On small pox and its prevention, including experiments upon the lower animals : and on the establishment of government hospitals for this and some other contagious diseases in the suburbs of London / by Edwards Crisp.

ON

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SMALL POX

AND ITS PREVENTION,

INCLUDING

EXPERIMENTS UPON THE LOWER ANIMALS,

AND

the establishment of Government Hospitals for this and some other Contagious Diseases in the suburbs of London.

BY

EDWARDS CRISP, M.D., M.R.C.S., L.A.C.,

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ON

SMALL POX, AND ITS PREVENTION;

INCLUDING

EXPERIMENTS UPON THE LOWER ANIMALS.

A Paper read before the Medical Society of London, February 27th, 1871.

Mr. President, and Gentlemen,

In the communication I am about to read to the Society, it will be my endeavour to touch upon such matters connected with Small-pox that I believe to be of practical value, and that are especially applicable at the present time, when an epidemic of a very fatal character is raging in London.

It has for many years been my custom, in investigating the nature and origin of the diseases of man, to endeavour to ascertain if like affections are to be found in the lower forms of organization; a mode of research (as I have often said before,) that I believe will hereafter lead to much practical good.

It is a remarkable fact, that the sheep is the only one of the lower animals which is liable to Small-pox; and it is singular that the goat, so nearly allied in anatomical structure and in habits to the sheep, is not subject to the disease, even when inoculated; and it is still more remarkable, that the cow (from which the antidote to this poison in the human subject is obtained,) is never affected with true Small-pox; although, when inoculated with Small-pox matter, a local disease is obtained that resembles Cow-pox, and that appears to possess the same amount of preservative power against variolous infection.

I have vaccinated many cows, but in no instance has the disease extended beyond the point of puncture. During the Cattle Plague, in my fourth and eighth Letters to the Lords of the Privy Council, pp. 83—87, I was the first to show the exanthematous nature of this disease, and to point out that

this affection (as supposed by some) bore no resemblance to Small-pox, either as regards the symptoms or morbid appearances.—"Transactions Pathological Society, October 17th, 1865.

I am well aware that cows in India are said to have had Small-pox; and in 1862, this disease is believed to have appeared among horses at Toulouse; the camel, also, is said to be subject to it; but I question whether any of these affections can rightly be denominated Small-pox?

Small-pox in the sheep probably first appeared in England in 1710, and was described by Dr. Thomas Fuller in 1730. Other outbreaks occurred in 1847 and 1862. I have had opportunities of studying this disease, and of examining sheep after death. The disease in many respects resembles human Small-pox, and is quite as contagious; a diseased flock is said to have infected other sheep 500 yards off. The pustules, as shown in the drawings, and in the model of the sheep's head on the table, are larger, and they remain for rather a longer period. Vaccination has been tried, without satisfactory results. Inoculation, as first shewn by Hurtzel in France, and more recently by Messrs. Marson and Simonds, reduces the mortality from 50 to 5 per cent. Professor Gamgee prefers isolation, believing, that as in human Small Pox, inoculation serves to spread the disease.

EXPERIMENTS.

As I have said before, I believe that the sheep is the only one of the lower animals that is affected with genuine Small-pox. I have recently made several experiments to ascertain if rats, mice, guinea-pigs, hens, small birds, frogs, and fishes, could be affected by Small-pox inoculation; but in no instance could I produce either local or general effects. I need not weary my hearers by a recital of details. Three months since, I vaccinated a young monkey on each ear, and six well-formed vesicles appeared. A month after this, I inoculated the same monkey with Small Pox matter, but without any perceptible result.

To ascertain if vaccine lymph would protect from Small-pox, I have recently inoculated a strong healthy monkey, at three separate times, with Small-pox matter; but no effect was

produced, except one small pustule at the seat of puncture. I need scarcely say, that all the animals were isolated in a large garden, and properly secured.

SMALL-POX IN MAN.

It is not my intention to speak of the treatment of Small-pox more than to express my opinion that generally the more the patient is left to nature, and the less meddlesome the treatment the better; cool, well ventilated rooms, and the absence of the brandy and wine treatment so common in modern practice, I think are the most important; but doctors differ, and I gladly pass on to ground of a more stable character.

Time will not permit me to glance now at the state of this Metropolis before the introduction of vaccination. The "Medical Register" and the works of Gaunt, Willan, Heberden, Haygarth, and others, may be consulted upon this point. According to Heberden, in the year 1808, the number of deaths in London exceeded the births by only 48; but in the first ten years of the 18th century, they exceeded the births by 5,738. During the present week, February 4th, 1871, the births in London exceed the deaths by 738.

THE PRESENT EPIDEMIC.

Although there can be but little doubt that the present epidemic began long before the war between France and Prussia, it is more than probable that it has been greatly increased by importations from Paris and other parts of France, where the disease has been rife. Second-hand clothes and other articles of dress have been distributed about London, and in this manner the poison has been disseminated. Since November, 1869, there has been an increase of Small-pox in London. Let me quote the last return of the Registrar-General, February 18th, 1871, when the deaths in London were 218 against 211 the preceding week. For eight weeks up to the 11th of February, the fatal cases averaged in London 144 weekly. In 31 years from 1840 to 1870, the weekly average was only 16. During this period there were nine epidemics, the greatest mortality occurring in 1840, 1844, and 1863; in the last-named year, 2,012 died in London

of Small-pox. In Liverpool the disease has been more fatal than in London, the deaths in this city amounting to 10·5 per cent. of the deaths, whilst in London they are 3·5 per cent.

On looking over the Registrar-General's Returns from 1850 to 1861, I find during these ten years that no case of Small-pox occurred in the following Unions: Christchurch, Ringwood, Whitchurch, Peusey, Holsworthy, Askrig, Bellingham, and Belford. The unions that had only one case in these ten years, were Arlesford, Farnboro', Cranbrook, Cuckfield, Petworth, Winslow, Whittlesey, St. Faith's, Blofield, Scilly Isles, Tetbury, Uppingham, Sedberg, and Wetherby.

During these ten years, the deaths in England and Wales amounted to 42,071; 22,416 males, and 19,655 females. It is worthy of remark, that in all the above-named places, the population was comparatively scanty, and the sick were easily isolated.

METHODS OF INFECTION.

But now let me ask how this disease is spread among the people? First and foremost among the causes is that of our public vehicles—cabs, omnibuses, railway carriages, and steam-boats. The carelessness of some people convalescent from Small-pox is beyond belief: many are in public places eight or ten days before they cease to contaminate others, and until a very stringent law is passed to punish severely those who thus endanger the lives of the public, there is little chance of a cessation of the danger.

Other methods of contamination are by means of clothes and bedding not properly disinfected, furnished lodgings, linen from washerwomen and laundresses, books from circulating libraries and literary institutions, second-hand clothes, woollen goods of various kinds, money too I believe may sometimes convey the poison, and attendance at funerals where persons who have been in attendance upon the sick are present, and the congregation of persons at churches and chapels, as well as at theatres, and other places of amusement. I am afraid, too, that members of my own profession who are not careful to wash their hands and change their coats, may sometimes be the conductors of the disease, and this leads me to speak of one evil likely to accrue

from the recent Educational Act. If very stringent laws are not enforced, the congregation of a large number of children, especially in unhealthy districts, will greatly add to the increase of some contagious diseases.

INCUBATION, INFECTION, AND DISINFECTION.

In concluding this brief notice of Small-pox, let me say a word about the period of incubation. According to Mr. Marson, one of our best authorities, "there are from the period of infection to the coming out of the eruption, about fourteen days, the patient being indisposed for two or three days before its appearance." M. Laboulbéne, at the Hôpital St. Antoine, Paris, ("L'Union Méd." Nov. 14th, 1868,) in seventeen carefully observed cases, found the period from fourteen to sixteen days.

As regards the time that a Small-pox patient may continue to infect others, there is much difference of opinion. As long as scab remains on the body there is danger, and if the clothes are not disinfected, the danger remains for a much longer time. According to Heberden and Haygarth, "A Small-pox patient does not communicate the disease before the appearance of the eruption, and the period of infection is extended to the fortieth or fiftieth day from the appearance of the papules, but in mild cases, after vaccination, the time will be much shorter."

DISINFECTANTS.

Heat, probably, is the only means to be relied upon to destroy the poison. Next to this, rolled brimstone burnt in the chamber, the windows and doors being pasted up with paper for eight or ten hours, will be most efficacious. Exposure to the air is another great adjunct to disinfection. Two or three warm baths, to which carbolic acid may be added, should be taken by the patient when the scab has disappeared. The greater number of so-called disinfectants are of little value, I believe; they have a false repute, and serve only to fill the pockets of those who advertise them.

ON THE PREVENTION OF SMALL-POX.

The great desideratum in all matters relating to health in this country is the want of a central authority and of uniform

power and action. We have recently had thirteen Acts—Health Acts, Nuisance Removal Acts—besides subsidiary Acts, and we have local authorities to whom are delegated duties that they are utterly unable, in consequence of their want of medical knowledge, properly to carry out. The divided and disjointed state of the medical profession makes us almost powerless in matters in which we should have most influence. Aristocratic Royal Commissions, with a small sprinkling of the *members* of our profession, make their reports, and we have crude and inefficient laws that exist for a time, and then are patched up again by Royal Commission or Parliamentary Committees. The only means of correcting this state of things is, I believe, the establishment of a Board of Health* properly constituted—one central authority to whom all proper power should be delegated. By this means the divided counsels which at present prevail would cease, and we should not have ill-digested and crude advice given to the public that tends to throw discredit upon the whole of the profession.

Let me very briefly allude to a plan that I have long advocated. Irrespective of the Officers of Health that should be appointed in all large cities and towns, there should be a chief Inspector for each county, whose duty it would be to report weekly to the central Board all matters relating to the public health; to investigate all the medical returns of the Unions; to analyze and register all important diseases, and carefully to inspect all districts where epidemics prevail, and report upon the causes likely to produce them, All diseases of our domestic animals, and of the vegetable kingdom, likely to affect the health of man, should especially engage his attention. With such a machinery as this, I believe that a large proportion of human life would be saved, a vast amount of disease prevented, and many of the "false facts" now so widely spread would be dissipated, and the plague-spot would be stamped out before its deadly radiations had blighted the district. The above remarks are especially applicable to the subject upon which I am treating. In 1819 a

* One of the objects of the "London Medical Examiner," which I started in 1850, was the establishment of an efficient Board of Health. When I read this paper I knew nothing of the Report of the Sanitary Commission, which I have since heard advises consolidation of the various Health Departments.

girl from York was attacked with Small-pox a few days after her arrival at Norwich; the disease spread, and killed 530 of the inhabitants. I could multiply these examples to an indefinite extent. They serve to show that if a proper Board of Health had existed, and if timely notice had been given, much of the mortality in this, and in other places, would have been prevented. In making the above remarks, I hope it will not be supposed that I impute blame to any member of our profession; it is of the system I speak, not of men.

GOVERNMENT HOSPITALS.

I have long advocated the establishment of Government Hospitals in London for contagious diseases, and especially for Small-pox. If three or four of these Hospitals had existed in suitable localities around London, and had been provided with proper vehicles for the conveyance of patients, the spread of Small-pox during the present epidemic might have been greatly prevented. The difficulty has been to know where to send persons affected with this disease, and by what vehicles? If sent, will they be received? Under such a state of uncertainty the patient has too often been kept at home, and by this means others have been infected. Two such cases during the last fortnight have come under my observation. In 1852, when Physician to one of the Westminster Ragged Schools, a poor boy was attacked with Small-pox—where was he to be sent? and by what means? who was to pay the £1. for his admission to the Small-pox Hospital? If time would admit, I could quote numerous examples of this kind, which are familiar to all London practitioners. In 1864 the two following cases occurred to me in the same week:—A servant came from the country, and had Small-pox a few days after she had been at her place; it was a mild form of the disease after vaccination; she was sent by her master to the Small-pox Hospital, and returned to the house after ten days, being obliged to take two omnibuses to reach Chelsea. A young man, after attending the funeral of a friend who died of Small-pox, and walking near to a person who had nursed him, was, some days afterwards, attacked with the disease, and was obliged to remain at his mother's house among six children. The Small-pox

Hospital (then the only one) was many miles off, and here there was no certainty of admission, and the only vehicle a street cab, which might have been the means of infecting a dozen other persons.

To these Hospitals should be attached a proper heat apparatus for disinfection, and there should be at least two Convalescent Hospitals near London where patients could remain until they are purified and disinfected.

These Hospitals might be made nearly self-supporting, so that those who do not come under the denomination of paupers might pay a weekly sum, and be in a different part of the building. The paupers would be paid for by the parish authorities.

The history of the present epidemic, and of all others, proves the utter inadequacy of isolating and of providing accommodation for those affected. Vestrymen and Guardians, however well disposed, are unable to meet the demands for beds, and the plague-stricken are left to contaminate those around them. How many medical men in London would gladly have sent some of their patients to Hospitals if they could have felt sure of their admission, or that they could have been sent in vehicles that would not infect others. On the 25th of December, the Small Pox Hospital was full. Dr. Cartis, a member of the Metropolitan Sick Asylum Board, stated, on the 10th of January, "that there were 700 paupers in London with Small-pox, and only accommodation for 500." At the end of January, there were 1,010 paupers without hospital accommodation. People have been sent about London in cabs, and other vehicles, from hospital to hospital, and have been obliged to return to the place from whence they started. At the present time in London, there are probably 1,000 persons labouring under Small-pox, who would gladly enter a Government Hospital.

But what are the objections to the establishment of these Hospitals? Is it right that in an overgrown city like London, with its 3,000,000 of inhabitants, such vital matters should be left to Vestrymen, Guardians, and private individuals? Should the formation of convalescent Hospitals be left to charitable ladies? The first answer will probably be, that the people do everything, and the Government nothing; that the plan is un-English and could not be adopted. Another objection

is the fear of spreading the infection to the neighbouring districts. I believe this objection is entirely without foundation, and that there is no evidence to show that the disease prevails more in the neighbourhood of these hospitals, than in other places.

Another objection that may be urged against Government Hospitals is, that the rural districts should not be taxed for the benefit of the Metropolis, but this is a matter that concerns every individual in the kingdom. Small-pox cannot exist to any extent in London, without its extending to many parts of the country; the trade of London, moreover, is materially affected by it, and in this and in many other ways it becomes a national question.

PUBLIC CONVEYANCES.

The question of public conveyances is so important, that I must devote a little time to its consideration. I take credit to myself for having been the first medical journalist who pointed out the dangers attending this mode of travelling. As the Article in the "London Medical Examiner," Dec. 1850, Vol. i., p. 243, is especially applicable at the present time, I make no apology for quoting it verbatim.

"On the Public Conveyances of London.

"More than twenty years ago, we were in the habit of riding frequently in the Paris omnibus; a nice, roomy, well ventilated vehicle, with plenty of space for knees and elbows, where a duchess might sit at her ease, and the asthmatic patient breathe with the same freedom as in his own chamber. The conductors well dressed and civil; the coachman going a steady pace, but though rather tortoise-like, he reached his destination without *loitering on the road;* he gave his passengers time to get fairly seated before he started, and did not endanger their lives and limbs by jolting them off the steps at their departure. Drunken people, bundles of linen, sheep's heads, baskets of fish, and other offensive articles, were not permitted to annoy the

eyes and noses of the travellers, and dirty straw did not encircle their feet. Moreover, for three-pence a person could be put down in any quarter of Paris. The above description will apply to the present mode of travelling in Paris, as well as to that of 1829. At the latter period there was not an omnibus in London. But why are our vehicles so badly regulated? Simply because Government takes no concern about the matter, so long as it gets the *duty*; like the sale of quack medicines, the *money* is the *object*; the public welfare is the secondary consideration. But what has this question to do with a Medical Journal, it will be asked? We have introduced the subject, because we believe it is one that materially concerns the public health. It is nothing to us if people wish to be squeezed and wedged together like the oxen at Smithfield; this and other matters, we could name, do not come within our province, but if we can show that many persons lose their lives, by the bad arrangement of our public conveyances in London, our time will not have been unprofitably occupied. We need not inform medical readers that a certain number of people require a given quantity of pure air, for proper respiration, and that, according to the present size and ventilation of the London omnibus, they cannot obtain this? That if a person predisposed to illness breathe such an atmosphere, as he is frequently subjected to, in one of these carriages, he must soon be on a sick bed. That an individual, during the prevalence of cholera, or any other epidemic, when the tendency to disease, and the preservative powers of nature, are nicely balanced, need only get into an omnibus to turn the scale. If rheumatism should be his bane, he may obtain draughts without a doctor's prescription; or he may inhale the vapours from bundles of dirty linen, reeking from the bed of contagion.

"Let us now turn to another evil respecting the public health, that has been entirely overlooked. At the commencement of the present year, 1850, we attended a very beautiful woman, who fell a victim to that former scourge of the human race, Small-pox. A few days before the eruption appeared, she was on board a steam-boat at Southampton. The man who gave the cheques, had his skin covered with Small-pox pustules. This lady believed she had taken the disease, before it appeared, and thought that it would prove fatal. But who can get into a hired vehicle of any kind in London, and feel sure that the

lining is not saturated with the miasms of Small-pox, scarlatina, or typhus?

"We see no chance of redress for these evils, until we have a Board of Health properly constituted, and a Government that thinks more of the public good, than of *public* pensions. There is no reason why the conveyances of London should not be as comfortable and as salubrious as those of Paris. We would have vehicles in various districts for the express purpose of carrying those affected with contagious diseases; and we would inflict a severe penalty upon those who by infringing this law, endangered the health of the community."

In the same Journal, vol. ii. p. 207, 1851, I advocated the establishment of Government Convalescent Hospitals. I quote one extract:—

"I must here point out, in addition to the reforms spoken of, a great desideratum in our hospital management, viz., the want of institutions in healthy localities near London, where convalescent patients might be sent. All who have seen much of hospital practice, must have observed poor creatures turned out of the wards, who only required *pure* air to restore them to perfect health. Could the Government money be better employed than in founding institutions of this kind? A fraction of the interest of the sums lavished in useless expenditure in this country, would be more than sufficient for the purpose."

Although twenty years have passed, the advice I gave in 1850 respecting our public vehicles and the establishment of Convalescent Hospitals, is more applicable now than when it was written. The population of London has much increased, the danger of epidemic disease is greater, and yet the Government makes no sign. A cabman may be punished for taking infected persons, but the Government and parochial authorities provide no proper substitute. According to a recent leading article in the "Medical Times and Gazette," "of the forty-five Metropolitan Unions only seven have proper vehicles and disinfecting chambers, sixteen are thinking about them, and the rest are dormant." But Small-pox in the last five weeks has killed 1,009 people in London. In one of the advanced Unions named, the carriage of the Workhouse, I find does not allow of the recumbent position, and the heat apparatus (used only for the inmates), is very defective.

VACCINATION.

Time will not allow me to enter into the origin of Cow-pox; whether it originates from the heels of the horse, or whether it is a disease peculiar to the cow? Whether Small-pox and Cow-pox are identical diseases? The experiments of Ceely Badcock, Sacco and others, on the question, are well known. M. Bowley, the Veterinary professor at Alfort, believes that what he calls Horse-pox is one and the same affection with Cow-pox. In the "Memoirs de la Societé Médicale de Lyon" 1865, p. 3, will be found some interesting deductions upon this subject, by Drs. Chaveau, Viennois and Meynet, showing the effects of vaccination and of inoculation on the horse and cow.

In the Transactions of the Bombay Medical Society" 1859—1862, a similar disease to that of Cow-pox is described on the udder of the camel and of the sheep, and the hands of those milking these animals, are affected with a like eruption to that first noticed by Jenner. These people are said also to be free from Small-pox. In these examples, there was, probably, no contamination from the horse. A large number of experiments will yet be required, to clear up this matter.

In treating upon the question of vaccination, it will be necessary to go back to the time when this practice was first adopted, 1798. Jenner at first spoke, with some hesitation, about the preventive power of vaccination; then he concluded, that it was likely to prevent Small-pox, as much as Small-pox itself, and three years after its introduction, he believed, that by its means, Small-pox might be extirpated. Unhappily, he was too sanguine in his prediction. The statistics of all countries, however, where vaccination has been practiced, show that the mortality from Small-pox has greatly diminished, but they also show that it is not an entire preventive, and the too sanguine expectations and assertions of some writers have, I believe, often tended to engender distrust and doubt among many who have not fully investigated the matter.

As is well known, Jenner's discovery met with all kinds of opposition, both from priest and layman. The London College of Physicians refused him its license. Jenner's letter to Dr. Cook upon this subject is so characteristic of the man, that I cannot help quoting the conclusion :—"I wish you would frame a

bye-law for admitting men among you who would communicate new discoveries for the improvement of the practice of physic. On this score (not alluding to vaccination) I could face your inquisition with some degree of firmness."—Baron's "Life of Jenner."

I need not allude to the various objections urged against vaccination at the time of Jenner's discovery, and for some time after. Sermons were annually preached against the practice, and strange tales were circulated respecting its injurious effects. One gentleman, a Mr. Smyth Stuart says: ("Medical Register," 1808, p. 19.) "Among the numerous cases of Cow-pox which I have heard of, I know not whether the most horrible of all has been yet published, viz.:—of a child at Peckham who, after having been inoculated with the Cow-pox, 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*."

Some of the modern objectors have not, I think, shown more sense than Mrs. Bulman, from whom Mr. Stuart obtained his information.

There is one fact I have not before seen noticed, that to my mind, is more conclusive than any other, as regards the innocuous nature of vaccination, and I especially commend it to the notice of the clamorous and senseless anti-vaccinists who assert "that nearly all the diseases which flesh is heir to, are introduced by means of this practice." In 1800 (two years before vaccination was introduced) the estimated population of the United Kingdom was about 16 millions. In April next, notwithstanding the enormous amount of emigration, it is supposed that the number will amount to 31 or 32 millions. So that since the introduction of vaccination (and notwithstanding the numbers that have left our shores) the population will have doubled! Can any man, gifted with common sense, suppose that if deleterious matter had been introduced into the blood that such an increase of population could have taken place? But I hope to enter more fully, at the end of my paper, upon this subject. Dogmatical assertion should not influence us in such a vital question as this.

There is one circumstance that is especially necessary to take into account, when estimating the influence of vaccination in the production of other diseases, viz.:—that among ignorant

people nearly all skin diseases, and many other affections that appear after the operation, are attributed to it. If a child has a pimple on its nose—vaccination is the cause. If blains and tetters, common to many children, break out, all are attributed to this practice. It is not unlikely after this re-vaccination mania has subsided, that thousands of deaths will be attributed to this cause. "Oh, Sir, he was never well after re-vaccination!" will be the cry, these persons forgetting that there is often a sudden change, and a break-up of the health of many people, and that out of a given number of individuals of a certain age, so many will die in a given time. I met, last year, with the following case, which fully exemplifies the fallacious reasoning that is likely to be used respecting the effects of vaccination. An infant, six weeks old, had abscess of the shoulder, which I opened, and the child recovered. When five months old, I vaccinated it in both arms, and an abscess, very similar to the first, formed on the opposite shoulder, which quickly healed. Had this abscess appeared after the first vaccination, no argument would have convinced the mother that it was not due to this cause.

Does lymph from the cow afford greater protection than that from the human subject?

Many have supposed that the preservative power of vaccination has been impaired by the length of time that has elapsed since it was first received from that animal. The Commission appointed by the French Academy of Medicine upon this question, made its report November, 1870, and the conclusion was, "That vaccine matter had lost none of its power, and that it was quite as efficacious when taken from the human subject as from the cow." "Archives Générales de Médicine, 1870." It has also been shown, that lymph from the cow or calf does not keep so well as that from the human subject, nor is it as certain in its effects.

Should lymph be taken from a vesicle, the result of secondary vaccination in the child or in the adult?

Generally the vesicle is not so perfect after secondary vaccination as in the infant, but in several instances I have seen as perfect a vesicle in individuals over thirty years of age as in the child. The lymph clear, the central depression perfect, and the areola well marked. In other cases the lymph is more

opaque in adult persons who are re-vaccinated, although the central depression and areola are normal. In the greater number of adults and children that are re-vaccinated there is no characteristic vesicle. In some there is a papulous elevation, with more or less inflammation around it, and occasionally uneasiness and slight swelling in the arm-pit. In rarer examples the swelling and inflammation are more extensive. But let me ask, what objection can be urged against the use of lymph taken from children or adult persons, provided they are of sound constitution, and the vesicle presents a normal appearance, especially when lymph is scarce and the danger urgent? I may remark, that the Cow-pox occurs spontaneously only in the adult animal, and that it is never seen, I believe, in the calf.

Mr. Simon, and the Medical Officers of the Privy Council, object to the use of lymph taken from vesicles, the result of secondary vaccination; but as far as I know, no sufficient reason has been given why in cases of urgency and danger, where lymph cannot be procured from infants, that from children and adults should not be employed; provided always, that it is taken from a healthy subject, a normal vesicle, and at the proper time. Upon this question I am especially anxious to obtain the opinion of the Members present.

RE-VACCINATION AND AGE.

I suppose the Profession is generally agreed as to the propriety of this step. My statistics upon this point are not very numerous, but the cases have been well observed. I have recently re-vaccinated about ninety persons, the majority of them over twenty years of age, and several of them above fifty. The youngest was four-and-a-half years. I have never been satisfied with one re-vaccination if the first has failed, and I have found that in several instances the second trial has been successful. Of these about twenty-five had perfect vesicles, generally two; twenty-nine imperfect, and in the remainder no effect was produced. Of these ten were under fifteen years of age, and only four of them had perfect vesicles. This leads me to a very important and practical point respecting re-vaccination.

Mr. Simon, in his circular to the Metropolitan Boards of Guardians, dated January 6th, 1871, when the deaths from Small-pox were 117 weekly, speaks briefly of re-vaccination, but gives no direction as to its practice. In a subsequent memorial, February 6th, "he advises that re-vaccination should be performed upon all from fifteen to eighteen years of age, and in circumstances of special danger every one over childhood on whom vaccination has not been successfully performed ought without delay to be re-vaccinated." The London College of Physicians, in a circular issued February 7th, "advises that all persons above the age of puberty should be re-vaccinated, and at any age, if they have not sufficient characteristic marks."

But Mr. Simon and the College of Physicians attach more importance, I think, to age and marks than is warranted by experience. Let me briefly examine both of these questions.

And first as to age? It will be seen that the result is a startling one. During the Norwich epidemic in 1819, of the 530 deaths, 392 were children under four years of age. But let me analyze the Registrar-General's Report, 1851 to 1860. I find that of the 42,071 deaths from Small-pox during these ten years, 26,102 were children under five years of age, and 35,007 under fifteen.

Surely the above statistics show the necessity of not limiting the age to that over puberty, nor even over twelve years?

It is more than probable that a vast number of these children, especially those a year old and under, were unvaccinated, but it is useless to blind ourselves to the fact that many of the children under ten years of age had been properly vaccinated. A great deal of harm, I believe, has been done by assuming that vaccination, when properly performed, is an antidote to Small-pox. It is better to let the public know that a great saving of human life has been effected by it, that in most cases it is a preventive, and that when Small-pox does occur after vaccination it is for the most part a comparatively mild disease.

Does the number of characteristic marks or cicatrices indicate the amount of exemption from Small-pox?

Mr. Marson, whose opinion is entitled to great weight, believes that persons are protected in proportion to the number of marks indicating the prior existence of a proper vesicle. As mentioned

in his article on Small-pox in Reynold's "Annals of Medicine." Of 4,896 Small-pox patients, 2,001 had one mark, the mortality 7·73 per cent.; 1,446 two marks, mortality 4·70 per cent.; 518 three marks, mortality 1·95 per cent.; 544 four marks, mortality 0·55; and of 370 with no cicatrix 101 died. The *age* of these patients is not given. My own experience, which is comparatively limited, does not bear out Mr. Marson's inference, and so with others from whom I have obtained information. In the re-vaccinated, I find that a person with one good cicatrix, is not more likely to take Cow-pox than another with three or four. At the present time I have three cases of Small-pox after vaccination in the same house; one confluent with four distinct vaccine marks, the other two with a mild, modified disease; one with one, and the other with two marks. In the same family three sisters had Small-pox after vaccination, and they had each 10 distinct marks. I could multiply these cases to a great extent. The evidence at present before us does not settle the matter, but if the number of marks is indicative of the amount of protection no infant should have less than three punctures made on each arm or leg. Jenner assumed that one perfect vesicle was sufficient. I think, however, judging from past experience, that three punctures should be made on each arm in all primary vaccinations; no harm can result from such a practice, and by this method the presence of three or four perfect vesicles will generally be insured.

VACCINATED AND UN-VACCINATED.

In the public records the deaths in the un-vaccinated vary from 37 to 50 per cent. In the circular of the London College of Physicians, February 7th 1871, already spoken of, it is stated "that the mortality in those properly vaccinated, is less than 1 per cent." I am afraid that this is an exaggerated estimate. Judging from the recent records now before me, from Parliamentary accounts, and from other sources, the death-rate in the vaccinated varies from 4 to 9 per cent.; but then it may be fairly assumed that some of these persons were not properly vaccinated.

Among young children, who form a large percentage of the deaths, the mortality after vaccination is much above 9 per cent.

but these die at their own homes, and no proper statistics are obtainable as to the proportionate rate of mortality. Of the 42,071 persons who died of Small-pox in England and Wales, from 1851 to 1860, 10,368 were under one year ; a large majority of these probably had not been vaccinated.

CAN OTHER DISEASES (LOCAL OR GENERAL) BE TRANSMITTED BY MEANS OF VACCINATION ?

I have vaccinated a large number of children during the last forty years, and I have never seen any injurious results from it as far as I can determine. I could give abundant evidence to this effect that I have obtained from other practitioners, but I need not tire my hearers by a repetition of them. Mr. H. Harris, of Redruth, Cornwall, in practice more than 40 years, Surgeon to the Redruth Union, says: "I believe that I have vaccinated more children than any man in Cornwall or Devonshire, and I have seen no ill results from it of any kind." The Registrar-General for Scotland, in his Report for the year 1868, mentions two deaths that are supposed to have occurred from vaccination out of 106,181 children vaccinated. It must not be forgotten that Small-pox not unfrequently lays the foundation for other diseases, and in this way indirectly may swell the bills of mortality.

But the most valuable evidence upon this point is furnished by Mr. Simon, 1857, when Medical Officer to the then Board of Health. Mr. Simon wrote to 539 members of the profession in this country and on the continent, asking for information respecting the supposed injurious effects of vaccination. Two of the four questions relate to the transmission by means of vaccine lymph of scrofula, phthisis, syphilis, and other diseases. There is no summary of this evidence, but I have made an analysis and the subjoined is the result.

Eruptions and sores, impetigo, eczema, &c. Sixteen of the 539 respondents believe that they have seen these as the result of vaccination, I give the numbers for the purpose of reference: 49, 68, 83, 162, 203, 237, 263, 275, 316, 366, 378, 379, 426, 437, 502, 519. As regards the transmission of syphilis, eleven: 2, 10, 51, 121, 176, 216, 258, 320, 338, 352, and 416, think that it may be conveyed, but they furnish

no satisfactory evidence. Mr. Hutchinson of the London Hospital, believes "that he has seen four or five cases." Five: 90, 221, 236, 455, 539, speak of disturbance of health and of febrile symptoms. Three: 107, 383, 393, believe that vaccination may bring scrofula into an active state. Two: 298, 476, mention ill effects from a foul lancet (not fatal). Mr. Hudson, Dublin, 249, relates a fatal example where a child was vaccinated from another that had purpura; and Dr. Stokes, Dublin, 454, "heard of a fatal case from phlegmanous inflammation."

So that of the 539 respondents, only 39 speak of evils from vaccination, most of them very slight, that may happen. The remainder, including Ricord, Rayer, Marson, West, and many other eminent men, have seen no evil effects after vaccination.

I am acquainted with the history of the Italian cases, Revalta series, Lupara, Torre de Busi: those in France by Depaul, Viennois, and others, including the Paper in the "Nashville Journal," 1868, by Dr. John Jones, on Spurious Vaccination, &c.

The evidence in most as to the propagation of syphilis is very incomplete, but it is not unlikely that when blood is introduced with the vaccine lymph (a very rare occurrence) that syphilis may be induced, but I cannot find any well authenticated case recorded in this country.

EXPERIMENTS UPON THE LOWER ANIMALS.

I now come to the last, and most important part of my communication, viz., the effect of vaccine matter upon some of the lower animals. In my experiments upon the inoculation of Small-pox matter, page 3, I have not entered into details, as the question is not one of much practical importance, but in the account of the subjoined experiments, I must be rather more diffuse.

In 1857, M. Villemin, in his work entitled "Etudes sur la tuberculose preuves rationelles experimentales de sa specificité, et de son inoculabilité," showed that tubercle in the human subject might be conveyed to some of the lower animals by means of inoculation. He made the extraordinary statement "that excepting man, the monkey, the cow, and perhaps the rabbit and other allied rodents, the lower animals are insusceptible of becoming tuberculous." In my paper in the 1st volume

of the St. Andrew's Graduates' Association, p. 110, "On Tuberculous affections in man and in the lower animals, in relation to their zymotic nature," I endeavoured to show that tubercle in man is not a zymotic disease; that so far from tubercle being confined to the animals mentioned by M. Villemin, I had seen it (at the Regent Park Gardens) in more than 150 different species of mammals, birds, and reptiles, but that it differed in many particulars from lung tubercle in man, pp. 121—132. I soon came to the conclusion that tubercle in some of the lower animals might be produced by the inoculation of pus and other substances. On the 5th of February, 1868, I inoculated a Guinea pig with healthy pus from a whitlow on my own finger, and the animal died of tubercle a month after the inoculation, the morbid appearances being similar to those in tuberculous inoculation. I now asked myself whether it was likely that vaccine matter would produce the same effect, and whether it was likely under any circumstances, especially when taken at too late a period, it would occasion tubercle in the human subject? The first series of experiments I have now only to record; the second, where the lymph was taken as late as the tenth or twelfth day, I reserve for a future communication, as they are not yet completed.

VACCINATION WITH PURE LYMPH, TAKEN BEFORE THE EIGHTH DAY.

On the 22nd December, 1869, I vaccinated behind the ears with fresh lymph taken from an infant on the 7th day, two young Guinea-pigs, leaving two of the same litter un-vaccinated: no effect was produced. The vaccinated animals were killed some months afterwards, they were in good condition, and no disease could be found in them. I may observe that Guinea-pigs inoculated with tuberculous matter or with pus, are generally affected in less than four weeks from its introduction.

On the same day I vaccinated on the inner side of each thigh five half-grown mice, leaving five unvaccinated. These animals were kept in a large tin box, and well fed on oats and bread; they were killed after several weeks, and no disease of any kind was found.

In February, 1870, a young kitten was vaccinated at the same time as the mice; the operation was repeated three times. No local effect was produced, and at the present time, twelve months after the vaccination, she is in good health.

Two young rabbits were subjected to the same process; when killed, no disease of any kind was found.

January, 1870. Two tame black and white rats, about half-grown, were vaccinated twice on each thigh, and on killing them six months afterwards, their bodies were found to be sound.

March 14th. Two guinea-pigs vaccinated six weeks after birth; no perceptible effect was produced upon them, and some months afterwards when killed, they were found to be perfectly free from disease.

January 25th, 1871. Two young mice vaccinated on each thigh, their bodies were examined a few weeks after, and found to be in a normal state.

Several hens and a cock were vaccinated on their combs. No perceptible effect was produced.

March 6th, 1870. Three guinea-pigs were vaccinated a few hours after their birth on the inner side of each thigh, and this process was repeated when they were three weeks old, no effect, local or general, appeared to result, and when killed six month's after this, no morbid lesions were found.

I need not repeat other experiments of the same kind that I have performed with a like result. The above are sufficient to show that clear vaccine lymph taken from infants before the eighth day was perfectly innocuous to these vertebrates; at the same time it must be borne in mind that the matter used was originally from one of the lower animals, the cow. In no example was there any local effect occasioned from the vaccination. Up to the present time, the monkey, the cow (or ox), and the sheep, are the only animals upon which I have produced any local action by vaccination; and in these, owing to the different character of the skin, the stages of progress and decline are not so apparent as in man.

A month after inoculating the second monkey with Small-pox matter (as mentioned at page 2) I vaccinated him without any apparent effect.

The above experiments I think serve to strengthen the conclusion, that genuine vaccine lymph is perfectly innocuous to the

human infant, as well as to the young of the lower animals; I am not aware that any experiments of a like kind have been before instituted.

From the evidence adduced I draw the following conclusions:

1.—That the present epidemic of Small-pox has to a great extent been augmented by the importation of the disease from Paris and other parts of France, and its extension and fatality have been much increased by the neglect of vaccination—by the want of Government Hospitals—the absence of disinfecting rooms, and the want of proper vehicles for the conveyance of the sick.

2.—That the only effectual means of preventing these evils in future is the establishment of permanent Government Hospitals in suitable localities, provided with proper vehicles for the conveyance of patients, and with proper heat-chambers for disinfection.

3.—That trusting to local authorities has been one great means of extending the disease, and that until a central Board of Health is established, and until united action is obtained, the spread of this and of other epidemics is not likely to be materially diminished.

4.—That to arrest the spread of this and other epidemics, and for the good of the public health, irrespective of Medical Officers of Health that should exist in every large city and town, an Inspector for each county should be appointed, whose duty it should be to collect and arrange all important information from the Officers of Health; from the Poor-law medical officers, and

report weekly to the central authority respecting the prevailing diseases and other matters affecting the health of the people.

5.—That unless great care be taken by the managers of our School Boards, and unless stringent laws be enforced, Small-pox and other contagious diseases will be greatly increased.

6.—That although vaccination is not a perfect safeguard against Small-pox, the statistics of all countries where it has been practised, show that it has served greatly to diminish the fatality and mitigate the severity of this loathsome disease.

7.—That the fact I have mentioned, that since its introduction the population of the United Kingdom (exclusive of emigration) has doubled, is sufficient to show that little or no deleterious influence has been produced upon the human constitution by its means.

8.—That no satisfactory proof exists that any disease can be conveyed by vaccine lymph taken from a genuine vesicle; and the evidence respecting the conveyance of disease by this means under any circumstances is very scanty, and of a doubtful character.

9.—That during an epidemic of Small-pox, Vaccination should not be confined to persons over puberty, but that all children in danger of infection should be re-vaccinated.

10.—That the fact I have mentioned, that out of 42,071 deaths in 10 years (1851 to 1860), 35,007 were under 15 years of age, greatly warrants the propriety of the above advice.

11.—That, looking to the history of Cow-pox, and its spon taneous occurrence only in the adult animal, there is n sufficient reason, in cases of urgency, during an epidemic, whe it is often difficult to procure lymph, why it should not be take from re-vaccinated children and adults, provided they ar healthy, and provided the vesicle presents a *normal* appearance.

12.—That more extended observations are required, before w can come to the conclusion that the amount of exemption fron Small-pox depends upon the number of perfect marks from primary vaccination.

13.—That, judging from the report of the French Commis- sion, and from other authorities, lymph taken from the human subject is quite as efficacious as that taken from the cow or calf.

14.—That the evidence I have adduced, and the experiments I have recorded, tend to show the innocuous nature of genuine vaccine lymph, upon the human infant, and upon the young of the lower animals.

29, Beaufort Street, Chelsea,

March 15*th*, 1871.