for the transmission of the Certificate to me, otherwise it devolves UPON YOURSELF to send me the Certificate.

FORM C.

VACCINATION ACTS, 1867 and 1871.

To _____

I HEREBY remind you that the next appointed periodical attendances for the performance of Public Vaccination in your District will take place at _____ on _____, and that if your Child _____ be not vaccinated, before the expiration of that period, you will be in default, and subject to the penalties of the Vaccination Acts; and that it will be my duty to take the proper steps for securing the enforcement of the law.

(Signed)

Vaccination Officer for

_____

Dated _____

Address of Vaccination Officer _____

Given under the Seal of Office of the Local Government Board, this Thirty-first day of October, in the year One thousand eight hundred and seventy-four.

(L.S.) G. SCLATER-BOOTH,
President.

JOHN LAMBERT,
Secretary.

ORDERS OF THE PRIVY COUNCIL AND THE LOCAL GOVERNMENT BOARD, OF THE 1ST DECEMBER 1859 AND THE 28TH FEBRUARY 1887 RESPECTIVELY, TO WHICH ARE APPENDED THE INSTRUCTIONS FOR VACCINATORS UNDER CONTRACT.

AT THE COUNCIL CHAMBER, WHITEHALL,

The 1st day of December, 1859.

BY THE LORDS OF HER MAJESTY'S MOST HONOURABLE PRIVY COUNCIL.

To the Guardians of the Poor of all Unions and Parishes, to the Churchwardens and Overseers of all Parishes, Townships, and places in which the Relief to the Poor is not administered by Guardians, in England and Wales, and to all Medical Practitioners.

WHEREAS by the Public Health Act, 1858, and by an Act since passed to perpetuate the same, it is enacted that the Privy Council may from time to time issue such regulations as they think fit, for securing the due qualification of persons to be thereafter contracted with by Guardians and Overseers of Unions and Parishes in England, for the vaccination of persons resident in such unions and parishes, and for securing the efficient performance of vaccination by the persons already or thereafter to be contracted with as aforesaid:

Now, therefore, it is hereby ordered, by the Lords and others of Her Majesty's MOST Honourable Privy Council (of whom the Vice-President of the Committee of the said Privy Council on Education is one) that on and after the 1st day of January, 1860, the following Regulations shall be in force, viz.:—

Qualification of Contractors.

1. Except where the Privy Council, for reasons brought to their notice, see fit in particular cases otherwise to allow, no person shall in future be admitted as a contractor for vaccination, unless he possess the same qualifications as are required by the Orders of the Poor Law Commissioners as qualifications for a district medical officer, and produce a special certificate, given under such conditions as the Privy Council from time to time fix, by some public vaccinator whom the Privy Council authorize to act for the purpose, and by whom he has been duly instructed or examined in the practice of vaccination, and all that relates thereto:—

but the production of this special certificate on occasion of the contract being made may be dispensed with if the certificate, or some other which the Privy Council judge to be of like effect, have been among the certificates or testimonials necessary for obtaining any diploma, licence or degree, which the candidate possesses;—

and also, in respect of persons legally admitted to practice before this regulation comes into effect, the special certificate may be dispensed with, on condition that the Contract, during one year from its making,

App. No. 9.

continue subject to the approval of the Poor Law Board;—

and all persons now contracted with shall be deemed to be qualified to be again contracted with.

Qualification of Deputies of Contractors.

2. Under the same conditions as are appointed for the admission of a contractor, any person qualified to be a contractor may, on the contractor's application, be admitted by the Guardians or Overseers to act as his occasional deputy;—

but, if this admission be not part of the original contract, it must be notified by indorsement upon the contract; and at least 15 days before it is intended to take effect, a copy of the proposed indorsement, together with all requisite evidence of the qualification of the person whom it is proposed to admit, must be transmitted to the Poor Law Board.

Vaccination and Inspection.

3. All vaccinations and inspections under contract shall be performed by the contractor in person, or by some other contractor of the same union or parish acting for him, or by a deputy, duly admitted as above:—

but, at any station where the contractor is authorised (as above) to grant certificates, pupils and other candidates, aged not less than 18 years, may, in his presence and under his direction, take part in vaccinating.

All vaccinations and inspections under contract shall be performed in accordance with the annexed "Instructions for Vaccinators under Contract."*

Register of Cases.

4. Until some new form of Vaccination Register be duly prescribed, the person who performs any vaccination under contract, shall, on the day when he performs it, legibly write in his register (as now provided) the letter R (for Re-vaccination) against the name of every person, adult or adolescent, who having in early life been successfully vaccinated, is re-vaccinated; and shall also enter in some column, or in the margin of the register, the source whence the lymph used in the vaccination was obtained;—

thus: the name, or number (if any) in the register, of the subject from whom the lymph was taken; or "N.V.E.," if the lymph was sent by the National Vaccine Establishment; or the name or description of any other source;—

and where the vaccination or the inspection is done by a person acting as deputy for the contractor, the deputy shall write the initials of his name in the register side by side with the entry of the case; viz., in the left margin of the page, if it be a vaccination which he performs, or in the right margin of tha page, if it be an inspection which he performs.

Contracts.

5. Guardians and Overseers, in their respective unions and parishes, shall forthwith take measures to bring the performance of public vaccination into conformity with these Regulations.

WM. L. BATHURST.

* For these Instructions, see annexed Order of February 28, 1887.

To the Guardians of the Poor of the several Unions and separate Parishes in England and Wales;—

And to all others whom it may concern.

WHEREAS, by an Order of the Lords of Her Majesty's Most Honourable Privy Council, dated the 29th day of July, 1871, it was provided that all vaccinations and inspections under contract should be performed in accordance with the "Instructions for Vaccinators under Contract" annexed to such Order:

Now therefore, we, the Local Government Board, in pursuance of the powers given to us by the Statutes in that behalf, hereby order as follows:—

Article I.—The said Order shall be rescinded from and after the 15th day of March, 1887, except so far as it rescinded certain provisions of an Order of Her Majesty's Most Honourable Privy Council, dated the 1st day of December, 1859.

Article II.—All vaccinations and inspections under contract shall be performed in accordance with the "Instructions for Vaccinators under Contract" contained in the Schedule appended to this Order.

Article III.—This Order shall come into force and have effect on and after the 15th da of March, 1887.

Article IV.—In this Order—

The word "Union" includes any Union of Parishes incorporated or united for the relief or maintenance of the poor under any Act of Parliament;

The term "separate Parish" means a Parish or place which is under a separate Board of Guardians;

The word "Guardians" includes any Governors, Directors, Managers, Acting Guardians, Vestrymen, or other Officers appointed or entitled to act in the distribution or ordering of relief to the poor from the poor rates under any Act of Parliament.

Given under the Seal of Office of the Local Government Board, this twenty-eighth day of February, in the year One thousand eight hundred and eighty-seven.

(L.S.) CHAS. T. RITCHIE, President.

S. B. PROVIS, Assistant Secretary.

INSTRUCTIONS FOR VACCINATORS UNDER CONTRACT.

(1.) Except so far as any immediate danger of small-pox may require, vaccinate only subjects who are in good health. As regards infants, ascertain that there is not any febrile state, nor any irritation of the bowels, nor any unhealthy state of skin; especially no chafing or eczema behind the ears, or in the groin, or elsewhere in folds of skin. Do not, except of necessity, vaccinate in cases where there has been recent exposure to the infection of measles or scarlatina, nor where erysipelas is prevailing in or about the place of residence.

(2.) In all ordinary cases of primary vaccination, make such insertions of lymph as will produce at least four separate good-sized vesicles or groups of vesicles, not less than half an inch from one another. The total area of vesiculation on the same day in the week following the vaccination should be not less than half a square inch.

(3.) Direct that care be taken for keeping the vesicles uninjured during their progress, and for avoiding afterwards the premature removal of the crusts. Do not use any needless means of "protection" or of "dressing" to a vaccinated arm; but if, in a particular case, you find reason for means of "protection" or of "dressing," define the material and the manner of use of the appliance best adapted to the case, avoiding all such as cannot readily be destroyed and replaced whenever they become soiled.

(4.) Enter all cases in your Register on the day when you vaccinate them, and with all particulars required in the Register up to and including the column headed "Initials of person performing the operation." Enter the results on the day of inspection. Each of those entries must be attested by the initials of the person who inspects the case. In cases of primary vaccination, register as "successful" only those cases in which the normal vaccine vesicle has been produced; in cases of re-vaccination, register as "successful" only those cases in which either vesicles, normal or modified, or papules surrounded by areolæ, have resulted. When any operation (whether vaccination or re-vaccination) has to be repeated owing to want of success in the first instance, it should be entered as a fresh case in the Register.

(5.) Endeavour to maintain in your district such a succession of cases as will enable you to vaccinate with liquid lymph directly from arm to arm at each of your contract attendances; and do not, under ordinary circumstances, adopt any other method of vaccinating. To provide against emergencies always have in reserve some stored lymph; either *dry* on ivory points, thickly charged and constantly well protected from damp; or *liquid*, in fine, short, uniformly capillary (not bulbed) tubes, hermetically sealed at both extremities. Lymph, successfully preserved by either of these methods, may be used without definite restrictions as to time. With all stored lymph caution is necessary, lest in time it have become inert, or otherwise unfit for use.

(6.) Consider yourself strictly responsible for the quality of whatever lymph you use or furnish for vaccination. Never either use or furnish lymph which has in it any, even the slightest, admixture of blood. In storing lymph, be careful to keep separate

the charges obtained from different subjects, and to affix to each set of charges the name, or the number in your Register, of the subject from whom the lymph was derived. Keep such note of all supplies of lymph which you use or furnish as will always enable you to identify the origin of the lymph. Do not employ lymph supplied by any person who does not keep exact record of its source.

(7.) Never take lymph from cases of re-vaccination. Take lymph only from subjects who are in good health, and, as far as you can ascertain, of healthy parentage; preferring children whose families are known to you, and who have elder brothers or sisters of undoubted healthiness. Always carefully examine the subject as to any existing skin disease, and especially as to any signs of hereditary syphilis. Do not take lymph from children who have any sort of sore at or about the anus. Take lymph only from well characterised, uninjured vesicles. Take it at the stage when the vesicles are fully formed and plump. Do not take it from a vesicle around which there is any conspicuous commencement of areola. Open the vesicles with scrupulous care to avoid drawing blood. Take no lymph which, as it issues from the vesicle, is not perfectly clear and transparent, or which is thin and watery. From a well-formed vesicle of ordinary size, do not, except under circumstances of necessity, take more lymph than will suffice for the immediate vaccination of five subjects, or for the charging of seven ivory points, or for the filling of three capillary tubes; and from larger or smaller vesicles, take only in like proportion to their size. Never squeeze or scrape or drain any vesicle, and do not use lymph that has run down the skin. Be careful never to transfer blood from the subject you vaccinate to the subject from whom you take lymph.

(8.) Scrupulously observe in your inspections every sign which tests the efficiency and purity of your lymph. Note any case wherein the vaccine vesicle is unduly hastened or otherwise irregular in its development, or wherein any undue local irritation arises; and if similar results ensue in other cases vaccinated with the same lymph, desist at once from employing it. Consider that your lymph ought to be changed, if your cases, at the usual time of inspection on the day week after vaccination, show any conspicuous areolæ round their vesicles. App. No. 9.

(9.) Keep in good condition the lancets or other instruments which you use for vaccinating, and do not use them for any other purpose whatever. When you vaccinate, have water and a napkin at your side, with which invariably to cleanse your instrument after one operation before proceeding to another. Never use an ivory point or capillary tube a second time either for the conveyance or for the storage of lymph; but when points or tubes have once been charged with lymph and put to their proper use, do not fail to break or otherwise destroy them.

N.B.—Supplies of lymph are furnished to medica practitioners on personal application at the Office of the Local Government Board, Whitehall, London, between the hours of 12 and 2; or by letter adddessed as follows:—

To

The Secretary,
Local Government Board,
Whitehall,
London, S.W.

National Vaccine
Establishment.

Memorandum of the Medical Officer of the Local Government Board on Arrangements for the Performance of Public Vaccination.

1. In order to secure the best sort of vaccination, the operation should, as far as practicable, be performed with fresh lymph direct from arm to arm. The lymph should be carefully selected from the best formed vesicles upon the healthiest children at the right period of the course of the vesicles.

2. As, in ordinary circumstances, it is at the end of the week from vaccination that the arm of a child is in the state best fitted for yielding lymph, the attendances for the performance of public vaccination must be given at weekly intervals.

3. As, for keeping up vaccination in perfection, it is essential that a public vaccinator should have on each vaccinating occasion an ample choice of children and of vesicles, it is obvious that the cases for vaccination must not be divided between too many stations, nor distributed over too many vaccinating days.

4. The Regulations of the 18th of February 1868 are accordingly designed to secure that as large a number of cases as practicable shall be brought together at each performance of public vaccination:

4*a*. Thus it is provided that the public vaccination of children living within two miles of a vaccination station shall (except for some special reason which must be entered in the Public Vaccinator's Register) be performed only at the station and at the time specified in the contract.

4*b*. It is also provided that in ordinary circumstances vaccination under contract shall not be performed at any station more often than once a week.

4*c*. It is also provided that any vaccination district which is partly or wholly urban shall not have more than one vaccination station within the town.

4*d*. It is further provided that any urban vaccination district shall contain a population of not less than 25,000, or all the part of the union which is within the town. It will be noticed that 25,000 is a minimum. It is found, however, that those stations are most efficient at which the number of cases annually vaccinated amounts to 800 or more; and this can only, in ordinary circumstances, be supplied by districts having a population over 50,000.

5. It is only in very populous districts that weekly vaccination can be maintained efficiently throughout the year. If an attempt were made to keep up vaccination throughout the year at a vaccination station to which 100 or even 200 cases are brought annually, it would be found that as the births are not equally spread over the whole year, and as accidental circumstances must often interfere with the bringing of children in particular weeks, there would frequently be no cases at all at the station to supply lymph, and in most weeks not a sufficient number of children to enable the vaccinator to make a free selection. Vaccination in very populous districts weekly throughout the year.

6. Hence, in districts which are not very populous, it is necessary that the performance of public vaccination should be limited to certain periods of the year (quarterly or half-yearly periods), weekly attendances being then given for two, three, or four successive weeks, according to the population for the accommodation of which the particular station is designed. In other districts vaccination to be at quarterly or half-yearly periods.

7. Without attempting to lay down a precise rule on a question which must largely be decided according to the circumstances of each locality, it may be said, generally, that any station at which there are less than 80 vaccinations annually should not be attended more frequently than half-yearly periods. Number of cases required for vaccination at quarterly periods.

8. Single attendances at other than weekly periods (*e.g.*, monthly or half-yearly) are inadmissible, as not providing for arm-to-arm vaccination. Moreover, as regards single attendances half-yearly, it is not proper that parents should only have one opportunity of obtaining public vaccination in the course of six months. Single attendances inadmissible.

9. In the case of districts in which public vaccination is performed at intervals exceeding three months, the 12th section of the Vaccination Act, 1867, provides that parents shall not be liable to penalty for the non-vaccination of their children until after the Legal provision for vaccination at half-yearly periods.

App. No. 9.

next periodical attendances of the public vaccinator at the appointed stations subsequently to the children having attained the age of three months.

Months suitable for half-yearly vaccination.

10. Having regard to weather and to other considerations, the months of April and October will generally be found most suitable for half-yearly vaccination.

Starting periodical vaccination.

11. In districts in which public vaccination is fixed to take place periodically, the public vaccinator should, on the day week preceding the first day of the periodical attendances appointed under Schedule A. to the contract, vaccinate, with lymph stored by himself or obtained from the National Vaccine Establishment, or from some other trustworthy source, two or three selected children. Arrangements should be made for bringing these children to the station on the day appointed for beginning the periodical vaccination of the district, and the lymph from their arms will afford means of starting such vaccination satisfactorily. (The public vaccinator in registering these preliminary vaccinations should, in accordance with the Regulations of 18th February 1868 [I.(1)], state in his register the special reason for their not having been vaccinated at the station.)

Periodical attendances to be arranged with regard to lymph supply.

12. In framing periodical arrangements for districts in which there are two or more stations, the attendances should not commence in the same week at all the stations, but a week or two should be given for establishing at the most frequented station a supply of lymph with which to start vaccination at the others.

It is also convenient that, as far as practicable, the stations of a district should be attended on the same week day, in order that, when it is necessary to take lymph from station to station, it may be taken fresh.

Unnecessary subdivision of districts to be avoided.

13. In order to facilitate the performance of vaccination with fresh rather than with stored lymph it is desirable that, even in unions where vaccination is only performed at periodical intervals, excessive subdivision of districts should be avoided. In a district containing several parishes with one station in each, the public vaccinator need only start vaccination with stored lymph at one station, which will furnish fresh lymph for beginning vaccination at the others. (See section 12.) But if each parish be constituted a district and allotted to a separate vaccinator, it is probable that stored lymph, instead of fresh, will have to be used for starting vaccination at each station.

Provision for domiciliary vaccination.

14. Children living over two miles from a vaccination station may be vaccinated by the public vaccinator at their own homes; and a clause may be inserted in his contract binding him to vaccinate any such children on receiving notice from the vaccination officer.

Vaccination stations to be provided by the Guardians.

15. By section 7 of the Vaccination Act, 1867, it is provided that all vaccination stations (except at the residence or surgery of the public vaccinator) shall be provided by the Guardians.

Stations not to be at workhouses or inns.

16. Vaccination stations must be within the district for which they are to serve, and must not be fixed at union workhouses, as the independent poor are unwilling to resort for vaccination to an institution connected with pauper relief. The appointment of pauper pay stations as vaccination stations is liable, in a certain degree, to the same objection. If the pay stations are also used for the purposes of medical relief, a special objection to their use as vaccination stations also arises. Children attending for vaccination thus become exposed to danger of infection brought by applicants for medical relief. This consideration applies equally to dispensaries. If, however, a medical relief station or dispensary be the only place available as a vaccination station, the arrangements should be such as to admit of the room remaining empty and disused for a clear period of 24 hours before the time when vaccination is appointed to commence, and the room should be perfectly cleansed and ventilated during this previous period.

The Board further consider it undesirable that public-houses should be selected for the purpose, as the accommodation is rarely suitable; some persons are found very unwilling to resort to public-houses; and others, not being aware that it is the Guardians' duty to provide stations free of cost, think it necessary to pay for drink by way of acknowledgment to the landlord for the use of his premises. Whatever room or place be selected as a vaccination station it is essential that the public vaccinator should have the exclusive use of it during the time of vaccination.

Stations should have a public character.

17. If possible, the vaccination station should be at some public building, *e.g.*, town hall, meeting hall, or school, or at rooms specially hired for the purpose. Various objections exist to the use of the surgeries of public vaccinators in large towns, especially that they rarely afford the accommodation necessary for the number of children likely to be brought, and that they do not possess the distinctive public character which is desirable.

Stations at schools.

18. In rural districts schoolrooms are frequently found convenient for the purpose. It is of course necessary that the assent of the managers of the school should be obtained; that the vaccination should be fixed at such an hour as not to interfere with school arrangements; and that the public vaccinator should have at the time fixed for vaccination the exclusive use of the schoolroom or class-room appointed for the purpose.

Notices of hours of vaccination.

19. In order to secure at vaccination stations the punctual bringing together of children (from some of whom lymph has to be taken for the vaccination of others) it is desirable that the time of attendance notified to parents should be that at which vaccination is intended to begin, as "at 10 a.m.," not "from 10 to 11 a.m."

Hour of attendance should not be too late.

20. The hour of public vaccination should never be fixed so late in the day as to make it impracticable to complete the business of the station by daylight. Regard should also be had to the necessity of allowing time for mothers to get their children home before dark.

Arrangement of hours of attendance.

21. Enough time (which should rarely be less than one hour) should be allowed between the times of attendance at different stations, to enable the public vaccinator, after performing vaccination and making the necessary entries in the register at one station, to arrive punctually at the next.

Rate of payment for domiciliary vaccination.

22. The payments to be made for vaccinations performed at other places than stations must not exceed the sum that would have been paid had the operation been performed at the station nearest to the residence of the person vaccinated. This rule, however, does not apply to the case of outlying places distant over two miles from a vaccination station.

Transmission of certificate of successful vaccination to vaccination officer.

23. Every vaccination contract must contain a stipulation or condition in accordance with section 7 of the Vaccination Act, 1867. The form in general use is as follows:—

"And it is hereby mutually agreed by and between "the parties hereto that no money shall be paid to the "said in respect "of any person vaccinated by him until he shall have "transmitted to the vaccination officer a certificate of the "successful vaccination of such person, and otherwise "fulfilled on his part the requirements of the Vaccina- "tion Acts, 1867 and 1871, and the regulations made "thereunder."

Outbreaks of small-pox.

24. The course to be taken if small-pox break out in a district where ordinarily the public vaccination is carried on periodically is explained in the Office Memorandum on the steps to be taken by Guardians in places in which small-pox is epidemic.

Postponement of vaccination on account of infectious disease.

25. If an infectious disease, such as scarlatina, measles, or diphtheria, prevail to such an extent in a district that the public vaccinator considers that the bringing of children together for vaccination would be likely to spread the disease, he should represent the facts to the Guardians with a view to the postponement of the attendances prescribed by the contract. Any such postponement should be forthwith reported by the Guardians to the Local Government Board. In some cases, however, it may be found desirable not to postpone vaccination altogether, but to perform it at the homes of the children instead of at the stations, the "special reason" being stated in the Public Vaccinator's Register.

Qualifications of public vaccinator.

26. A contractor for public vaccination must be a registered medical practitioner qualified in medicine and surgery, and (if admitted to practice since 1st January 1860) possessing a special certificate of proficiency in vaccination from one of the Examiners authorised to grant such certificates for the purposes of the Order of 1st December 1859.

Limitation of employment of deputy.

27. The duties of a public vaccinator must be habitually discharged by the contractor himself, and the employment of a deputy must be limited to those occasions when unavoidable circumstances prevent the contractor's personal attendance.

Admission of occasional deputy.

28. In order to provide for occasions when the public vaccinator is unavoidably absent, it is proper that a deputy (who must possess the same qualifications as a contractor) should be appointed under the Order of 1st December 1859, and that the appointment, after

having been submitted by the Guardians for the approval of the Local Government Board, should be endorsed upon the contract. The form of endorsement usually adopted is as follows:—

"WHEREAS the within-named
" has applied to the Guardians of the
" Union that of ,
" being a duly qualified Medical Practitioner, may be
" admitted to act as the occasional Deputy to the said
" in the performance of Public
" Vaccination: NOW, THEREFORE the said Guardians do
" hereby admit the said to
" act as such occasional Deputy, in accordance with and
" pursuant to the Order of Her Majesty's Most Honour-
" able Privy Council of the 1st December 1859."

This endorsement should be executed by the Guardians and the public vaccinator.

29. On the occurrence of a sudden vacancy in the office of public vaccinator if any attendances for vaccination which have been notified to parents are due before a new contract can be executed by the Guardians and approved by the Local Government Board, the Guardians should make arrangements with the public vaccinator of an adjoining district of the union to give such attendances. This course is warranted by the exceptional provision of section 11 of the Vaccination Act, 1867. App. No. 9. — vaccinator of adjoining district on occurrence of sudden vacancy.

30. Public vaccination cannot under any circumstances be legally performed by an unqualified person, and the Guardians cannot legally pay for any vaccination so performed, or for any vaccination not performed in accordance with a contract approved by the Local Government Board. Payment for public vaccination illegal if not in accordance with contract.

GEORGE BUCHANAN, M.D.,
Medical Officer.

Local Government Board,
23rd August 1887.

APPENDIX X.

App. No. 10.

(Papers handed in by Mr. Charles Creighton, M.D., 11th December 1889 and 22nd January 1890.)

Mr. Ward's Cases of Inoculation for the Cow-pox. (*From the Medical and Physical Journal*, ii. 134, September 1799.)

. . . The same vaccine matter was made use of in the first nine cases; the other five patients were inoculated with matter taken from Martha Mead . . . .

First Case.

April 16, 1799.—Martha Mead, aged seven years.

Fourth day. The punctures are considerably inflamed; the superior one discharges a little matter.

Eighth day. There is less efflorescence round the punctures than on the fourth day.

Thirteenth day. The superior puncture is healed, the inferior one has the appearance of an oblong vesicle, and contains a limpid fluid; it is more elevated than on the eighth day; there is also a greater degree of efflorescence.

She began to be feverish yesterday morning and continued so all day; had a restless night and was delirous, but walked to the infirmary this morning, and is relieved by being out; her breath is offensive, tongue white, appetite bad, and her eyes dull and heavy.

Fifteenth day. She slept tolerably last night, vomited three times the night before, and was very ill yesterday till noon, when some spots were observed on her face, which relieved her. Towards evening, a great number of pustules appeared on her neck, breast, and arms; and this morning there is a plentiful crop on every part of her body. Her arm is more inflamed than on the thirteenth day, her tongue is white and foul, throat great, her appetite bad, but she slept better last night than she has done since the eruptive fever attacked her.

Sixteenth day. She has had a restless night, and complains of her throat being sore. Several pustules are visible on the tonsils and mucous membrane of the throat; in other respects she is much the same as yesterday. The eruption is now confluent in some places on her face and arms.

Seventeenth day. She slept well, and is not feverish, but she is rather hoarse, and very dull, and complains of general soreness.

Eighteenth day. She has slept well; is very weak; throat sore.

Nineteenth day. She has not had a good night; her tongue is foul and very sore; there are several pustules upon it; throat somewhat better; her eyelids are much swelled, and nearly closed; the pustules become more confluent daily; she is very unwilling to be moved.

Twentieth day. The patient has had a restless night, and complains heavily of the soreness; her throat is better; her eyelids are closed; the pustules continue to run more into each other; maturation seems nearly complete everywhere but on the legs and feet; the inoculated arm is painful from the shoulder to the elbow; it is much loaded with pustules; the puncture is covered with a small dry scab.

Twenty-first day. She has been restless, but is better this morning; her throat is well, and the hoarseness gone; the soreness is so great that she moans and cries continually, except when quieted by opiates.

Twenty-second day. She has slept well and is much better; she can open her eyes with ease. Many of the pustules have dropped off from her face since yesterday, and have left the skin of a deep red colour, but not pitted. The child has complained of pain several days in her left knee, a cluster of pustules having joined so as to form one very large one. It broke last night and she is eased.

Twenty-third day. She has slept well, and makes no complaint, except of soreness on the bottom of her feet, which prevent her from walking. It is surprising with what rapidity the pustules fall off from her breast and neck, leaving only a redness and a roughness on the skin.

Twenty-fourth day. She is going on well in every respect. The pustules continue to exfoliate rapidly.

Twenty-sixth day. She has had an uneasy night; there is a considerable discharge from the pustules on her sides, back, and belly.

Twenty-eighth day. Has rested well the two last nights, but is very tedious and uneasy to-day; she complains that "her clothes stick to her like bird-"lime."

Thirty-fifth day. Her health is restored.

July 4. She was inoculated with variolous matter.

July 11. She has not taken the infection.

"I have only to add to the above statement, that the "eruptive fever was not so strongly marked by debility, "as it usually is in the confluent small-pox; the "secondary fever was so trifling as to be scarcely worth "mentioning; the progress of the pustules to matura-"tion, as well as their subsequent separation, was more "rapid; the separation was also more complete, *and "the exhalations were all along free from any unpleasant "odour*. As nearly as I could ascertain, she had not "fewer than 1,600 to 1,800 pustules.

"Though she lives in a populous part of the town, I "have reason to believe the disease has not been com-"municated from her to any other person in the neigh-"bourhood, having taken some pains to gain informa-"tion on this point."

Second Case.

April 16, 1799.—William Mead, aged nine months. He was attacked with feverish symptoms on the eighth day, at which time some elevation of the punctures, accompanied by some degree of efflorescence, had taken place. These appearances decreased from that time to the eleventh day, when they were quite gone, and on the fifteenth day one of the punctures was healed, and the other was covered with a small dry crust. The child continued well from the eleventh to the thirty-second day. A slight ulceration began to take place under the scab on the twenty-first day, which gradually increased to the size of a silver threepence, but it was so superficial I did not think it necessary to apply anything; a little ichor was discharged from the place from this time to the thirty-second day, when he became feverish, and continued very restless and tedious three or four days. On the thirty-third, thirty-fourth, and thirty-fifth days, about 50 pustules appeared, most of which were on his face. The discharge ceased, and his arm got well soon after the fever abated.

I was unable to account for the fever coming on so late as the thirty-second day (and it seemed a strong argument against introducing the cow-pox into general practice) till I had read Dr. Jenner's second publication on the *variolæ vaccinæ*.

July 4.—Inoculated him with variolous matter.

July 11.—The punctures are healed.

Third Case.

April 16, 1799.—Sarah Gray, aged five months, was inoculated.

April 23.—She was inoculated again, the matter inserted on the 16th having produced no effect.

Fourth day. She has not taken the infection; variolous matter was inserted.

Eighth day. The eruptive fever has taken place.

Twelfth day. She has a fine distinct sore.

Fourth and Fifth Cases.

April 16, 1799.—Ann Morley, aged five years, and Mary Ann Morley, aged nine months.

Eighth day. They have not either of them taken the infection, and were therefore inoculated a second time, and with the same result.

April 30.—They were inoculated with variolous matter, but without success, and they were inoculated again with variolous matter on the 5th of May.

Eighth day. The punctures are a little elevated and inflamed.

Seventeenth day. The children have not been indisposed since the last inoculation, nor have any pustules appeared on either of them. The mother is certain they have not had the small-pox, and they were in every respect healthy each time of their being inoculated.

Sixth Case.

April 16, 1799.—George Wood, aged three years, was inoculated with vaccine matter, and afterwards with variolous matter, but without effect in both instances; but it must be observed, he had been inoculated four months before, and that his arm was inflamed at that time, a trifling indisposition also took place, but no pustules appeared.

Seventh Case.

April 19, 1799.—Thomas Coop, aged five months.

April 23.—He was inoculated again, the first inoculation having failed.

April 26.—The punctures are healed. He was inoculated with variolous matter.

Eighth day. The inflammation on his arm is pretty considerable.

Fifteenth day. The child has not been indisposed, nor had any pustules. His arm is well.

Eighth Case.

April 19, 1799.—Samuel Barnes, aged 16 months.

April 23.—Not having taken the infection he was inoculated again.

Eighth day. There appears about as much inflammation round the incisions as usually takes place on the third or fourth day, when infection has been produced by variolous matter. He has been hot and feverish since the fifth day, owing to his teeth, as his mother supposes, and this opinion is strengthened by the state of the arm.

Eleventh day. There is a good deal of efflorescence round the punctures; he was restless last night, and is tedious and hot to-day.

Eighteenth day. He is very well, and has not had any pustules.

Twenty-ninth day. I inoculated him with variolous matter in both arms; but no disease ensued.

Ninth Case.

April 23, 1799.—James Hopwood, aged 19 weeks. The punctures being healed on the 26th he was inoculated again with vaccine matter.

Fifth day. His arm is inflamed from the vaccine matter inserted four days since. He was feverish yesterday, but is better to-day. His mother thinks he is about his teeth, but his gums are not swelled.

Eighth day. The inflammation advances on his arm; he looks pale, and is hot and restless.

Twelfth day. No complaint; the punctures are healed; he has not had any pustules except a few on the inoculated arm close to the incisions. I this day inoculated him with variolous matter.

Nineteenth day. He has taken the infection.

Twenty-second day. He has a mild disease, and 30 pustules.

Tenth Case.

April 30, 1799.—John Lunt, aged 14 weeks. He took the infection and sickened on the seventh day. He began to break out on the tenth, and was pretty full of pustules on the twelfth, but the eruption was distinct. There was an unusual number of white pustules, as well as a great degree of efflorescence round the punctures on the eleventh day; and the pustules being placed at regular distances from each other, the arm assumed a studded appearance . . . .

On the twenty-second day his health was completely restored, and on the twenty-fourth day he was inoculated with variolous matter, but without effect.

Eleventh Case.

William Bullock, aged 9 months. He took the infection and broke out on the tenth, eleventh, and twelfth days, and had about 40 pustules besides a great number in the neighbourhood of the punctures; he was poorly three days before they came out, and one after. He was subsequently inoculated with variolous matter but without effect.

Twelfth Case.

Robert Foley, aged six months. As he did not take the infection, I inoculated him again in 10 days, but his mother neglected to bring him in, and I have not heard of him since.

Thirteenth and Fourteenth Cases.

Henry Delmore, aged three years, and Elizabeth Delmore, aged six months. Their place of residence was not noted, and I have not heard of them since.

TABLE OF BURIALS WITHIN THE LONDON BILLS OF MORTALITY FROM PLAGUE, FEVER, SMALL-POX AND ALL CAUSES, DURING THE YEARS 1603–1848.

Year.	Plague.	Fever.	Small-pox.	All Causes.	Year.	Plague.	Fever.	Small-pox.	All Causes.
1603	30,561	—	—	37,294	1629	0	956	72	8,771
1604	896	—	—	5,219	1630	1,317	1,091	40	10,554
1605	444	—	—	6,392	1631	274	1,115	58	8,562
1606	2,124	—	—	7,920	1632	8	1,108	531	9,535
1607	2,352	—	—	8,022	1633	0	953	72	8,393
1608	2,262	—	—	9,020	1634	1	1,279	1,354	10,400
1609	4,240	—	—	11,785	1635	0	1,622	293	10,651
1610	1,805	—	—	9,087	1636	10,400	2,360	127	23,359
1611	627	—	—	7,343	1637	3,082	—	—	11,763
1612	64	—	—	7,842	1638	363	—	—	13,624
1613	16	—	—	7,519	1639	314	—	—	9,862
1614	22	—	—	7,389	1640	1,450	—	—	12,771
1615	37	—	—	7,887	1641	1,375	—	—	13,142
1616	9	—	—	8,072	1642	1,274	—	—	13,273
1617	6	—	—	8,286	1643	996	—	—	13,212
1618	18	—	—	9,614	1644	1,492	—	—	10,933
1619	9	—	—	8,008	1645	1,871	—	—	11,479
1620	21	—	—	9,712	1646	2,365	—	—	12,780
1621	11	—	—	8,123	1647	3,597	1,260	139	14,059
1622	16	—	—	8,959	1648	611	884	401	9,894
1623	17	—	—	11,102	1649	67	751	1,190	10,566
1624	11	—	—	12,210	1650	15	970	184	8,754
1625	35,417	—	—	54,265	1651	23	1,038	525	10,827
1626	134	—	—	7,535	1652	16	1,212	1,279	12,569
1627	4	—	—	7,715	1653	6	282	139	10,087
1628	3	—	—	7,743	1654	16	1,371	832	13,247

App. No. 10.

TABLE OF BURIALS WITHIN THE LONDON BILLS OF MORTALITY DURING THE YEARS 1603–1848—*continued.*

Year.	Plague.	Fever.	Small-pox.	All Causes.
1655	9	689	1,294	11,357
1656	6	875	823	13,921
1657	4	999	835	12,434
1658	14	1,800	409	14,993
1659	36	2,303	1,523	14,756
1660	13	2,148	354	12,681
1661	20	3,490	1,246	16,665
1662	12	2,601	768	13,664
1663	9	2,107	411	12,741
1664	5	2,258	1,233	15,453
1665	68,596	5,257	655	97,306
1666	1,998	741	38	12,738
1667	35	916*	1,196	15,842
1668	14	1,247†	1,987	17,278
1669	3	1,499	951	19,432
1670	0	1,729	1,465	20,198
1671	5	1,343	696	15,729
1672	5	1,615	1,116	18,230
1673	5	1,804	853	17,504
1674	3	2,164	2,507	21,201
1675	1	2,154	997	17,244
1676	2	2,112	359	18,732
1677	2	1,749	1,678	19,067
1678	5	2,376	1,798	20,678
1679	2	2,763	1,967	21,730
1680	0	3,324	689	21,053
1681		3,174	2,982	23,951
1682		2,696	1,408	20,691
1683		2,250	2,096	20,587
1684		2,836	1,560	23,202
1685		3,832	2,496	23,222
1686		4,185	1,062	22,609
1687		2,847	1,551	21,460
1688		3,196	1,318	22,921
1689		3,313	1,389	23,502
1690		3,350	778	21,461
1691		3,490	1,241	22,691
1692		3,205	1,592	20,874
1693		3,211	1,164	20,959
1694		5,036	1,683	24,100
1695		3,019	784	19,047
1696		2,775	196	18,638
1697		3,111	634	20,972
1698		3,343	1,813	20,183
1699		3,505	890	20,795
1700		3,675	1,031	19,443
1701		2,902‡	1,099	20,471
1702		2,682	311	19,481
1703		3,162§	398	20,720
1704		3,243	1,501	22,684
1705		3,290	1,095	22,097
1706		2,662	721	19,847
1707		2,947	1,078	21,600
1708		2,738	1,687	21,291
1709		3,140	1,024	21,800
1710		4,397	3,138	24,620
1711		3,461	915	19,833
1712		3,131	1,943	21,198
1713		3,039	1,614	21,057
1714		4,631	2,810	26,569
1715		3,588	1,057	22,232
1716		3,078	2,427	24,436
1717		2,940	2,211	23,446
1718		3,475	1,884	26,523
1719		3,803	3,229	28,347
1720		3,910	1,442	25,454
1721		3,331	2,375	26,142
1722		3,088	2,167	25,750
1723		3,321	3,271	29,197
1724		3,262	1,227	25,952
1725		3,277	3,188	25,523
1726		4,666	1,569	29,647
1727		4,728	2,379	28,418
1728		4,716	2,105	27,810
1729		5,235	2,849	29,722
1730		4,011	1,914	26,761
1731		3,225‖	2,640	25,262
1732		2,939	1,197	23,358
1733		3,831	1,370	29,233
1734		3,116	2,688	26,062
1735		2,544	1,594	23,538
1736		3,361	3,014	27,581
1737		4,580	2,084	27,823
1738		3,890	1,590	25,825
1739		3,334	1,690	25,432
1740		4,003	2,725	30,811
1741		7,528	1,977	32,169
1742		5,108	1,429	27,483
1743		3,837	2,029	25,200
1744		2,670	1,633	20,606
1745		2,690	1,206	21,296
1746		4,167	3,236	28,157
1747		4,779	1,380	25,494
1748		3,981	1,789	23,069
1749		4,458	2,625	25,516
1750		4,294	1,229	23,727
1751		3,219	998	21,028
1752		2,070	3,538	20,485
1753		2,292	774	19,276
1754		2,964	2,359	22,696
1755		3,042	1,988	21,917
1756		3,579	1,608	20,872
1757		2,564	3,296	21,313
1758		2,471	1,273	17,576
1759		2,314	2,596	19,604
1760		2,136	2,181	19,830
1761		2,475	1,525	21,063
1762*		3,742	2,743	26,326
1763		3,414	3,582	26,148
1764		3,942	2,382	23,202
1765		3,921	2,498	23,230
1766†		3,738	2,334	23,911
1767		3,765	2,188	22,612
1768		3,596	3,028	23,639
1769		3,430	1,968	21,847
1770		3,214	1,986	22,434
1771		2,273	1,660	21,780
1772		3,207	3,992	26,053
1773		3,608	1,039	21,656
1774		2,607	2,479	20,884
1775		2,244	2,669	20,514
1776		1,893	1,728	19,048
1777		2,760	2,567	23,334
1778		2,647	1,425	20,399
1779		2,336	2,493	20,420
1780		2,316	871	20,517
1781		2,249	3,500	20,709
1782		2,552	636	17,918
1783		2,313	1,550	19,029
1784		1,973	1,759	17,828
1785		2,310	1,999	18,919
1786		2,981	1,210	20,454
1787		2,887	2,418	19,349
1788		2,769	1,101	19,697
1789		2,380	2,077	20,749
1790‡		2,185	1,617	18,038
1791		2,013	1,747	18,760
1792		2,236	1,568	20,213
1793		2,426	2,382	21,749
1794		1,935	1,913	19,241
1795		1,947	1,040	21,179
1796		1,547	3,548	19,288
1797		1,526	522	17,014
1798		1,754	2,237	18,155
1799		1,784	1,111	18,134
1800		2,712	2,409	23,068
1801		2,908	1,461	19,374
1802		2,201	1,579	19,379
1803		2,326	1,202	19,582
1804		1,702	622	17,034
1805		1,307	1,685	17,565
1806		1,354	1,158	17,938
1807		1,033	1,297	18,334
1808		1,168	1,169	19,954
1809		1,066	1,163	16,680
1810		1,139	1,198	19,983
1811		906	751	17,043
1812		783	1,287	18,295
1813		714	898	17,322
1814		908	638	19,283
1815		1,309	725	19,560
1816		1,299	653	20,316
1817		1,299	1,051	19,968
1818		1,170	421	19,705
1819		1,093	712	19,928
1820		1,109	792	19,348

* Ague, 31 deaths. † Ague, 21 deaths.
‡ Ague for this and five following years, 6, 3, 7, 6, 3, 2.
§ Scarlet fever, 7 deaths.
‖ Scarlet fever included from this year (deaths from it in previous years very few).

* Sanitary improvements begun in Westminster.
† Sanitary improvements begun in the City of London.
‡ Christenings exceed burials for the first time.

Diagram illustrating the Table of Burials within the London Bills of Mortality.

To face page 230.


7000 deaths
6000 deaths
5000 deaths
4000 deaths
3000 deaths
2000 deaths
1000 deaths
Burials within the Bills of Mortality London, for each year from 1629 to 1848.
Plague (averaged)
Fever (mostly Typhus)
Smallpox
Contemporary observers of Typhus written across in red ink
Plague Deaths Averaged 1629 - 1666
Fever
Smallpox
Fever (mostly Typhus)
The Great Fire 1666
Great Plague 1665
Great Frost
Great Drought
Great Storm
Sickness very rife
Influenza
Hot Summer
Cholera
Cholera
Typhus
Typhus
Typhus

DIAGRAM ILLUSTRATING THE TABLE OF BURIALS WITHIN THE LONDON BILLS OF MORTALITY.

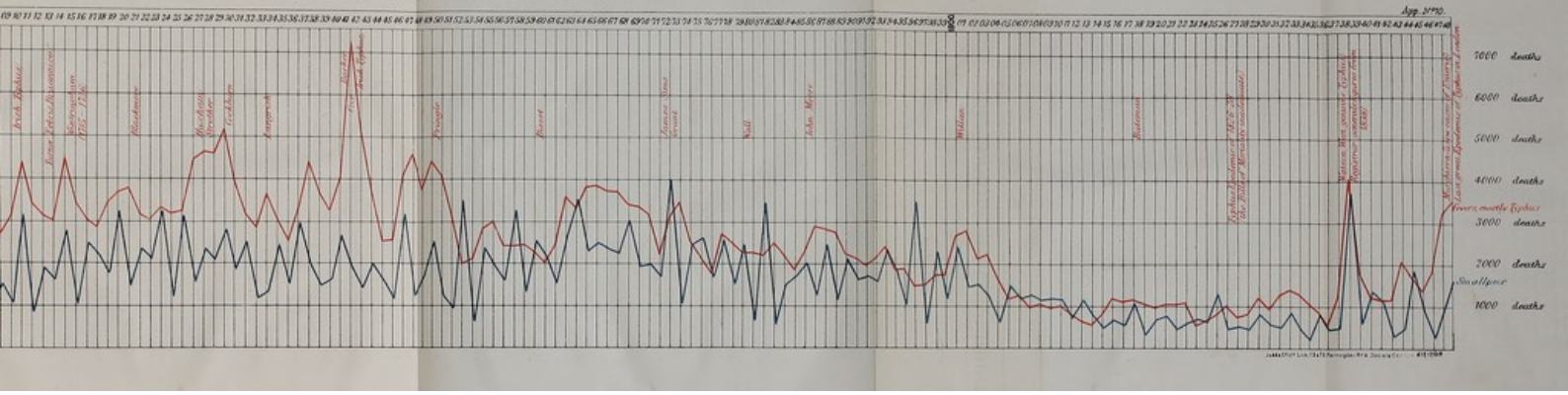


TABLE OF BURIALS WITHIN THE LONDON BILLS OF MORTALITY DURING THE YEARS 1603–1848—*continued.* App. No. 10.

Year.	Plague.	Fever.	Small-pox.	All Causes.	Year.	Plague.	Fever.	Small-pox.	All Causes.
1821		1,101	508	18,451	1835		937	863	—
1822		1,124	604	18,865	1836		674	536	—
1823		721	774	20,587	1837		1,090	217	—
1824		787	725	20,237	1838*		4,078	3,817	52,698
1825		895	1,299	21,026	1839		1,819	634	45,441
1826		1,023	503	20,758	1840		1,262	1,235	46,354
1827		847	616	22,292	1841		1,151	1,053	45,507
1828		921	598	21,709	1842		1,174	360	45,460
1829		1,270	736	23,524	1843		2,083	438	48,718
1830		996	627	21,645	1844		1,696	1,804	51,110
1831		1,331	563	25,337	1845		1,301	909	43,318
1832		1,513	771	—	1846		1,796	257	49,450
1833		1,411	574	—	1847		3,184	955	59,131
1834		1,110	334	—	1848		3,509	1,617	57,771

* First year of complete registration of deaths.

INDEX TO MINUTES OF EVIDENCE AND APPENDICES.

[N.B.—In this Index the Figures refer to the Questions in the Evidence, unless they follow the letters "App.," when they refer to the pages in the Appendix.]

ABEL, Mr. JOSEPH (analysis of his evidence):
Is a watchmaker at Faringdon in Berkshire, 5645. Has been fined thirty-four times under the Vaccination Acts, 5646–7; thirty-two times in respect of two of his children, and twice in respect of a third, 5648–9. Objects to vaccination on conscientious grounds, 5656.

ADMIRALTY:
Orders issued by the Admiralty for the encouragement of vaccination in the navy, 2645, 3209–11, App. 255; for its compulsory enforcement, 2646, 2651–3, 3212–7, App. 255; and for compulsory re-vaccination, 2659, 2681, 3163, 3220–1, 3224–34, 3242–4, 3399–400, 3417, 3432–8, 3443, App. 255. Order issued by the Admiralty in 1873 for the vaccination of all "foreigners" entering the service abroad, 2664–70, 2679–81, 3157–8, 3226–34.

AËRIAL INFECTION:
The possibility of small-pox having been spread by aërial infection from the Sheffield Small-pox Hospital during the epidemic of 1887–8, 2225–34.

ANIMAL VACCINE LYMPH STATION (Lamb's Conduit Street):
The arrangements with regard to the supply and distribution of calf lymph, 4272–7. The origin of the lymph used for the vaccination of the calves, 4278–80, 4314, 4520, 4570–9. Origin of the lymph used prior to 1882, 4281. Lymph supplied by Dr. Simpson used to a limited extent for some time, 4281–91; its origin, 4318–21, 4329, 4331–2, 4429–34, 4557–9, 4564–8; and effects, 4289, 4291, 4322–3, 4443–6, 4560–3.
Particulars as to the children, from 1882 onwards, vaccinated at the station with calf-lymph, and of those brought back with complaints, 4370–91, 4512–3, 4682–5, 4704–5. Deaths reported to the station of children who had been there vaccinated, 4392–401, 4474–6, 4513, 4688–9.

ARMY:
Regulation with regard to the submission of recruits to vaccination or re-vaccination, 3450–1, 3456–8. Conditions under which recruits were vaccinated prior to the regulations of 1883, 3452–6. Regulations affecting militia recruits, 3459. The regulations respecting method of vaccinating, 3461–3. Steps taken to ensure vaccination and re-vaccination, 3464, 3517, 3600. Source of the lymph employed, 3466, 3561–9.
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Cow-pox as a spontaneous disease, 5595–5614. In witness's opinion the belief of those among the milkers who, before Jenner's time, were thought to have been protected from the small-pox by the cow-pox, was quite fallacious, 5615–20. Small-pox differs from typhus in that the former is contagious, 5631–34. The amount of protection afforded by vaccination during the Sheffield small-pox epidemic of 1887–8, 5635–44.

CURTIS, MR. HENRY (analysis of his evidence):
Is a miller at Beaminster in Dorsetshire, 6087. Has been fined ten times, in respect of one child, under the Vaccination Acts, and objects to vaccination as he considers it a dangerous operation, and ineffectual in the prevention of small-pox, 6093–6102.

DARKE, MR. E.:
Supplies of calf lymph obtained from Mr. Darke by the Vaccine Department of the Irish Local Government Board, 3115, 3127–31.

DIARRHŒA:
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DIPHTHERIA:
Reference to that portion of Dr. Barry's Report on the Sheffield small-pox epidemic of 1887–8, where comparison is made between the small-pox death-rate and the death-rate from diphtheria in Sheffield in the 27 years 1861–87, 1950–6.

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Action of the guardians at the time of the Sheffield small-pox epidemic of 1887–8 for promoting vaccination and re-vaccination, and for ascertaining the localities of unreported small-pox cases, 1881, 1883–6. Analysis made of the vaccination registers to ascertain the amount of default in the union, 1898. Proportions of attacks of small-pox of differing type in vaccinated and in unvaccinated persons at all ages treated in the Ecclesall Bierlow Union Workhouse, 2018, App., facing page 248 (Diagram J.).

ECCLESALL DISTRICT (SHEFFIELD):
Referred to in connexion with Dr. Barry's investigation of the Sheffield small-pox epidemic of 1887–8, 1907, 1909, 1911, 1912, 1915, 1948*a*, 1948*b*, 1956, 1961, 1989, 2014, App. facing page 248 (Diagrams C., M., and N.).

EGYPT:
Small-pox amongst the British soldiers in Egypt, 3475–8, 3482, 3553–5, 3602–6.
Table showing the admissions and deaths from small-pox among soldiers, during the 29 years 1860–88, in the United Kingdom, Colonies, India, and Egypt respectively, together with the ratio per 1,000 of the strength, App. 278 (Table D.).
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EVESHAM UNION:
Letter of the Local Government Board of the 17th March 1876 to the guardians of the Evesham Union on the subject of repeated prosecutions under the Vaccination Acts, 3907–9.

FARN, MR. ALBERT B. (analysis of his evidence):
Is examiner of vaccine lymph to the Local Government Board, 4011–4. The sources of the humanised lymph distributed from the National Vaccine Establishment, 4015–7. The method of registration employed in the collection and distribution of lymph by the National Vaccine Establishment, 4018–26, 4040, 4186–8. Witness' examination of the lymph previous to distribution, 4027–38, 4058–62, 4065–83, 4103–16, 4125–44, 4146–67, 4182–3, 4202–3, 4207–12, 4214–18, 4221–3, 4241–52, 4255–66; and whence it is derived (humanised lymph in tubes), 4015–26; (humanised lymph on points), 4230–9; (calf lymph), 4041–3.

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FARR, Dr.:

His opinion that small-pox attained its maximum after inoculation was introduced, and began to grow less fatal before vaccination was discovered, agreed with by Dr. Creighton, 5500.

FEVERS:

Reference to that portion of Dr. Barry's Report on the Sheffield small-pox epidemic of 1887–8, where comparison is made between the death-rates from small-pox and fever in Sheffield in the 27 years, 1861–87, 1950–6; the rates for the three periods 1861–69, 1870–78, and 1879–87, 2510–3.

Deaths from fever in Sheffield, and the share of such mortality borne by children, 2528–38. The diseases that were in Dr. Creighton's opinion probably included under the head "Fever" in the London Bills of Mortality, 5169, 5173, 5179–5206, 5233–4, 5242–9, 5589–90.

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FLINZER, Dr. MAX:

Dr. Flinzer's statistics of the small-pox epidemic in Chemnitz in 1870–71, 1468–70, 1585–1610, 1633, 1645–50, 6765–9, 6771–2; App. 234–6 (Table E.).

FRANCE:

Small-pox mortality and vaccination in France, from 1860 to 1871, 1537–42, App. 241 (Table Q.). Small-pox mortality and vaccination in the French Army, 1543–7, 1568–75, 1653–60, 6774–88, 6889–93. App. facing page 240 (Diagram), App. 242 (Table R.).

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FRANCE—*continued.*

Diagram showing the death-rate per 10,000 from typhoid, dysentery, and small-pox amongst the Prussian army from July 1870 to June 1871, and the French garrison of Langres from September 1870 to March 1871, App. facing page 240.

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FRY, Mr.:

Mr. Fry's cases of small-pox inoculation of persons who had had cow-pox, 5063–4, 5066–9.

GAINSBOROUGH:

The outbreak of erysipelas following vaccination at Gainsborough, 3942.

GALWAY UNION:

Letter of the Local Government Board for Ireland, of the 10th February 1879, to the guardians of the Galway Union, on the subject of the proposed inoculation of a calf with small-pox virus, 3104–7; and Dr. MacCabe's opinion that the letter was written under a misapprehension of the real facts, 3108–9, 3118–9.

GAYTON, Mr. WILLIAM, M.D. (analysis of his evidence).

Is superintendent of the North-Western Fever Hospital, 1683. His experience of small-pox cases and the number treated by him, 1684–5. The value of vaccination and re-vaccination as a protective agency against small-pox, 1686, 1754–78. Analysis of 10,403 small-pox cases considered, 1687. The classification of vaccine cicatrices, 1697–1712. As to doubtfully vaccinated cases, 1713–6.

Witness' experience at the Homerton small-pox hospital, at the camp at Darenth, and the hospital ships for small-pox patients, and at the North-Western Hospital, of the immunity of the successfully re-vaccinated nurses and other persons employed from contracting the disease, 1719–26, 1795–6. The importance of efficient vaccination as shown by well-defined marks, 1728–44. As to whether, or not, the quality of vaccination has improved of late years, 1745, 1750–53.

Per-centage of mortality from small-pox in present times compared with per-centage of last century, 1746–9. Respecting column headed, "Vaccinated but without evidence," in table handed in by witness, 1779–90. As to column headed "Not vaccinated" in table handed in by witness, 1791–6. The possibility or otherwise of the annihilation of small-pox by vaccination and re-vaccination, 1797–1802.

The protection afforded by small-pox in the case of a second attack, 1803–7. Respecting cases of small-pox among vaccinated persons, 1808–21. The difficulty of discerning the vaccination marks in the case of patients with confluent small-pox admitted after the third day, 1822–6. Good vaccination marks may wear out in time, 1827–8, 1869–72.

Whether successful re-vaccination implies a susceptibility to small-pox, 1836–9. Sanitation and small-pox outbreaks, 1840–7. Beneficial effect of isolation in small-pox cases, 1848. Vaccination and small-pox in hospital cases, 1848–59. The abiding influence of vaccination, 1860–4. The effect of a general repetition of vaccination every 15 years, 1865–8.

GERMANY:

The vaccination laws of Prussia, and of the German Empire, 1433–5, 1451–62, 1500–1, 1513–28, 5383, 6789–99, 6864–72. Small-pox mortality and vaccination in the city of Berlin, 1436–50, 1463, 1499, 1529–31, App. 231 (Table A.), App. facing page 231 (Diagram), App. 232 (Table B.), App. 240 (Table O.). Small-pox mortality in Prussia, 1463–6, 1469, 1493–5, 6807–21, App. facing page 231 (Diagram), App. facing page 232 (Diagram), App. facing page 238 (Diagram), App. 238 (Table L.). Small-pox mortality in the German Army, 1496–8, 1534–6, App. 239 (Table M.), App. 241 (Table P.).

Table showing the mortality from all causes of the German army during the war of 1870–71, App. 239 (Table M.).

GLAISTER, Mr. J. W. (analysis of his evidence):
Is an importer of manufactured timber in Darlington, 6326. Has been fined four times under the Vaccination Acts, 6327–40. Reasons for his objection to vaccination, 6327–54. Prosecutions under the Vaccination Acts at Darlington and at Newcastle, 6355–65. Small-pox outbreak in the Friends' School at Wigton, 6366–71. The compulsory vaccination of steerage passengers on the voyage to America, 6372–82. An instance of a vaccinated child taking small-pox, while one unvaccinated escaped entirely, and another took it slightly, 6382–92.

GOWER, Mr. JAMES (analysis of his evidence):
Is a machinist at Ashford, in Kent, 6073. Has been summoned 42 times, and fined in all 19*l.*, under the Vaccination Acts, in respect of two children, 6073–79. Objects to vaccination on the ground that he believes that it has proved injurious to his children, 6080–86.

GRAHAM, Mr. J. A. (analysis of his evidence):
Is a surveyor, residing in St. James's Road, Sutton, 6216. Has been fined nine times in respect of one child and twice in respect of another, sums amounting in all to 3*l.* 11*s.* 6*d.*, under the Vaccination Acts, 6217–21. Objects to vaccination because he believes that he has seen ill effects resulting from it, 6222–5.

GRIMSHAW, Mr. THOMAS W., M.D. (analysis of his evidence):
Is Registrar-General for Ireland, 2687–99. Took an active part in promoting the Vaccination (Ireland) Amendment Act of 1879, 2701. Has had practical experience in the treatment of a large number of small-pox cases, 2702; and has written several reports on small-pox outbreaks, 2703–5. Witness issues forms and regulations under the Irish Vaccination Acts after consultation with the Local Government Board for Ireland, 2706. Witness's personal experience of small-pox cases, and his reports on epidemics, 2701–6. The various Acts relating to vaccination and its compulsory enforcement in Ireland, 2706–8, 2727–38, 2761–2, 2766, 2769, 2776–8, 2843, 2889–92, 2898–9.

Statistics for Ireland, showing the estimated population in each of the years 1864–88, the number of deaths from small-pox registered during each year, and the rate per million of the living, 2717–25, 2904–55. Statistics showing by decennial periods the total number of deaths from small-pox in Ireland, the proportion of such deaths to deaths from all causes, and the average annual number of deaths per million living from 1831 to 1880, with like details for the eight years 1881–8, 2741–71.

The relation between births, registered vaccinations, and deaths from small-pox, from 1864 to the end of the year 1888, 2772–2828, 2904–55. Statistics showing the number of births registered and the number of vaccinations performed in the Dublin registration district, 2829–37. The epidemic of 1875 at Athenry, Ireland, 2838–42. The practice of inoculation in the West of Ireland within recent years, 2839–40, 2880–8, 2967–75.

Statistics of births, vaccination results, and deaths from small-pox in each union in Ireland from 1882 to 1888, 2848–62. Witness's experience of small-pox when physician to the Cork Street Hospital during the epidemics of 1871–3, and 1877–8, 2863. The relation of small-pox deaths to the general death-rate of Ireland, 2864–5.

The annual averages by quinquennial periods, and by ages, of the deaths from small-pox in Ireland from 1864–88 inclusive, 2866. The age composition of those dying from small-pox compared with those dying from fever, 2867. Deaths from cow-pox and other effects of vaccination in Ireland from 1st January 1881 to 30th September 1889, 2868–9.

Deaths from infantile syphilis in Ireland from 1864 to 1888, 2870–1, 2876–9. Statistics of blindness resulting from small-pox, 2872–3. The fall in the number of vaccinations in Ireland compared with the births in the last few years, 2894–7.

Witness believes that offenders may be fined repeatedly under the Irish Vaccination Acts, 2898–9. The feeling with regard to vaccination and its enforcement in Ireland, 2900–3. In witness's opinion the recrudescence of small-pox epidemics in Ireland is caused by the neglect of vaccination and re-vaccination, 2956–66. The sanitary condition of Ireland, 2978–81.

The danger of an outbreak of small-pox in Ireland in consequence of the falling off in the number of persons vaccinated, 2985–8.

GRIMSHAW, Mr. THOMAS W., M.D.—*continued.*
Statistics showing the small-pox, zymotic, and general mortality in Dublin during the past 25 years, 2989–94. The system of isolation in the treatment of small-pox in Ireland, 2996–7. Re-vaccination of nurses and attendants in Irish small-pox hospitals, 2999–3001.

The necessary discrepancy in the dates up to which the statistics in witness's tables are made, 3028–32.

GUEST, Mr. WILLIAM (analysis of his evidence):
Is a gardener at Quinton, 6686. In 1878 was fined 1*l.* under the Vaccination Acts, 6687. In 1880 was sentenced to 14 days hard labour, eight days of which were afterwards remitted, in default of paying two other fines, 6688–90, 6694–8. In 1882 and again in 1887, was imprisoned for 14 days, 6691–4.

GUTTSTADT, Dr.:
Dr. Guttstadt's paper in the "Zeitschrift des Königlichen Preussischen Statistischen Bureaus" for 1873, on the small-pox epidemics in Prussia from the beginning of the century down to 1872, 1431–2, 1436–50, 1463, 1469, 1493–5, 1600, 6807, 6822, 6824–6, 6838–9, App. 231 (Table A.), App. facing page 231 (Diagram), App. 232 (Table B.), App. 238 (Table L.).

HARRISON, Mr. JOSEPH (analysis of his evidence):
Is a carpenter residing at Crossways, Abinger, 6193. Has been fined sums amounting in all to 5*l.*, and once committed to prison for 14 days under the Vaccination Acts, 6194–6202, 6207–8. Instances other cases of prosecutions in his neighbourhood, 6203–6, 6209–11. The reasons for his objections to vaccination, 6214–15.

HAYWARD, Mr. CHARLES (analysis of his evidence):
Is a turner of Ashford, Kent, 6161–2. Has been prosecuted 79 times and fined sums in all amounting to 37*l.* 10*s.* under the Vaccination Acts, 6163–8. Has a conscientious objection to vaccination, 6169–72. Witness has received assistance in the payment of some of his fines, 6176–81.

HICKS, Mr.:
A friend and supporter of Jenner, his statement as to the frequency of ulcerations in the first stages of vaccine inoculation, 4834–5.

HINDUS:
Instance of a village in the Hyderabad collectorate in Scinde, during an epidemic of small-pox in 1866, where great mortality occurred amongst the unvaccinated Hindu children, while the vaccinated Mussulman children were entirely free from the disease, 1233–8, 1315–27, 1396–7, App. 230. The relative proportion of Mussulmans to Hindus in Scinde, 1251. The Hindus have no objection, on principle, to vaccination, 1252.

HOPKIRK, Mr. ARTHUR F., M.D. (analysis of his evidence):
Is a doctor of medicine of the university of Jena, 1428.

Dr. Guttstadt's account in the "Zeitschrift des Königlichen Preussischen Statistischen Bureaus" for 1873, of the small-pox epidemics in Prussia from the beginning of the century down to 1872, 1431–2, 1436–50, 1463, 1469, 1493–5, 1600, 6807, 6822, 6824–6, 6838–9.

The vaccination laws of Prussia and of the German Empire, 1433–5, 1451–62, 1500–1, 1513–28, 5383, 6789–99, 6864–72. The laws of Bavaria in regard to vaccination, 1481–4, 1488–9. Statement of Dr. Böing as to the compulsory enforcement by law, and his opinion as to the prevalence, of vaccination in Prussia before 1874, 1521, 1523–8; and the opinion of Dr. Koch of the Imperial Health Office in Berlin, as to the date of the commencement of compulsory vaccination in Prussia, 1528, 6870. Small-pox mortality and vaccination in the city of Berlin, 1436–50, 1463, 1499, 1529–31. Small-pox mortality in Prussia, 1463–6, 1469, 1493–5, 6807–21. Small-pox mortality in the German army, 1496–8, 1534–6.

Dr. Max Flinzer's statistics of the small-pox epidemic in Chemnitz, in Saxony, in 1870–71, 1468–70, 1585–1610, 1633, 1645–50, 6765–9, 6771–2. The non-reliability of German statistics of earlier date than 1875, as regards the condition of the population with respect to vaccination, 1598–1601, 1633–5, 1673–82, 6816–37, 6873–86.

Small-pox mortality in Vienna during the years 1870–83, 1529–33; and in the Austrian army during the years 1870–9, 1534.

HOPKIRK, Mr. ARTHUR F., M.D.—*continued.*

Small-pox mortality and vaccination in France from 1860 to 1871, 1537–42; and in the French army, 1543–7, 1568–75, 1653–60, 6774–88, 6889–93.

Small-pox and vaccination in Cologne in 1871–3, 1629–35; the small-pox fatality in vaccinated and unvaccinated in Coblentz in 1871, 1638, 1641–2, 1646, 1649, 6770.

The verification and the sources of witness' statistics, 1502–11, 1549–51, 1554–5.

The question of the transferability of small-pox into cow-pox, 6848–9, 6852–63.

HORSE-GREASE:

Dr. Creighton's opinion that inoculation with horse-grease will produce a vesicle indistinguishable from the vaccine vesicle, 5558–9, 5562–3. Horse-grease used in France, with the belief that it protects from small-pox, 5564–5.

HOSPITALS:

The position of the Sheffield hospitals in use during the small-pox epidemic of 1887–8, 1916–8; the cubic space per bed in each, 2031–2. The incidence of small-pox during the Sheffield epidemic of 1887–8, in the neighbourhood of the Sheffield (Winter Street) Small-pox Hospital, 1920–49, 2156, 2190–2234, 2609–12. The fatality (case mortality) of the cases of small-pox treated in the various Sheffield Hospitals during the epidemic, 2018–26, App. facing page 248 (Diagrams J. and K.).

Dr. Gayton's analysis of 10,403 hospital small-pox cases, showing the fatality per cent. of attacks of patients classified according to the number and quality of their cicatrices, 1687–1712, 1714–8, 1727–38, 1780–2, 1860–4, App. 243–5 (Table A. and B.).

Mr. Sweeting's analysis of 2,584 hospital small-pox cases, showing the fatality per cent. of attacks of patients classified according to the absence or, if present, the quality of their cicatrices, 3689–3716, 3767; his analysis of 1,888 vaccinated cases, according to the number of the cicatrices, 3717–21, 3744; his analysis of 311 vaccinated cases according to the area of the cicatrices, 3722; and his table showing the relation between the severity of small-pox and the observed condition of vaccination in the above-mentioned 2,584 cases, 3723.

Dr. Gayton's experience of the immunity of the successfully re-vaccinated nurses and other hospital attendants from contracting small-pox, 1719–26, 1795–6. Dr. Barry's similar experience at Sheffield during the small-pox epidemic of 1887–8, 2029–30, 2494–2500. The practice of re-vaccinating the nurses in the small-pox hospitals in Dublin, 2999–3001, 5278–97. Mr. Sweeting's experience at the Metropolitan Asylums Board's Western Hospital, as to the re-vaccination of the hospital staff and its results, 3733, 3775–95, 3799. The re-vaccination of the hospital staff at the London Small-pox and Vaccination Hospital with calf lymph, 4410. Statement contained on the cards given to parents of children vaccinated at the Animal Vaccine Lymph Station, with reference to re-vaccinated nurses at small-pox hospitals, 4509–11, 4554–7, 4808. Dr. Creighton's opinion as to the immunity of hospital nurses from contracting small-pox, 5267–5301.

HUTCHINSON, Mr. THOMAS (analysis of his evidence):

Is a builder's clerk at Ruskinton near Sleaford, 6067. Has been twice fined under the Vaccination Acts, 6068–71. The magistrates in his district hold it to be a reasonable excuse if a previous child has, in the opinion of the parent, suffered from vaccination, 6072.

INDIA:

Surgeon-General John Pinkerton's experience of vaccination in India, 1226–7. The ravages of small-pox in Scinde previous to the enforcement of vaccination, 1228–30. The commencement and increase of vaccination in Scinde, and the prohibition of inoculation, 1231, 1270–5. The rarity of cases of injury by small-pox observed in Scinde in 1888, as compared with the large number of such cases seen in 1863, 1232.

Instance of a village in Scinde where, during an epidemic of small-pox in 1866, great mortality occurred amongst the unvaccinated Hindu children, while the vaccinated Mussulman children were entirely free from the disease, 1233–8, 1315–27, 1396–7, App. 230. Dr.

INDIA—*continued.*

Pinkerton's general experience in India that of unprotected persons attacked by small-pox, 25 per cent. would die, 1239–41.

The mortality from small-pox, and the regulations as to vaccination in the Bombay army, 1242–5, 1247–8, 1276–9, 1328–35, 1356–61; the sanitary regulations in the army, 1336–7. The meaning of the Indian word "*mata*," 1246. Lameness as a result of small-pox in Scinde, 1249–50. The relative proportion of Mussulmans to Hindus in Scinde, 1251. The Hindus have no objection on principle to vaccination, 1252. Method of vaccinating in Scinde, 1253–4.

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LUCK, Mr. PHILIP (analysis of his evidence):
Is a teadealer at Eastbourne, 6116. Has been fined 13 times, in sums amounting in all to 13*l.* 5*s.*, under the Vaccination Acts, in respect of two of his children,

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MACCABE, Mr. FRANCIS-XAVIER FREDERICK (analysis of his evidence):

Fellow of the King's and Queen's College of Physicians of Ireland, and a member of the Royal College of Surgeons, England. Is Medical Commissioner on the Local Government Board for Ireland, and was formerly an inspector of the Local Government Board, Ireland, 3033–6. The early history of small-pox in Ireland, 3037–42, 3095.

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MACDONALD, Dr. J. D.:

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MINNS, Mr. THOMAS TATE (analysis of his evidence):
Is a grocer at Murton Colliery, Seaham Harbour, 6393. Has been fined four times under the Vaccination Acts, 6394–6400, 6421, 6434–6. Objects to vaccination because both himself and his sister took small-pox during the 1871 epidemic, although they had been re-vaccinated some few weeks previously, while the other members of the family who had not been re-vaccinated did not take it, 6401–46. The feeling of the colliery people at Seaham Harbour with regard to vaccination, 6437.

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PEARSE, MR. FREDERICK (analysis of his evidence):
Is a photographer at Basingstoke, formerly residing at Andover, 5739–40. Was prosecuted at Andover 60 times, and fined sums amounting in all to 17*l.* 5*s.*, under the Vaccination Acts, in respect of nine of his eleven children, 5741–54, 5763, 5767, including 22 prosecutions in respect of the eldest, 5755. Was twice distrained upon for nonpayment of fines or costs, 5751.

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Letter from Surgeon-General John Pinkerton to the Chairman of the Commission, enclosing an extract from the Report on Vaccination throughout the Bombay Presidency and Scinde for the year 1866, App. 230.

PITMAN, Mr. HENRY (analysis of his evidence):

Is a reporter and teacher of phonography at Manchester, 6241. Has been fined three times, and once imprisoned in default of payment, under the Vaccination Acts, 6242–67. The feeling at Manchester as regards vaccination, and its compulsory enforcement, 6268–71.

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POCOCK, Mr. CALEB (analysis of his evidence):

Is a hatter and hosier at Brighton, 6557. Has been prosecuted 18 times, and fined sums in all amounting to 12*l.*, under the Vaccination Acts, in respect of six of his children, 6558–62, 6595. The reasons of his objection to vaccination, 6563–4, 6570, 6596–9, 6604–23. Has been secretary to the Brighton Anti-Compulsory Vaccination League for the last 14 years, 6565–7, 6591–4. Cases at Brighton of imprisonment and distraint under the Vaccination Acts, 6567–9; and cases of injury, in witness' opinion, arising from vaccination, 6571–80. Case of a child vaccinated in the Brighton Workhouse and believed by witness to have died from the effect, 6581–90. Resolution passed some years ago by the Brighton Board of Guardians only to prosecute once under the Vaccination Acts in respect of each child, 6595. The feeling at Brighton as regards vaccination and its compulsory enforcement, 6591–5, 6600–2.

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The letter of the Local Government Board (England) to the guardians of the Evesham Union on the subject of repeated prosecutions under the English Vaccination Acts, 3907–9. The Board have never given instructions to vaccination officers to proceed to further prosecutions in cases where the guardians have not desired to do so, 4004; practically the guardians' discretion as to the repetition of prosecutions is absolute, 4001–5. The Board's view on the matter, 3909. The recommendation as to repeated prosecutions made in 1871 by the Select Committee of the House of Commons on the Vaccination Act (1867), 3957–9.

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Dr. Guttstadt's paper in the "Zeitschrift des Königlichen Preussischen Statistischen Bureaus" for 1873, on the small-pox epidemics in Prussia from the beginning of the century down to 1872, 1431–2, 1436–50, 1463, 1469, 1493–5, 1600, 6807, 6822, 6824–6, 6838–9, App. 231 (Table A.), App. facing page 231 (Diagram), App. 232 (Table B.), App. 238 (Table L.).

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Memorandum of the Medical Officer of the Local Government Board on arrangements for the performance of public vaccination, App. 285.

QUARANTINE (*see* " ISOLATION ").

RABSON, MR. PETER (analysis of his evidence):

Is a draper at Ashford, in Kent, 6103. Has been five times fined 20*s.* under the Vaccination Acts in respect of one of his children, 6104–9, 6113. The reasons for his objection to vaccination, 6110–2, 6114–5.

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RAWLINGS, MR. ALFRED (analysis of his evidence):

Is a stationer at Guildford, 6624. The results of inquiries made by the Guildford Anti-Compulsory Vaccination Society with the view of ascertaining how the Vaccination Acts are carried out by the different boards of guardians, 6625–33.

RENNER, DR.:

Dr. Renner's establishment for the supply of calf lymph, 4455–6.

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The effect of sanitation on small-pox and its mortality, in Surgeon-General John Pinkerton's opinion, 1336–8, 1377–80; in Dr. Gayton's, 1840–5; in Dr. Barry's, 2175–7, 2553–7; in Staff-Surgeon T. J. Preston's, 3253–4; in Mr. Sweeting's, 3755–61; in Dr. Creighton's, 5214–7, 5250–1, 5474–7, 5481, 5631–4; and in Dr. MacLaurin's, 5929.

The sanitary conditions of the nine sub-districts of Sheffield previous to and at the time of the small-pox epidemic of 1887–8, 1907–15, 2084, 2167–89, 2504–9, 2545, 2550–1, 2614–17; and the effects of these conditions on the small-pox incidence and fatality during the epidemic, 2010–15, 2075–83, 2175–7, 2553–7.

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Dr. Willan on the sanitary condition of London in 1801, 5214–5, 5223–5, 5250, 5494–9; Dr. John Moore on the sanitary condition of London in 1786, 5492–4. Dr. Creighton's opinion as to the diseases with which small-pox should be compared in considering the effect of sanitation upon the decline in the death-rate, 5485–9, 5507.

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Table showing the mortality from small-pox in the three towns Rawicz, Bojanowo and Sarnowo during the epidemic of 1795–96, and in Lower Franconia in 1866–67, primary vaccination being compulsory in the latter instance, App. 237 (Table G.).

SAUNDERS, MR. JOHN RUPERT (analysis of his evidence):

Is a sailmaker at Newhaven, 6634. Has been imprisoned for seven days in default of payment of a fine imposed under the Vaccination Acts, 6635–47.

SAVAGE, MR. JOHN (analysis of his evidence):

Is a shopkeeper at Kinsale, County Cork, Ireland, 6272. Has been prosecuted 29 times, and fined sums amounting in all to 10*l.* 5*s.*, for not having two of his children vaccinated, 6273–4, 6283–90, 6301–4, 6306–9, 6312–23; and has been six times distrained on for non-payment of fines, 6282, 6304, 6312–4. The reasons for witness' objection to having these two children vaccinated, 6275–82, 6291–8, 6319–25. The feeling in Cork regarding vaccination, 6299–300, 6305–6, 6310–1.

SCARLATINA:

Reference to that portion of Dr. Barry's Report on the Sheffield small-pox epidemic of 1887–8, where comparison is made between the small-pox death-rate and the death-rate from scarlatina in Sheffield in the 27 years 1861–7, 1950–6.

SCINDE:

Surgeon-General John Pinkerton's experience of vaccination in Scinde, 1226–7. The ravages of small-pox there previous to the introduction of vaccination, 1228–30. The commencement and increase of vaccination in Scinde, and the prohibition of inoculation, 1231, 1270–5. The rarity of cases of injury by small-pox observed in Scinde in 1888, as compared with the large number of such cases seen in 1863, 1232. Instance of a village in Scinde where, during an epidemic of

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Letter from Surgeon-General John Pinkerton to the Chairman of the Commission, enclosing an extract from the Report on Vaccination throughout the Bombay Presidency and Scinde for the year 1886, App. 230.

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SHEFFIELD:
Dr. Barry's investigations into the Sheffield small-pox epidemic of 1887–88, 1876–2641. (*And see* "*Barry.*")

The sanitary conditions of the nine sub-districts of Sheffield previous to and at the time of the small-pox epidemic of 1887–8, 1907–15, 2084, 2167–89, 2504–9, 2545, 2550–1, 2614–17; and the effects of these conditions on the small-pox incidence and fatality during the epidemic, 2010–15, 2075–83, 2175–7, 2553–7.

Form of card used in making inquiries into cases of deaths from small-pox during the Sheffield small-pox epidemic of 1887–88, App. 248.

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Diagram showing the variations in the age incidence of the several fatal infectious diseases in the borough of Sheffield as witnessed during the 10 years 1861–70, and the 10 years 1876–83, 1886–7, App. facing page 248 (Diagram A.).

Diagram showing separately for vaccinated and for unvaccinated persons living in those houses of Sheffield which had, up to the date of the "Census," become invaded by small-pox, the small-pox attacks, and the small-pox deaths, that had occurred up to that date, per cent. of the inhabitants, under 10 years of age, over 10 years of age, and at all ages, App. facing page 248 (Diagram B.).

Diagram showing the proportion in each 100 persons, of the vaccinated and unvaccinated classes respectively, reported by the "Census" enumerators to have resided in the several sub-districts of Sheffield in houses invaded by small-pox, who were attacked by the disease during 1887–88, distinguishing fatal and non-fatal cases, App. facing page 248 (Diagram C.).

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Table showing for the borough of Sheffield, and for each of its sub-divisions, the number of small-pox attacks and small-pox deaths, during the whole epidemic to the 31st March 1888, together with the rates per 1,000 of the population in each case, excluding attack and death of unvaccinated infants under one month of age, App. 249 (Table E.).

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Diagram showing for the whole period of the epidemic and severally for all classes, for vaccinated and for unvaccinated, small-pox attack-rates and small-pox death-rates in the borough of Sheffield, and in each of its sub-divisions, App. facing page 248 (Diagram G.).

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Diagram showing the proportion of cases of small-pox of different types which occurred in persons of the vaccinated and unvaccinated classes respectively, at all and certain specified ages, in the Winter Street and Sheffield Union Workhouse Hospitals, App. facing page 248 (Diagram K.).

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SHORTER, Mr.:
Correspondence between Mr. Shorter and Dr. Edward Jenner with reference to the results of a variolous test tried by the former in December 1799 on two recently vaccinated persons, 4971–94, 5058, 5075.

SIBLY, Mr. GEORGE WILLIAM, M.A. (analysis of his evidence):
Is a master of arts of Oxford, and a schoolmaster of Stonehouse in Gloucestershire, 6052. Has been prosecuted in respect of one of his children seven times and in respect of two others twice and three times respectively and fined sums amounting in all to 8*l.* 12*s.* 1*d.*, under the Vaccination Acts, 6053–5, 6059. Has a relative who has not been prosecuted though his seven children are all unvaccinated, 6056, 6059. The reasons of witness' objection to vaccination, 6057, 6060–6, and the feeling in his district on the subject, 6058.

SIMPSON, Dr.:
Lymph supplied by Dr. Simpson and used at the Animal Vaccine Lymph Station (Lamb's Conduit Street) for a limited time, 4281–91; its origin from the variolation of a cow, 4318–21, 4329, 4331–2, 4429–34, 4557–9, 4564–8; and effects, 4289, 4291, 4322–3, 4330, 4443–6, 4560–3.

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The ravages of small-pox in Scinde previous to the enforcement of vaccination, 1228–30. The rarity of cases of injury by small-pox observed in Scinde in 1888, as compared with the large number of such cases seen in 1863, 1232.

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The mortality from small-pox, and the regulations as to vaccination in the Bombay army, 1242–5, 1247–8, 1276–9, 1328–35, 1356–61. Lameness as a result of small-pox in Scinde, 1249–50. The small-pox epidemic of 1872 in the Bombay Presidency, 1282. Statistics of vaccination and small-pox in the Bombay Presidency, 1283–9, 1311–2, 1344–54. Dr. Pinkerton's opinion as to the decline of small-pox in the Bombay Presidency, 1339–43, and its cause, 1338, 1377–81. The vaccination of, and the small-pox mortality amongst, the infantile population in the Bombay Presidency, 1415–27. Small-pox amongst the British soldiers in India, 3475–9, 3484–8, 3544–52, 3617.

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Gayton's, 1840–5; in Dr. Barry's, 2175–7, 2553–7; in Staff-Surgeon T. J. Preston's, 3253–4; in Mr. Sweeting's, 3755–61; in Dr. Creighton's, 5214–7, 5250–1, 5474–7, 5481, 5631–4; and in Dr. MacLaurin's, 5929.

Dr. Guttstadt's paper in the "Zeitschrift des Königlichen Preussischen Statistischen Bureaus" for 1873, on the small-pox epidemics in Prussia from the beginning of the century down to 1872, 1431–2, 1436–50, 1463, 1469, 1493–5, 1600, 6807, 6822, 6824–6, 6838–9, App. 231 (Table A.), App. facing page 231 (Diagram), App. 232 (Table B.), App. 238 (Table L.). Small-pox mortality and vaccination in the city of Berlin, 1436–50, 1463, 1499, 1529–31, App. 231 (Table A.), App. facing page 231 (Diagram), App. 232 (Table B.), App. 240 (Table O.). Small-pox mortality in Prussia, 1463–6, 1469, 1493–5, 6807–21, App. facing page 231 (Diagram), App. facing page 232 (Diagram), App. facing page 238 (Diagram), App. 238 (Table L.). Dr. Max Flinzer's statistics of the small-pox epidemic in Chemnitz, in Saxony, in 1870–71, 1468–70, 1585–1610, 1633, 1645–50, 6765–9, 6771–2, App. 234–6 (Table E.). Small-pox mortality in the German army, 1496–8, 1534–6, App. 239 (Table M.), App. 241 (Table P.).

Small-pox mortality in Vienna during the years 1870–83, 1529–33, App. 240 (Table O.). Small-pox mortality in the Austrian army during the years 1870–9, 1534.

Small-pox mortality and vaccination in France from 1860 to 1871, 1537–42, App. 241 (Table Q.). Small-pox mortality and vaccination in the French army, 1543–7, 1568–75, 1653–60, 6774–88, 6889–93, App. facing page 240 (Diagram), App. 242 (Table R.).

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Dr. Gayton's analysis of 10,403 small-pox cases, showing the fatality per cent. of attacks of patients classified according to the number and quality of their cicatrices, 1687–1712, 1714–8, 1727–38, 1780–2, 1860–4, App. 243–5 (Tables A. and B.). Mr. Sweeting's analysis of 2,584 small-pox cases, showing the fatality per cent. of attacks of patients classified according to the absence or, if present, the quality of their cicatrices, 3689–3716, 3767; his analysis of 1,888 vaccinated cases, according to the number of the cicatrices, 3717–21, 3744; his analysis of 311 vaccinated cases according to the area of the cicatrices, 3722; and his table showing the relation between the severity of small-pox and the observed condition of vaccination in the above-mentioned 2,584 cases, 3723.

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Prevalence of small-pox in Dublin in 1871–2–3, 2825, and in 1878–9, 2830–1. The small-pox epidemic at Athenry, Ireland, in 1875, 2838–41. The relationship between the general mortality in Dublin and the mortality from small-pox and zymotic diseases generally, 2864–5, 2989–93.

Small-pox in Ireland before the time of inoculation or vaccination, 3038–42, 3095.

Dr. Farr's opinion that small-pox attained its maximum after inoculation was introduced, and began to grow less fatal before vaccination was discovered, agreed with by Dr. Creighton, 5500; and Dr. Creighton's opinion as to the causes of the great decline of small-pox at the commencement of the nineteenth century, 5474–7, and as to the diseases with which small-pox should be compared in considering the effect of sanitation upon the decline in the death-rate, 5485–9, 5507.

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The outbreak of small-pox on the S.S. "Preussen," 5839, 5886–9, 5936, 5942–88, 6030–2.

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Table showing the mortality from small-pox in the three towns Rawicz, Bojanowo, and Sarnowo, during the epidemic of 1795–6, and in Lower Franconia in 1866–67, primary vaccination being compulsory in the latter instance, App. 237 (Table G.).

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Table showing the per-centages of deaths from small-pox among vaccinated and unvaccinated in various places in different years, App. 240 (Table N.).

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Table showing the number of births, vaccinations, and cases of, and deaths from, small-pox in France from 1860 to 1871, App. 241 (Table Q.).

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Diagram showing the proportion of cases of small-pox of the confluent and discrete types respectively, which occurred in persons at all ages of different classes in the Sheffield small-pox hospitals, App. facing page 248 (Diagram J.).

Diagram showing the proportion of cases of small-pox of different types which occurred in persons of the vaccinated and unvaccinated classes respectively at all and certain specified ages in the Winter Street and Sheffield Union Workhouse Hospitals, App. facing page 248 (Diagram K.).

Diagram showing for the borough of Sheffield, the share, during successive epidemics, of the total small-pox mortality borne by children under 10, and by persons aged 10 years and upwards, and also similar facts, during 1887–88 for vaccinated and unvaccinated classes respectively, App. facing page 248 (Diagram L.).

Diagram showing for each sub-district of Sheffield, during successive epidemics, the share of small-pox mortality borne by children under 10 years, and by persons aged 10 years and upwards, App. facing page 248 (Diagram M.).

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Table showing for each of the years 1864–88, in the whole of the Royal Navy and on each station, the number and the ratio per 1,000 of force of attacks of small-pox, the number and the ratio per 1,000 of force of deaths from small-pox, the vaccinational condition as far as known of those attacked, and the average number of men sick daily from small-pox, App. 250 (Table A.).

Table showing the number of attacks of, and of deaths from, small-pox in the Royal Navy for each of the years 1860–88, with, in each case, the ratio per 1,000 of force, App. 254 (Table B.).

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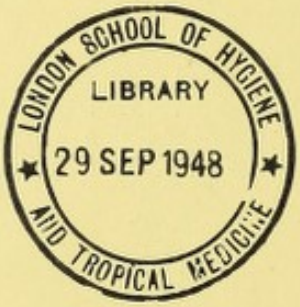
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