Preliminary report on an investigation of the results of vaccination from the calf in the various countries of Europe, in India, and America; with proposals for the establishment of a central government establishment for continuous supply of fresh calf lymph to public vaccinators in Great Britain / by Ernest Hart.

British Medical Association.

PARLIAMENTARY BILLS COMMITTEE.

ANIMAL VACCINATION:

A PRELIMINARY REPORT

ON

AN INVESTIGATION OF THE RESULTS OF VACCINATION FROM THE CALF

In the various Countries of Europe, in India, and America; with proposals for the establishment of a Central Government Establishment for continuous supply of Fresh Calf Lymph to Public Vaccinators in Great Britain.

BY

ERNEST HART, Esq.,

CHAIRMAN OF THE PARLIAMENTARY BILLS COMMITTEE OF THE ASSOCIATION.

WITH A REPORT OF THE PROCEEDINGS OF THE CONFERENCE, INCLUDING ADDRESSES BY Dr. WARLOMONT, Dr. CAMERON, M.P., Dr. BALLARD, AND OTHERS, Etc.

[Reprinted from the British Medical Journal of November and December, 1879.]

LONDON:
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1880.

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PREFATORY WORDS.

THE annexed report on the subject of vaccination direct from the calf has been prepared under the following circumstances :—As Chairman of the Parliamentary Bills Committee of the British Medical Association, it is my practice to consider and submit for appreciation by that Committee (which is made up of elected representatives of the eight thousand members of the Association, and representatives appointed by each of its twenty-nine provincial branches) all measures introduced into Parliament affecting the Public Health, the organisation of the State Medical Services of the Army, Navy, and Poor-Law, and cognate matters. Dr. Cameron's bill to provide official Vaccination direct from the Calf, therefore, challenges our especial attention. The subject is one which has been much discussed in various meetings of the Medical Profession in Great Britain, but hitherto decided in an adverse sense by the medical advisers of the Government. Throughout the Continent of Europe, in America, and in India, vaccination direct from the calf has made much practical progress, and it is largely carried out with the sanction of various states and municipalities. I therefore resolved to visit some of the principal stations for animal vaccination. Having done so, and being of opinion that the practice is much more simple, effective, and inexpensive than has been represented, and is generally believed in this country, I have thought it right to make available for the information of the Committee and of the Profession at large, all the existing data within my reach as to the actual position of the practice of direct vaccination from the calf throughout the world. The documents which I have been able to collect are unexpectedly numerous. I have condensed into the smallest possible compass the substance of the voluminous reports which I have collated ; nevertheless, I fear that this short study will prove too dry and too voluminous for many whom I could wish to read and judge it.

It will be seen that I consider it advisable that the Government should institute one or more central stations of animal vaccination, which should supply public vaccinators gratuitously with pure calf lymph, and none other. I have examined, as will be seen, all the alleged objections to

this practice, and by the light of observation I do not find any of them to be substantial; moreover, the change would be inexpensive, and the supply not only always pure beyond suspicion, and effective, but ready in relatively indefinite quantities at moments of emergency. By this means, the small but troublesome faction of anti-vaccinators would be deprived of the last shadow of reason for their agitation against the beneficent gift to mankind by which Jenner placed in our hands the means of practically putting an end to the ravages of small-pox.

In order, however, to have this subject thoroughly debated on all its sides, I last summer, when in Brussels, asked M. Warlomont, who has long presided over an extensive State Institution for Vaccination from the Calf, if he would attend a public conference on the subject in London. He kindly consented to do so, and with the consent of the Parliamentary Committee, I also invited Dr. Cameron to be present and to expound his Bill. Sir Thomas Watson, Mr. Simon, the late Medical Officer of the Local Government Board, Mr. Ceely of Aylesbury, the greatest living authority on the vaccinal process; Mr. Greene of Friday Bridge, Dr. Cory, Dr. Braidwood of Birkenhead, have also undertaken to be present. This conference concentrated a great amount of knowledge, experience, and critical power. The President of the Local Government Board also kindly deputed Dr. Ballard, an Inspector of the Board specially versed in the subject, to attend. Their important and valuable communications are here printed, and as the final result it is expected that the Local Government Board will seriously prosecute an experimental inquiry into the applicability of vaccination from the calf for the purposes indicated in my report, viz., that of furnishing and refreshing the vaccine stocks of public vaccinators, and of supplying by sale at a moderate fee to private vaccinators the means of renewing their stocks for arm-to-arm vaccination, or for direct vaccination with lymph from the calf in special cases.

In this way, not only will the most pressing difficulties of compulsory vaccination be overcome, but systematic re-vaccination will be greatly facilitated.

ERNEST HART.

PRELIMINARY REPORT

ON

ANIMAL VACCINATION IN ITS RELATION TO PROPOSED LEGISLATION.

Recent History of the Question in England.—Objects of the forthcoming Conference.—Preliminary Remarks.—Historical Note on the Origin and Progress of Animal Vaccination in Europe, India, and America. —Present State of the Question in Foreign Countries.—Statement of and Examination into Alleged Objections to Animal Vaccination.— Suggestions for Future Action.

By the introduction last session into the House of Commons of Dr. Cameron's Bill providing for the supply of animal lymph as an alternative to humanised lymph for the vaccination of children whose parents have conscientious objections to the latter, the attention of the Parliamentary Bills Committee was particularly directed to a subject which has engaged professional and public attention for a considerable period. With a view to procuring for the Committee all needful information for its guidance in taking a course of action on this important subject, it seemed to me desirable that the arrangements which have been in force for several years in Belgium should be carefully studied, in order that their adaptability to our English system might be considered; and for that purpose I have on two occasions visited the animal vaccination *bureaux* at Brussels. It seemed, moreover, desirable that, pending the reintroduction of Dr. Cameron's Bill into Parliament next session, a Conference of those interested and of those specially experienced in the subject should be held, with the view of eliciting an expression of opinion from those best qualified to judge as to the most desirable course to be pursued with regard to Dr. Cameron's Bill, and the general subject of the official recognition in this country of animal lymph. With the sanction of the Committee, this Conference has now been arranged to be held on the 4th December proximo, and there is reason for hoping that the results of its deliberations will have an important bearing upon the future of vaccination in this country. In addition to Dr. Cameron, M.P., who will attend to explain the motives and pro-

visions of his Bill, Dr. Warlomont of Brussels has, with characteristic kindness, promised to come over expressly from Belgium to give us the benefit of his valuable experience, ranging over a long series of years, and many thousands of vaccinations, and to read a paper on the general subject. We are also promised the attendance of men so distinguished and specially informed as Sir Thomas Watson, Mr. John Simon, Mr. Ceely of Aylesbury, Dr. Robert Cory, Mr. John Greene of Birmingham, Dr. Braidwood of Birkenhead, and others, who have all devoted considerable attention to the subject before us. I am happy to add that the President of the Local Government Board, recognising the importance of the Conference, has most kindly offered to send one of the Board's Medical Inspectors (from whom we shall doubtless learn more particularly what are the official views upon this question) to represent the Department on this occasion.

In order to present to the Committee, and through them to the Conference, as complete an account as possible of the progress which animal vaccination is making throughout the world, I have collected together such statistics and information on the subject as I have been able to discover. I feel, however, that this information is still imperfect; and I would suggest for the consideration of the Committee whether it would not be desirable to move the President of the Local Government Board to procure, from our representatives abroad, official and more complete information on the subject of the practice of animal vaccination in the countries to which they are accredited. The particulars which I have been able to collect will, however, be sufficient, I feel little doubt, to convince the Committee of the importance of some steps being taken to secure the official recognition of animal vaccination in this country.

This subject of animal vaccination has not been seriously discussed before the British Medical Association since its meeting at Leeds in 1869. I do not on the present occasion intend to deal at any length with the, in many respects, interesting discussion that then took place; but I may refer in the briefest fashion to its results.* The subject was started by Dr. Blanc with some enthusiasm, but with statistics which were much questioned, and which were certainly deficient in exactness; and he was followed by Drs. Braidwood, Ballard, and Druitt, all of whom expressed themselves in favour of the use of calf-lymph. Dr. M. K. Robinson, then Medical Officer of Health for Leeds, expressed a judicious *caveat* as to the decrying of arm-to-arm vaccination, for which the late Mr. A. B. Steele of Liverpool argued strongly. Mr. Steele's position can easily be understood. As one of the very best vaccinators of the staff of the National Vaccine Establishment, and as Teacher of Vaccination for Liverpool, he, of course, found arm-to-arm vaccination in his careful and judicious hands to be sufficiently successful.

At the time of this discussion in Leeds, animal vaccination was but little esteemed, either in this country or abroad; and the results at that period of the use of calf-lymph were certainly not so satisfactory as to warrant the disturbance of the arrangements for arm-to-arm vaccination in England, which had been perfected at great trouble and expense only a short time before. It was therefore not surprising that Dr. Seaton, to whom we are indebted more than to any one else for our present excellent system of public vaccination in England, should have reported in 1869 adversely to the official recognition of animal vaccina-

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* See British Medical Journal, vol. ii 1869, pages 275-278.

tion by the Government.* But, since that time, changes of the most crucial and important kind have been effected in the conduct of animal vaccination abroad; so that now its supporters maintain that not only are its local effects equal to that of humanised vaccination, but greatly superior to them. The Government, however, as represented by the Local Government Board, have consistently refused to admit this, swayed, no doubt, by the very strong opinions which Dr. Seaton is known to hold on the subject. I desire to speak with the very greatest deference of Dr. Seaton's views in this matter; but I feel bound to say that the now available information leads to conclusions much opposed to those at which, as Dr. Mouat, one of the medical inspectors of the Local Government Board, stated at the recent congress at Amsterdam, Dr. Seaton has arrived after a recent review of the subject. It is a matter of extreme regret that Dr. Seaton will be unable to attend the Conference, as his great experience and the careful inquiries into the subject which he has on two occasions instituted would have made his presence most valuable and important; but I hear from Mr. Sclater-Booth that he is now incapacitated by illness from attending to business. The President of the Local Government Board, who has most courteously expressed his great desire to facilitate the discussion at the Conference, and his readiness, under different circumstances, to furnish the Association with the results of Dr. Seaton's examination into the Belgian system of vaccination, informs me that those results are now before him in only an incomplete form, as he has but a short memorandum on the subject from Dr. Seaton, and it is impossible now to refer it to him for completion. However, it would appear from Dr. Mouat's statement that Dr. Seaton is still not convinced that animal vaccination as practised on the continent is superior to, or presents greater success than, the procedure adopted in England. Holding these views, and committed as he is, Dr. Seaton's refusal to substitute animal vaccination for what he considers the perfect system practised under his care is readily explicable. But it is still, in my opinion, to be regretted that he should have advised the Local Government Board to refuse animal vaccination as an alternative which would induce many people to submit to vaccination and revaccination who now (absurdly, if you will) object to it. There can be little doubt that, when Dr. Seaton made his historic report on animal vaccination in the year 1869, there was not much to be said for animal vaccination as then practised. He showed clearly enough that it was then altogether inferior to the system practised in this country, because it was impossible to keep up the stock, which had repeatedly failed, especially in Holland; and because the percentage of unsuccessful vaccination was enormously greater than that obtained under our English system. The alleged superiority of calf over humanised lymph, that syphilis could not be invaccinated with it, was scouted, because it had apparently been proved to demonstration that syphilis could not be introduced into the system in this way. Against this adverse report of 1869, which is being officially depended on and quoted as though its facts were equally applicable at the present day, we have the following. During the ten years which have since elapsed, Dr. Warlomont, at the head of a large animal vaccine establishment in constant operation, has never had the smallest difficulty in keeping up his succession of vaccinifer calves. The same experience comes from other countries. No difficulty is now found by Dr. Martin in

* Twelfth Report of the Medical Officer of the Privy Council for 1869, pp. 171-191

America, or by the heads of the vaccination bureaux in Holland, Berlin, or Milan. Dutch statistics show the number of failures in primary vaccinations to be under one per cent. ; and, in revaccinations, animal lymph has been shown to "take" much better than humanised lymph. The evidence as to the possibility of the invaccination of syphilis has now satisfactorily established that, although happily infinitely rare—so much so, as to be beyond all calculation—nevertheless such invaccination is possible.

Dr. Warlomont has stated that, when he suggested to the official adviser of the Local Government Board that an experimental station should be established in London for animal vaccination, the latter refused on the ground that "everyone would flock there". Surely this admission is very damaging. If everyone would flock there, this is an unanswerable argument of those who contend that, *cæteris paribus*, that is, if animal vaccination be equally effective, a compulsory law should also allow some play to such rooted prejudice.

All the members of the Medical Department of the Local Government Board are not, however, opposed to the introduction of animal vaccination. I have the authority of Dr. Cameron for saying that Mr. Simon, the late eminent Medical Officer of the Privy Council and Local Government Board, declared that, if he had remained in office, he would have introduced animal vaccination ; and I will only give, in addition, the remarks made in 1868 by Dr. Ballard—now one of the most distinguished of our Government medical inspectors—after an inspection of even the imperfect results at that time attained. After alluding to the number of cities in which the practice of animal vaccination had taken root, Dr. Ballard says : "It is difficult to account for its adoption in so many places, except on the ground that some real advantage attaches to it. I confess that I should be glad to see animal vaccination adopted in this country as a part of our national arrangements for the prevention of small-pox. I believe that good would result from it; if no other good, there would be this: that practitioners who are dissatisfied with the virus they are using might have recourse to the vaccinated heifer at any time for the improvement of their supply. It would not necessitate or even render desirable the abandonment of arm-to-arm vaccination ; but its adoption would tend to meet the prejudices of some persons who decline now to avail themselves of vaccination on account of the dangers with which they believe it is surrounded."*

The late Mr. J. F. Marson, for many years the chief vaccinator to the Privy Council, and subsequently to the Local Government Board, whose knowledge of the subject of vaccination was of the highest order, and whose practical experience of the operation was greater than that of almost any other man in the profession, stated before the Select Committee of the House of Commons in 1871 that he thought animal vaccination would be a very good plan ; and that he had himself, in June 1869, successfully vaccinated thirteen children from an inoculated heifer brought to the National Vaccine Establishment station in the Blackfriars Road.†

One great object of the Parliamentary Bills Committee in convening the forthcoming conference has been to attempt to get at the general opinion of medical men in England upon this important subject. I believe I am correct in stating that, outside the official medical world,

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* *Prize Essay on Vaccination.* By Edward Ballard, M.D. Page 253.

† Report of the Select Committee on the Vaccination Act of 1867, Questions 701-2.

there are very few of our profession who have any positive objections to urge against animal vaccination. On the other hand, those who have taken the trouble to inquire into the subject on their visits to the continent, have, I think, uniformly been struck, as I have been, with the simplicity and efficiency of the arrangements made at the various stations at which animal vaccination is in force, and their adaptability to our English system. I shall not now recount the opinions of those who have studied the subject, but shall content myself with a brief reference to what Sir Thomas Watson, the Nestor of our profession, has said in the able paper recently contributed by him to the *Nineteenth Century*, and since republished in a separate form.* Sir Thomas Watson, after alluding to the "ugly blot" which has fallen "upon this fair and priceless charter of safety to humanity", vaccination, describes the arrangements made at Brussels under the able superintendence of Dr. Warlomont, and proceeds, "Surely similar institutions might be formed in London, and in all the large towns of this rich kingdom, whereat the general public might obtain vaccination from the baby or from the calf at their pleasure, while compelled vaccinations should in all cases be from the calf alone. It seems to me that all this could be effected under the authority and control of the Local Government Board, without derogation from the status or the emoluments of our licensed vaccinators, and therefore without opposition on their part." This view will, I am sure, find an echo in the mind of every member of this Committee.

After these preliminary remarks, I propose, in the first place, to show the progress that animal vaccination is making in the estimation of other countries than our own; then to state what appear to me to be valid answers to objections which have been raised to the use of calf-lymph; and finally, to indicate what, in my opinion, are the steps necessary to be taken to place this country, the birthplace of vaccination, on a level with other countries as regards the perfection of its machinery for securing the general vaccination of the population.

I.—Origin and Progress of Animal Vaccination† in Europe, India, and America.

Shortly after the introduction of vaccination into Italy, Troja of Naples conceived the idea of taking the vaccine virus from the vaccinated cow for the purpose of human vaccination, and the practice was pursued by him and his successors during many years for the benefit of the upper classes of society. On the death of Troja, Galbiati, his successor, continued it; and although in 1810 these vaccinations were proscribed, yet in the same year, we are told, several distinguished statesmen availed themselves of this method for their own children. Galbiati, who is reported to have become insane through the bitter opposition and ridicule of his scheme which he experienced, and to have

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* *The Abolition of Zymotic Diseases.* By Sir Thomas Watson, Bart., M.D., F.R.S. London: C. Kegan Paul and Co. 1879. (See pages 145-153.)

† The term "animal vaccination" has not unfrequently been misunderstood to mean something which it is not. It may therefore be desirable to explain that throughout this report the term is used to mean what Dr. Martin correctly describes as "the inoculation of a young selected animal of the bovine species, from an original spontaneous case of cowpox, from this others, and so on in continuous and endless series, as a source of virus to be used for the protection of the human race from variolous disease"

terminated his life by suicide, was followed by M. Negri, who had to bear the brunt of official opposition similar to that offered to his predecessors. It is to M. Negri that we owe the practice of animal vaccination as it is understood now. Troja and Galbiati had both propagated in the heifers a vaccine disease implanted upon them originally from a human source. In fact, what they practised was a retro-vaccination, the result of which was perpetuated through a series of animals. At first, M. Negri followed in their steps, but subsequently, on the occasion of an outbreak of cow-pox in Calabria, the use of this virus was abandoned, and M. Negri propagated henceforth that obtained from the natural cow-pox. It is said that, on three occasions, he thus availed himself of natural cow-pox, on each occasion maintaining the supply by an uninterrupted succession of inoculations from animal to animal. At the date of Dr. Ballard's first inquiry in 1867, so thoroughly had all the prejudices upon the subject been cleared away, that M. Negri vaccinated from the heifer, in the course of a year, from 3,000 to 4,000 persons, a number nearly equal to the annual births that take place at Naples; and for several years M. Bima, of the Italian army, had used the animal vaccine alone for his regimental vaccinations, and for the pupils of the military colleges.

In 1864, Dr. Palasciano of Naples addressed the Medical Congress at Lyons on the subject of the vaccinations practised by his townsman Negri. So impressed was one of his listeners, Dr. Lanoix, that he visited Naples, studied animal vaccination under Negri, and presented, in a memoir to the French Academy, the facts he had collected on the subject. On his return, he brought with him a vaccinated calf, and after introducing the practice of animal vaccination at Lyons, established it in Paris under the auspices of M. Depaul, the director of vaccine. From Paris, the practice of animal vaccination has extended in many directions, amongst the first to take up the question being Dr. Warlomont, of Brussels (February 1865), and Dr. Pissin, of Berlin (June 1865), both of these being private speculations. Subsequently, the ramifications became so extensive, that it is impossible to follow them, and the practice is now in force, not only in France and Italy, but in Belgium, Holland, Germany, Russia, Spain, Austria, Switzerland, the United States, and in our own Indian empire at Bombay and elsewhere. Below are given the salient points of the information communicated to me with regard to each of these countries.

FRANCE.—I have already referred to the introduction of animal vaccination in Paris by Dr. Lanoix, who, in conjunction with M. Chambon, set up in 1864 a private establishment for the propagation of the virus from calf to calf. In 1866, the French Government placed the sum of six thousand *francs* at the disposal of the Académie de Médecine for the purpose of experiments in the matter; and subsequently a Commission reported in favour of the practice of animal vaccination. At first, the virus used by the Commission was that of MM. Lanoix and Chambon; but, after four transmissions of this virus had been made, a new source from natural cow-pox was discovered at Beaugency (Loiret), in favour of which the Neapolitan virus was abandoned. MM. Lanoix and Chambon also adopted the use of this virus; and having in the same year (1866) met with another case of natural cow-pox at St. Mandé, near Paris, they introduced this lymph also into their practice. The establishment of these gentlemen is a private one; but M. Lanoix has, since the summer of 1865, held an appointment from the Directeur

de l'Assistance Publique for the weekly performance of vaccinations at the hospitals at Paris, from the calves which he inoculates week by week. By far the larger number of vaccinations and revaccinations performed in these establishments are done in this way. During the Franco-Prussian War and the siege of Paris, animal vaccination ceased in that city for very obvious reasons. The last virus carried from Paris was that taken by Dr. Martin's agent to America; and, during the siege, the "stock" was lost. The virus employed since the war has been from other stocks discovered since that of Beaugency. The mode of procedure at Paris is as follows. The animals used for the purpose are calves of the age of from four to eight months. Animals with white skins and females are preferred. Those used are such as are brought to the market for the purpose of slaughter; and no difficulty has been experienced in making an arrangement with a butcher for a constant supply of them at a price previously agreed upon, and for their repurchase. Such calves, coming to the Paris market, are generally weaned calves; and, even when they are not, no great difficulty in feeding them is generally experienced by persons accustomed to the management of such animals. They are carefully stabled, and fed as nearly as possible upon the diet to which they are accustomed; and, when done with, they are returned to the butcher for slaughter. A vaccinating table of convenient construction is provided. It is a strong wooden table, with a flap, which is cut out semicircularly in the middle, so as to correspond in shape roughly with that of the body and legs of the animal. The flap being let down, the calf is placed with its left side against it; and, being then securely fastened, the flap is raised horizontally, so that the animal lies with the right side uppermost. The operator then proceeds to shave, with a dry razor, the right side of the abdomen, commencing from the udder, and extending over a space of about ten inches long by six or eight broad. The calf which is the vaccinifer, from which the virus is to be taken, is also securely fastened down in a similar manner upon the floor, and the vaccine matter is obtained from the pock by forcible compression of its base with a pair of spring forceps. The result is the rupture of the pock, and an abundant flow of a thickish fluid, which is taken upon the lancet or into capillary tubes for the purpose of preservation. The animal upon the table is vaccinated upon the shaven surface by puncture in sixty or seventy places, a little turn being given to the lancet at each puncture, and means are adopted to prevent subsequent injury by biting or licking. Pocks, which finally attain the size of large human vaccine pocks, speedily begin to rise, and are used for the vaccination of children from the fourth to the sixth day. After this day, the vaccine they contain is found to be less active, but still sufficiently so for the vaccination of another calf, for which the pocks left unopened are, therefore, used on the seventh or eighth day. The method of obtaining the vaccine matter just described is different from that followed by M. Negri in Naples. His practice is, or was, to slice off the entire pustule with a lancet, and then, taking it in his fingers, to scrape the attached surface, so as to obtain a magma of lymph and dermal tissue. This method is still followed at Milan and other Italian stations; and the lymph so obtained is mixed with glycerine, and largely used *in loco*, as well as for export demands.

With the exception of the necessary interval during the Franco-Prussian War, I believe M. Lanoix has never once failed in his attempts to continue the cow-pox by inoculation. In some animals, the eruption

might be finer, in others poorer; but the genuine disease was always produced; and, whatever the eruption on the animal, it made little or no difference as to the effects of the lymph on the human subject, nor as to its effects when transmitted to another animal. At first, only one calf was vaccinated per week; but, since the latter part of 1865, two calves have been kept weekly under inoculation, the one being vaccinated on Friday, and the other on Saturday.

In a recent communication to the French Academy of Medicine, Dr. Pietra Santa, the accomplished editor of the *Journal d'Hygiène*, who has devoted much attention to the subject of animal vaccination, stated the reasons which had induced the Société Française d'Hygiène to patronise the establishment at Paris of a vaccination station, provided with both sorts of lymph.* An attempt was made to vaccinate the children brought for vaccination with humanised lymph on one arm, and animal lymph on the other. This, however, had to be discontinued, in consequence of the very general preference of the mothers for animal vaccination. The ascertained results attained by the Society are not of sufficiently exact a nature to warrant any definite conclusions being drawn from them; but they bear out the general principle enunciated by Dr. Pietra Santa, that animal vaccination is a good, useful, and efficacious method of vaccination, as evinced by the results of the numberless vaccinations that have been performed with it.

BELGIUM.—For the sake of completeness, I append a brief history of the growth of animal vaccination in Belgium, leaving the statement of the measure of success attained in that country with calf-lymph to the able hands of Dr. Warlomont at the forthcoming Conference. When Dr. Warlomont introduced animal vaccination into Brussels in February 1865, his first supply of virus was from the Neapolitan source; but, after that, he obtained the Beaugency virus, and in July 1868 introduced the Esneaux (Liége) lymph. In September 1866, at the request of the Minister of the Interior, the Royal Academy of Belgium referred the whole question to a commission, who reported favourably of it. In July 1868, an Institut Vaccinal de l'État was established by royal decree at Brussels, under the direction of Dr. Warlomont, for maintaining the practice of animal vaccination, and distributing gratuitously the lymph obtained from the animals. The Institute is attached to the Zoological Garden at Brussels, and consists of two waiting-rooms; one for applicants who pay for their vaccination; and the other, larger, for those who are vaccinated gratuitously. There are also two other rooms appropriately fitted up, one of which communicates directly with a stable capable of containing six calves. The calves are brought regularly, as wanted, by a butcher, who lets them to the institute for a term of seven days, after which they are returned to him. As a rule, two calves per week suffice. I purposely do not go into details with regard to the method of vaccinating the calves, or of taking the lymph, as this will come better from Dr. Warlomont; nor do I go at length into the statistics of success, to which Dr. Warlomont will draw attention at the Conference. But I cannot refrain from quoting what to my mind is one of the strongest evidences in favour of animal vaccination that we have—namely, that among more than ten thousand children vaccinated at Brussels from 1865 to 1870, and living afterwards amidst the terrible epidemic of small-pox of 1870 and 1871, there was not known a single

* See *Journal d'Hygiène* for October 9th and 16th, 1879.

instance of an attack of small-pox; and the same absolute immunity from that disease was enjoyed by the far greater number of revaccinated persons living under similar conditions.* Animal lymph is also used for the vaccinations performed under the direction of the Brussels Board of Health. This lymph comes from Milan in quills, and is highly spoken of by Dr. Janssens, the Chief of the Health Department in Brussels.

HOLLAND.—In Holland, the practice of animal vaccination is very largely developed. At the present time, there are four permanent institutes, at Rotterdam (founded in 1868), at Amsterdam (1869), The Hague (1871), Utrecht (1872); besides three temporary stations, working only in summer, at Kampen, Haarlem, and Groningen. In the Netherlands, it is customary to make ten punctures; and if, after five days, there be fewer than four pocks, a few punctures more are made with the lymph of the same child [auto-revaccination]. Dutch experience is the same as that of other countries, that animal lymph in tubes cannot be kept so long as human lymph; in fact, that it loses its efficacy from day to day. It is found that lymph mixed with glycerine has the same effect. In Rotterdam, tubes are employed; but, in Amsterdam and Utrecht, glass plates, closed with sealing-wax or soldered, have been used. The use of these latter is, however, very properly, being more and more abandoned. At the Hague, pure lymph has been found more efficacious after a time than that mixed with glycerine. Calf-lymph is largely exported from Holland to its colonies, etc.; and some sent to the East Indies in 1876 came back without any impairment of its efficiency. The transport of the lymph is undertaken by the Government, and it is carriage free throughout the kingdom. The calculation has been made that an establishment where two calves are inoculated per week would cost four thousand *francs* a year, excluding the vaccinator's fees. All the Dutch stations are open once a week for gratis vaccination, and once a month for vaccinations which are paid for. The number of the latter is very inconsiderable, almost the whole population availing themselves of free vaccination. The deficit at all the stations is covered more or less by the State or the Province.

Dr. Carsten stated at Geneva in 1877, that, after nine years of experience in animal vaccination, they had arrived in Holland at such perfection that they could compete in every respect with the best institutes vaccinating with human lymph.† As in other places, the results were at first disappointing; but this has now been completely changed. From a valuable table compiled by Dr. Carsten with regard to the statistics of the four permanent stations, I take the following facts. The percentage of failures has gradually dwindled from 18.5 in 1869 to 8, 4.6, 1.6, 1.2, 1.3, 1.0, 0.8, and 0.09, in subsequent years, ending in 1877. During the ten years 1868-77, a total of 22,810 humanised vaccinations and revaccinations, and 39,864 animal vaccinations and revaccinations, were performed. Of the 29,465 animal vaccinations, 28,862 were successful, and 603 were unsuccessful. In 1877, the number of animal vaccinations was, at Rotterdam, 2,383; at Amsterdam, 2,905; and at the Hague, 2,454. The table shows very clearly the very large decline in vaccinations performed with humanised lymph year by year since the introduction of animal vaccination; the relative numbers

* *Compte Rendu du Congrès Périodique International des Sciences Médicales*, 4me Session, à Bruxelles. 1875.

† *La Vaccination Animale dans les Pays Bas*, par Dr. B. Carsten. La Haye, 1877.

being 2,024 (humanised) and 744 (animal) in 1869, against 1,467 (humanised) and 8,032 (animal) in 1877.

Rotterdam.—Early in 1868, the Society for the Promotion of Cow-pox Inoculation at Rotterdam, "Genootschap tot bevordering van de Koepokinenting te Rotterdam", by which the public vaccination of that city has been conducted since 1799, determined to open a station for the practice of animal vaccination, and such station has been in operation since April 1868. The Rotterdam Association was founded in 1799 for the propagation of cow-pox, and the first name inscribed on its list of honorary members is that of Edward Jenner. It has, since its foundation, performed the public vaccinations of Rotterdam at a station in the centre of the town, and distributed lymph through Holland and its colonies. It was with the view of obviating, by all possible means, any scruples or prejudices of parents, that the Society determined to add to its existing station a second for the performance of animal vaccination. The latter was at first practised with one calf weekly; but, since 1871, two calves each week have been regularly employed. These calves are inoculated—the one on the Tuesday, the other on the Wednesday. The calf of Tuesday is inoculated direct from the calf of the preceding Wednesday, and serves for the vaccination of children on the Sunday following. The calf of the Wednesday is inoculated with lymph collected on the Sunday from the calf of the Tuesday of the week before, and serves for the vaccination of children the Monday following. The vaccinations of the human subject with animal lymph are performed on Sundays and Mondays only, and in each case with lymph at the sixth day of eruption. The propagation of the cow-pox on the heifer is done always with lymph collected at the sixth or seventh day. To obtain the lymph, Dr. Minderap, the superintendent at the station, adopts the method of compressing the pock on the calf with pincers. The results of this method are stated to be satisfactory. From the report of the Rotterdam Society for 1877, it appears that ten punctures are made for the insertion of the virus into the human arm. The average number of resulting pocks was, in 1877, 8½; 1,367 cases had ten pocks or more, 256 nine pocks, 290 eight pocks, 150 seven pocks, 109 six pocks, and 206 having five pocks or less.

Amsterdam.—Animal vaccination was started here on March 31st, 1869, by a Vaccination Society similar to that at Rotterdam. The station is now a very successful one. At first, only one calf was inoculated weekly, on the Wednesday, and directly from the calf of the week preceding—the human vaccinations being done from it on the Monday and Tuesday of the week following, or the sixth and seventh days of eruption. One calf was, however, found inconvenient, as the lymph could not be kept up permanently, and renewals had frequently to be made from Rotterdam. After a time, the Society had better success, particularly since two calves have been employed. At present, the medical staff give their services gratuitously. The growth of the use of calf lymph is well shown by the fact that, whereas in 1869 there were 1,192 more vaccinations performed with humanised than with calf lymph, in 1877 the number of animal vaccinations surpassed the humanised vaccinations by 1,906.

The Hague.—On June 11th, 1871, a station was opened here, and its results now quite correspond with those of Amsterdam and Rotterdam. From the first, the transmission of lymph from calf to calf has been successful; this being mainly due to the employment of two vaccinised

calves. Since 1872, the method of Dr. Bezeth has been followed, and it is reported to yield favourable results, especially in the transmission of lymph from calf to arm. During the summer of 1877, three calves were employed.

Utrecht.—The animal vaccination station at this city was opened on July 29th, 1873. Here calves are used which are a little older, and which are not fed with milk. The lymph from these calves is reported as being not so brilliant in its results as that taken from younger calves.

Haarlem has a vaccination station in the summer, and it is hoped that it will soon be made a permanent one.

ITALY.—In this kingdom, there appear to be no fewer than fourteen animal vaccination stations, all instituted and kept up by the enterprise of private medical men. These are at Bologna, Milan, Bergamo, Ancona, Genoa, Venice (2), Arezzo, Verona, Vicenza, Rome, Modena, Ravenna, and Rimini.

Milan is a great lymph-providing station, sending supplies not only to Italy, but to Austria and Belgium, notably to Brussels, to the Board of Health there. During the first half of 1877, the latest period for which I have statistics, there were performed at Milan 2,733 vaccinations; the proportion of success being 99.70 per 100 vaccinations, and 3,169 revaccinations, with a percentage of success of 47.95 per 100.* From 1869 up to 1877, the number of vaccinations performed by the Milanese Committee had exceeded 100,000, and 668 heifers had been inoculated. The ideas of the Milanese Committee on the subject of animal vaccination are so sensible that I cannot but quote them. They observe that they never contemplated the weakening or annihilation of vaccination from arm to arm, which is and which will be a great benefit for the prophylaxis of small-pox. They only wish for a sanitary reform, which possesses great advantages in guarding infants from accidental but formidable affections, which it would be inhuman to insert into their veins at the same time as the protecting vaccine virus.†

At *Genoa*, the success of revaccinations is 51 per cent. Genoa possesses a strong garrison; and since 1870, a third of the recruits have, by Government orders, been revaccinated with animal lymph. The average of positive results has now been raised to 60.95 per 100.

At *Rome*, animal vaccination would appear to be practised, although the municipal vaccination service deals only with humanised lymph. It may be of interest to state that, during the twenty-five years 1848 to 1872, 22,701 vaccinations were performed by the municipality. Of these, 2,488 did not return on the eighth day; and of the remainder, 20,137 were successful, whilst 14 gave abnormal results and 62 were unsuccessful. Thus the proportion of successful results was, in the able hands of Dr. Toscani, as high as 99.62 per 100.

Ancona.—Here both humanised and animal lymph appear to be used. During the four years 1874-7, 5,795 vaccinations (5,506 successful) and 1,384 revaccinations (497 successful) were performed with humanised

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* *Gaz. Med. Ital. Lomb.*, No. 90, 1877.
† *Journal d'Hygiène*, October 9th, 1879, p. 491.

lymph, and 14,044 vaccinations (13,021 successful) and 5,316 revaccinations (2,261 successful) with animal lymph. From this station large quantities of calf lymph are sent to the Austrian provinces on the coast of the Adriatic, the provinces on the banks of the Danube, Greece, and Turkey.

Naples.—I have already referred to this city as the cradle of animal vaccination. So far as can be judged from an interesting paper,* recently read by Dr. Serafino before the Sixth Italian Medical Congress, held at Naples last September, animal vaccination would appear to be exclusively practised there. Dr. Serafino shows at some length the reasons why children escape vaccination, and argues strongly for an uniform register of vaccination throughout the kingdom. He also examines the question as to the relative value of the two systems of vaccination (*i. e.*, with humanised and animal lymph); and observes that, if this had to be settled with the statistics collected at Naples, during the epidemic of small-pox of 1871 and subsequently, the preference must be given to animal lymph. Indeed, statistics demonstrate that the Neapolitan population, vaccinated with animal lymph, offer a comparatively greater resistance to small-pox than those vaccinated with humanised lymph. From a table appended to his report, I extract the following figures: Births in Naples in 1878, 15,190; of which 12,828 have been vaccinated, all with animal lymph. Of these, 12,377 were certified as successful (or 96.4 per cent.); in 224, the result had not been certified; one was spurious; and 226 were unsuccessful.

The animal lymph from Italy would appear, from a report presented to the Constantinople International Board of Health, to have proved of immense service during the Russo-Turkish war. Flying before the invaders, half-a-million refugees from Roumelia arrived at Constantinople, where they remained several weeks before being transported for the most part into Asia Minor. Small-pox made frightful ravages amongst these hordes of people, crowded in the mosques in the villages of the Bosphorus. Measures were, however, early taken to secure their vaccination; and this was promptly effected through the supplies of animal lymph sent from Ancona and Naples.

From an exhaustive memoir,† by MM. Felice dell'Acqua and Gioachino Grancini, I take the following general statistics as to animal vaccinations in Italy. Excluding the cases that did not return for inspection on the eighth day, the figures as to animal vaccinations performed in the kingdom since its introduction, would appear to stand as follows.

	Number.	Successful.	Abnormal.	Unsuccessful.
Vaccinations	115,920	106,183	455	9,282
Revaccinations	89,490	38,691	9,720	41,076

giving proportions of success of 91.59 and 43.37 per cent. respectively.

In the year 1877, the positive results reached at Milan, 99.7 per cent.; at Venice in 1876, 99.2; at Bergamo in 1876, 98.9; and at Ancona, 94 per cent.

GERMANY.—In this empire, animal vaccination is in great favour, and a large number of institutes at which it is practised are now open.

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* *Il Censimento Vaccinico della Città di Napoli.* Del Dott. Cav. Raffaele Serafino. Napoli: 1879.

† *Il Vaccino animale e il Vaccino umanizzato, Studi sperimentali statistici.* Del dottori F. dell'Acqua e G. Grancini. Milano: Fratelli Dumolard, 1879, pp. 224.

The first animal vaccination service in Germany was organised at *Berlin* by Dr. Pissin, in June 1865, as a private speculation, and is still carried on as such. It happens most opportunely for my present purpose, that Dr. Pissin has recently published a long and most interesting report* on the fourteen years' working of his institute, and I am thus enabled to submit the very latest information with regard to animal vaccination at Berlin. Dr. Pissin's station is not nearly so large as those in Holland, at three of which considerably more than two thousand cases come for vaccination each year; but it is not less successful. Following the experience of others in the conduct of animal vaccination, Dr. Pissin at first had little success; but he attributes this to his use of M. Negri's system of obtaining the lymph. Subsequently, he went to Paris (in 1866); and, after inspecting M. Lanoix's system, adopted the latter in preference to the Neapolitan method. As to his success in vaccinating human subjects, the same initial difficulty has to be recorded. In 1869, only 46 per cent. of the vaccinations were certified as successful: a proportion, as Dr. Pissin admits, far too small. But doubtless a large number of those which were not recorded as successful did not come back for inspection, since we find Dr. Pissin referring to the favourable change in this respect after the passing of an improved vaccination law in 1875. Since that year, the percentage of success has been very much greater. In 1875, it was as nearly as possible 100 per cent.; in 1876, it was 98; in 1877, 95; and in 1878, 97. For the same years, the ascertained success in revaccinations, which before 1875 were beyond control as regards inspection, was: 1875, 68; 1876, 72; 1877, 75; and 1878, 80 per cent. From these figures, Dr. Pissin argues that animal vaccination is quite as successful as humanised vaccination; the more so, as all these vaccinations were not made direct from the calf, but with lymph in tubes, which had been kept for days and even weeks. As to the success of animal lymph in revaccination, which has been particularly observed elsewhere, Dr. Pissin insists strongly; for he says, adverting to the figures given above: "Ein günstigeres Resultät hat, soviel ich weiss, auch die humanisirte Vaccine nicht aufzuweisen." (P. 20.) Some important tables are given in the report as to the actual number of vaccinations, etc., accomplished; and from these I gather that, during the twelve years 1867-1878, 555 calves were inoculated, 6,773 vaccinations were performed with their lymph at Berlin, and 26,284 tubes were sent away. Dr. Pissin uses, as a rule, one tube for each vaccination; and each calf is made to yield about sixty tubes of lymph. But it is possible, as he says, to get a much larger number of tubes if desired. Most calves yield one hundred tubes, and a good many yield more. Dr. Pissin agrees that animal lymph in tubes is not so effective as humanised lymph; but he states that vaccination direct from the calf on the fourth or fifth day after inoculation is, without exception, effective. To use tube-lymph with success, he advises that simple punctures should not be trusted to, but that cross incisions with broad openings should be made on the arm. In the second quarter of 1866, the percentage of ascertained success in tubes sent away was 65 per cent.; but since then it has risen considerably, especially since the new law of 1875, and amongst those vaccinators who use the method of cross incisions. In fact, it is now quite the exception to use punctures or simple incisions. As to the

* *Bericht über die vierzehnjährige Wirksamkeit des Impf.-Institutes für animale Vaccination.* Von Dr. Med. Pissin. Berlin: 1879.

degree of success in the particular case, Dr. Pissin gives the following figures. Of 404 successful vaccinations in a particular period, 56 had one pock, 56 two, 60 three, 69 four, 77 five, and 83 six; the number of incisions being six in each instance. Thus considerably more than half the cases had more than three pocks. On the whole, Dr. Pissin thinks very highly of animal vaccination; and he considers that it can be carried on in Germany as well as in other countries. As to the cost, he reckons that, paying fifteen shillings to the butcher for the loan of the calf, the cost of lymph for each vaccination would be under twopence; but, as the success is only unimportantly diminished by the admixture of glycerine—which, in fact, can be added so as to increase the amount of the lymph five times—each vaccination would only cost a halfpenny. The rent of the stables and of the vaccination-station, the food and attendance of the animals, and the remuneration of the vaccinator, must of course be added; but these are of a constant value and can easily be estimated. The great point for such an in stitute would be that a weekly cattle-market should be held in the town where it is established, so that the necessary animals could be procured. Dr. Pissin thinks that the Government ought to provide stations for animal lymph; and he recommends that, if the State take the question up, a central bureau should be established, with a head depôt at the largest town in each province. I may add that Dr. Bollinger states in his report that animal lymph is on sale at several dispensaries at Berlin, and at one in Reichenstein (Silesia).

Hamburg.—Animal vaccination was started at the Hamburg public vaccination station in 1875, by the indefatigable Dr. Voigt. The lymph obtained from Amsterdam at that time is still being used. The lymph is taken from the calves one hundred and twenty hours after inoculation; and the animals are, therefore, kept six days. The cost of feeding each calf for this period on milk (which is constantly tested) is estimated at ten shillings; and a further sum of twelve shillings has to be paid to the butcher from whom it is hired. Dr. Voigt is of opinion that calf-lymph should not be kept longer than a fortnight, and none that has been taken from the calf beyond one hundred and forty-four hours. At the Hamburg station, the proportion of unsuccess with calf-lymph during 1878 was only 0.29 per cent.*

Stuttgart.—Here animal vaccination was commenced in 1875. The inoculation of the calves is reported to be done on the scrotum, on the ground of the very thin and highly vascular nature of the skin on that part, enabling it to be easily grasped by pincers.

Weimar.—The Medical Association of Thuringia commenced animal vaccination here in 1870. The calves are mostly inoculated between the vulva and the udder. The proportion of successful vaccination amounted, up to August 1878, to 89 per cent.; while of revaccinations 80 per cent. were successful.

At *Leipsic*, animal vaccination has been practised since the end of 1877 by Dr. Livius Fürst; at *Munich*, a station was opened under government patronage by Dr. Kranz on the 21st of March of this year; and at *Würzburg* (Bavaria) there is also a station under the charge of Dr. Hofmann.†

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* *Des Erfolg mit der Animalen Vaccine in der Hamburger Impfanstalt.* Von Dr. Leonard Voigt, Oberimpfarzt in Hamburg. Leipzig: 1879.

† See Hofmann, "Ueber Impfung mit animale Lymphe". (*Aertzl. Intelligenzblatt*, p. 22, 1879).

AUSTRIA.—At *Vienna* there are two private institutes, both established in 1877, one under the direction of Dr. von Heinrich, the other under Dr. Moritz Hay. At *Pesth* there are several private institutes for animal vaccination.

At *Prague*, an institute for animal vaccination was started by Dr. Lilienfeld, on the 1st February last, and at a meeting of the Medical Association of Prague, on the 7th instant, Dr. Lilienfeld gave the result of his vaccinations.* Since the commencement of the institute, 273 primary vaccinations have been performed. Of these, 213 were successful and 60 unsuccessful. Doubtless, this large proportion of failure will soon be considerably diminished with further experience, as it seems to be invariably the case that a large number of failures attends the early days of the use of animal lymph.

RUSSIA.—Observations were, early in the history of animal vaccination, instituted in Russia by M. Prosoroff under the direction of the Government. Animal vaccination has now been practised in *St. Petersburg* for the last ten years under Government auspices by Dr. Bulmerinck.† Dr. Risdon Bennett, the President of the Royal College of Physicians, who was in St. Petersburg in 1870, states that he saw, in the Foundling Hospital in that city, some rooms fitted up for vaccinating upon and from the heifer, and witnessed and admired there the decent and strict attention to order and cleanliness with which the whole process was conducted.

At *Moscow* there is also an important station at the Foundling Hospital. In 1869, 1870, and 1871, 662 calves were inoculated there, with sixty-four failures.

SWITZERLAND.—There is an animal vaccination station at *Bâle* under the control of Dr. Siegmund. From the report of the Sanitary Department for 1877, it would appear that, of 328 vaccinations with animal lymph, twelve were without result; while of 281 vaccinations from arm to arm, eight were without result. At *Schaffhausen* there is an animal vaccine station, and one is also projected at *Zürich*.

SPAIN.—Animal vaccination has not yet been officially recognised in this country, but it would appear to be practised at *Barcelona*.

INDIA.—Animal vaccination has made very considerable progress in our Indian empire. It has been practised for several years at *Bombay* and *Poona*, and it has at various times been in force at *Bhooj* (1873-4), *Barsi* (1874-5, given up in 1875-6), *Sakkhar* (for three consecutive years in the cold season), *Kolapore* (1875-6), and *Surat* (1877-8). Indeed, a Bill is now before the Council of the Governor-General of India, for making the use of animal lymph in ordinary cases compulsory.‡ Section 13 of the Vaccination Bill of 1879, introduced by the Honourable Sayyad Ahmad Khán, proposes to enact that "the vaccination of a child shall ordinarily be performed with animal lymph, but in

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* *Prager Medicinische Wochenschrift*, No. 47, November 19th, 1879.

† A series of interesting papers on Revaccination and Animal Vaccination in St. Petersburg, with a long historical *résumé* of previous experiences of other countries in the matter, is now being contributed by Dr. Bulmerinck to the columns of the Munich *Aertzliches Intelligenz-Blatt*.

‡ See *Gazette of India*, October 18th, 1879, page 935

case animal lymph is not procurable, with human lymph; provided the parent or guardian of such child has consented to have the child so vaccinated [with human lymph], or the Governor-General in Council has so directed by notification in the *Gazette of India*, and has fixed the period for which such mode of vaccination shall be adopted." Nothing was said by the mover of the Bill as to the reasons which prompted him to insist on the universal use of animal lymph; but there seems to be a great prejudice in the minds of the native gentry against allowing lymph to be taken from their children's arms, and the very next clause of the Bill (No. 14) forbids the taking of such lymph without the consent of the parent or guardian. I may here remark that the clause as to animal lymph, which the Honourable Sayyad Ahmad Khán would wish to apply to the whole of India, is already in force in the city of Bombay, under the provisions of Section 12 of the Bombay Vaccination Act of 1877. I am indebted to the kindness of Sir Louis Mallet for the preceding facts, as also for the information which follows as to animal vaccination at Bombay. Sir Louis has indeed most courteously forwarded to me copies of the last reports on the vaccination operations in the whole of the presidencies and districts comprised in the Empire; but in none of these but Bombay does animal lymph seem to be used.

At *Bombay*, animal vaccination was first started about 1869 by Dr. Ananta Chandroba, Superintendent of the Bombay Presidency Circle; the lymph being brought from Europe by Dr. Blanc, who vouched for its origin and purity. At first, there were a good many failures; but soon better results were achieved. In 1872, a special report was presented to the Government by the Superintendent-General of Vaccination, much interest having been excited in the subject, and all the superintendents having previously come either to Bombay or Poona to learn animal vaccination. Meagre as Dr. Pinkerton felt to be the information which he had been able to collect together, he nevertheless reported that it was "entirely in favour of the protective power, purity, and trueness of the animal virus in use". About this time, seventeen practitioners of Bombay, who were asked by Dr. Ananta if they had ever seen or heard of an undoubtedly authentic case of small-pox after vaccination with animal lymph, had to state that none of them could give the name of a single person. Dr. Ananta has devoted immense attention to the subject of animal vaccination, and every succeeding report records better results at his station. In 1872-3, 241 calves were inoculated: 233 with the animal lymph in general use, and 8 with lymph from Dr. Warlomont. Of inoculations with the former, 228, or 97.8 per cent., were successful; with the latter, 2, or 25 per cent. With 24 exceptions, all the revaccinations were performed with animal lymph. Of 14,940 primary vaccinations, 12,663 were performed with animal lymph, with success in 10,577 cases. Thus the proportion of success was 90.37 per cent. In 1873-4, 205 heifers were inoculated, and 8,285 primary vaccinations were performed, with 7,130 successes, or 89.8 per cent. During 1875-6, there was an epidemic of small-pox in Bombay; and at the beginning of the year it was found difficult to get calves to supply sufficient lymph to vaccinate the crowds of people who flocked to the station. The effect of this was to lower the percentage of successful vaccinations during part of the year. The number of cows inoculated was 372, and only 11 were unsuccessful. Of 19,259 primary operations, 16,853 were performed with calf-lymph, with a percentage of success of 92.65. All the revaccinations but 11 were done with calf-lymph, with what success is not stated. During

1876-7, animal vaccination was continued, to the entire satisfaction of Dr. Ananta. Of 293 heifers inoculated, 287 were successful. In 1877-8, 320 heifers were available, out of a total of 324. The cost during that year on account of heifers was about £260, as against £268 in the previous year. Since the passing of the Compulsory Vaccination Act for Bombay above referred to, all operations in that city are performed with animal lymph, and human lymph is no longer used.

Poonah.—About 1870-1, animal vaccination was practised here by Dr. Blanc. In the report for 1875-6, it is described as being of much benefit in the way of supplying good and pure lymph. During 1877-8, there was failure in 3 out of the 60 heifers operated on, the total cost under this heading being about £20.

Surat.—Animal vaccination was introduced here during the rains of 1876, and continued up to February 13th. 1878, when it had to be discontinued, as no heifers could be procured for inoculation. During this period, 35 heifers were used, at a cost of £6. In 32 of these, the inoculation was successful. The number of primary vaccinations was 273, and of these 257 were successful, or 90.4 per cent. Revaccinations with calf-lymph were performed on the prisoners in the Surat Jail and eight European inhabitants of that city, and primary vaccinations were performed on the native residents.

UNITED STATES.—The credit of introducing animal vaccination into America belongs to Dr. Henry A. Martin of Boston, who sent specially to Paris for lymph from Professor Depaul, and who was supplied with autograph directions from that distinguished *savant*. Dr. Martin had secured the use of a farm on which was a herd of nearly fifty young bovine animals, and when, on September 23rd, 1870, he received the virus from the 258th, 259th, and 260th animals of Dr. Depaul's series, beginning with the heifer of Beaugency, he vaccinated three calves, on the next day two, and so on till he had nearly exhausted his supply of virus in the vaccination of nine or ten animals. In no instance did these vaccinations fail, and Dr. Martin was thus put in possession of ample supplies of animal lymph. The first physician who followed Dr. Martin's example was Dr. F. P. Foster, of the New York Dispensary, who has since established a flourishing service of heifer-vaccination. Dr. Martin and Dr. Foster had the field to themselves for about eighteen months, after which an epidemic of small-pox produced a demand for lymph so extraordinary, that a great many physicians, to say nothing of dealers, instrument makers, etc., set to work to propagate animal virus. The natural consequence of this haste was, that very large quantities of so-called animal virus were sold, the failure of which did great harm to the cause of animal vaccination. All this time, Dr. Martin was continuing his inoculations with the same care as before, with the result that, after 570 transmissions, he found no tendency to deterioration of the lymph, no shortening of the duration of the induced disease, no indication of change, however slight, from the standard of excellence observed in his first vaccinations six years before.* As over eleven years of constant bovine transmission had elapsed at the date of Dr. Martin's report since the case of cow-pox at Beaugency, without the slightest indication of deterioration, it would

* *Report on Animal Vaccination to the American Medical Association.* 1877. Vol. xxviii of *Transactions*, pages 187-248.

seem justifiable to assume that original cow-pox, transmitted through a series of selected young bovine animals, will not manifest the tendency to change which has been noted in virus of long humanisation.

It is a matter for regret that no statistics are forthcoming as to animal vaccination in America, with the exception of some "quasi"-reports, published as business circulars and advertisements, and which are evidently unreliable. It appears, however, from Dr. Martin's report, that, during the six years and nine months that he had practised animal vaccination, he had vaccinated 580 animals, besides some forty more in his early experiments. From these animals, 80,000 charged points, and an uncounted but very large number of crusts and tubes of fluid lymph — many thousands — have been issued. Virus has been supplied to vaccinate many cities and other municipalities, to a very large number, with quantities of from 500 to 84,000 points. Dr. Martin supplied the Departments of War and the Interior with large quantities of virus, principally in the form of crusts, for the vaccination of troops, frontiersmen, and Indians; and on one occasion supplied 3,000 points for the arrest of an epidemic of small-pox, which threatened the annihilation of an Icelandic colony in British America. In his own practice, Dr. Martin at first experienced, and acknowledged, failure in 20 per cent. of his cases; but he now reports that, with further experience, failure in primary vaccination of infants is a very uncommon event. From the very first, the remarkable success of animal virus in revaccination was generally, indeed universally, admitted—the results of revaccinations, in all cases when the vaccinee has been vaccinated only once before, but at various ages, being exactly 73 per cent. at the first attempt.

Before leaving this part of my subject, it behoves me to refer to the results of an investigation made last year by the eminent professor, Dr. Bollinger, of the University of Munich.* Dr. Bollinger was commissioned by the Government of Bavaria to inquire into the present state of animal vaccination, and for this purpose he seems to have personally visited a large number of the continental stations. As the result of his investigation, he reports himself as very greatly in favour of animal vaccination, and he thinks it gives the very best results. He recommends that large towns should have institutions for the supply of animal lymph, and he regards its universal application as possible. I do not now quote further from Dr. Bollinger's valuable report, but the results of his independent inquiries into the subject seem to me to argue very strongly for the recognition of animal vaccination by the Government of this country, or at all events for a fresh and exhaustive investigations into the improvements effected in it since Dr. Seaton made his adverse report of 1869.

II.—Examination into Alleged Objections to Animal Vaccination.

The objections which have been urged against animal vaccination may be thus briefly summarised. It has been alleged that, 1. The vaccinia induced by the use of animal virus is objectionably and even dangerously violent; 2. That animal vaccination is liable to be the

* *Ueber animale Vaccination.* Bericht über eine im Auftrag des Kgl. Bayer. Staatsministeriums des Innern zum Besuche des Animalen der animalen Impf. Anstalten, etc. Von Dr. Med. O. Bollinger. Leipzig: F. C. W. Vogel. 1879.

means of communicating other animal diseases than that which it is intended to communicate; 3. That the vaccination of an animal, even with the warm fluid or "living lymph", is an uncertain process, and with tube or dried lymph very likely indeed to fail; 4. That calf-lymph does not "take" easily on human arms, and that, when it does succeed, the measure of success obtained is not so great as that arising from the use of humanised lymph; 5. That it does not "keep" well; 6. That it is expensive and difficult to obtain. It will be necessary to deal with these several objections a little in detail.

1. *Violence.*—The fears that the vaccinia induced by the use of calf-lymph may be objectionably violent are founded not upon actual observations, but on the traditions of the vaccine disease as observed by the early writers. Dr. Seaton has admitted, and it is within my personal observation, that the vesicles produced by calf-lymph are good and well characterised pocks, running the same course, and manifesting the same varieties, as are produced by humanised lymph at the best public vaccination stations in England. Neither in the size of the vesicle, nor in the intensity of the local symptoms, nor in the length of period which the eruption takes to run its course, is there any notable difference. "The cicatrices which I have seen from the action of animal lymph", said Dr. Seaton in 1869, "are quite characteristic; in depth and foveation, they were as good as the cicatrices ordinarily produced by humanised lymph in the practice of good vaccinators. In short, the result of my personal observations with regard to the animal vaccine lymph in use in London [by Dr. Blanc], in Paris, and at Rotterdam, was that, tested by the character and course of the pocks it produced, it was perfectly good lymph." This frank admission effectually disposes of the first objection. It may be well, however, to add, to avoid possible misconception, that it is well known that peculiarities of local action do attend the use of some stocks of primary cow-lymph, not only in the direct transference of such lymph to the human subject, but also in its passage through many successive subjects. These local peculiarities are far, however, from pertaining to all original stocks of cow-lymph. In the Bridgwater level and the vale of Gloucester, where the natural disease is not unfrequently seen, Dr. Sanderson states that he has met with many practitioners who have inoculated from such cases, but "that all who have employed such lymph agree in stating that, after the first or second transmission, the results obtained do not differ from those of ordinary vaccination, either in respect to the progress or character of the vesicle."* To argue, therefore, that, because these local effects are manifested in some instances, they must follow in all cases of animal vaccination, is manifestly absurd. The experience of America is in accord with this, for Dr. Martin states that, "in the positive experience of many thousand American physicians, animal vaccination is no more intense than typically perfect vaccination should be, that it is infinitely less liable to be followed by troublesome and irregular sequelæ than that of long humanisation, and that it has, most unexpectedly, but most undoubtedly, proved to be exempt from that miserable complication, the pest of vaccinators, erysipelas."

2. *Inoculation of other Diseases.*—That animal vaccination may be the means of communicating other animal diseases than that which it is intended to communicate is an exploded bugbear founded on nothing—a revival, in fact, of the "prognostics and denunciations" referred to by Mr.

* Sixth Report of the Medical Officer of the Privy Council, p. 10.

Simon in such eloquent and amusing terms in his masterly "Papers relating to the History and Practice of Vaccination", and so severely satirised by Gilray in one of his best cartoons. It is not a little curious to note that these new objections to the use of animal lymph are the same as the old objections urged in the beginning of the century against humanised lymph. As Mr. Simon has ably said: "Divested of its more ludicrous imagination, 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 renamed, 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."

We may apply with equal truth these forcible words to the objectors against the purity of animal lymph. A sufficient answer is that there is not an authentic record, hardly even an unauthentic one, of a single case giving colour to the objection in the history of vaccination. The only disease transmitted by animal lymph in Dr. Martin's experience has been a very trivial form of herpes circinnatus, and that can never occur when animals are selected and kept with any approach to ordinary care or propriety. This disease can be remedied at once by the simplest means, and now that it is known, need not recur. Dr. Martin states that at least five thousand calves have been vaccinated during the past seven years in America. "Many of these have been most carelessly selected and improperly kept, but the opponents of animal vaccination will look in vain for any facts to support their dire threatenings and forebodings of disaster.

It is proper that I should mention in this connection that, of course, reasonable care must be taken by the operator in not using lymph that has obviously become putrid. An instance of evil effects arising from the neglect of this most obvious of precautions was recently communicated by Dr. Pietra Santa to the French Academy of Medicine,* and it is right that I should refer to it here. On the 22nd April last, three vaccine pustules were sent to San Quirico d'Orceia by the Vaccination Committee at Rome, these pustules being taken from a heifer inoculated on the 17th April. Supplies were sent to numerous other places on the same day from the same calf, but no abnormal symptoms followed in the vaccinations performed with the lymph anywhere else than at San Quirico. Here the pustules were used for vaccinations on the 26th and 28th April. On the first day, eight persons were vaccinated from one of the pustules, which, as the officiating vaccinators admitted, exhaled a mouldy smell. Notwithstanding this, they used the lymph for twenty-nine persons.

Upon the first eight persons vaccinated, red blotches appeared two hours after vaccination, followed shortly by fever, erysipelas, phlegmons, and suppurating abscesses; the other children, with seven exceptions, also presenting unusual morbid phenomena.

Two inquiries were at once set on foot by the legal authorities and by

* *Journal d'Hygiène* for October 16th, 1879, page 301.

the General Board of Health of the Kingdom, and it was incontestably proved—1. That the heifer was not ill; 1. That the virus sent had been of good quality; 3. That, in the three pustules sent to San Quirico, and especially the first, a process of change and of putrefaction had been commenced, so extensive as to have attracted the attention of the operators when only a few of the vaccinations had been performed. The carelessness of the vaccinators in continuing to use the lymph under these circumstances is, to our English ideas, quite inconceivable; and so gross an instance of *mala praxis* ought not to invalidate for a moment our conclusions as to the value of animal vaccination.

3. *Failures in Animals.*—There can be no doubt that, at the date of Dr. Seaton's inquiry in 1869, frequent failures took place in the transmission from animal to animal of lymph derived, in the first instance, from natural cow-pox. But since then very great improvements have taken place in the method of inoculation, so that now to fail in infecting an animal is a very rare occurrence. It must be remembered that in 1869 animal vaccination was in its infancy, and the rules to be observed in selecting animals and in the method of vaccinating them had not then been adequately appreciated. It needs, in fact, to be constantly borne in mind that some amount of care and patience are necessary for the successful cultivation of cow-pox on the calf, as, indeed, for the success of almost any other similar proceeding, however simple. Dr. Warlomont, whose success is now complete, and who can go on with perfect assurance, though inoculating one calf a week only, met at first nothing but disappointment; and his unsuccesses were so numerous that, had he been guided by the results of his first year's work, he could not but have abandoned the practice. It is not necessary that I should now state how entirely this has been reversed by experience, as Dr. Warlomont will doubtless himself state the results of his inoculations to the Conference. The experience of the Society at Rotterdam supports the same conclusion. They commenced their proceedings in April 1868 by taking a calf to Brussels for inoculation direct from one of Dr. Warlomont's calves. The inoculation was successful; but, after two or three months, the eruption on the successive calves became less pronounced, and the Society had, therefore, to send to Brussels for fresh lymph. This acted at first as their original supply had done; but, like it, after a number of weeks' use, apparently deteriorated. The same happened with the supply next obtained; and altogether, between April 1868 and June 1869, they had to renew their supply from Brussels at least six times. At length, Dr. Van Vollenhoven went to Paris to consult M. Lanoix (who, I believe, has never on any occasion failed in his attempts to continue the disease by inoculation); and, doubtless, profiting by M. Lanoix's experience as to the method of inoculation, brought back with him some mixed Beaugency and St. Mandé lymph of uninterrupted transmission. A degeneration (which I cannot think was only temporary) followed, however, the use of this lymph after a certain time, and recourse was again had to M. Lanoix. Since that time, no difficulty at all has been experienced in keeping up the supply unimpaired, and the lymph now in use at Rotterdam has undergone considerably more than five hundred transmissions without any necessity for renewing the stock. The same experience has been found at other places where animal vaccination was at first found difficult to maintain; and we are justified in asserting that the difficulty of transmitting successive vaccination from calf to calf does not, or need not, exist.

I cannot refrain, however, from quoting Dr. Martin's remarks in dealing with this objection. He says: "When I commenced the vaccination of animals, I was troubled by apprehensions of failure; and, in a few instances, did fail entirely. In many, I failed to induce the development of the number of vesicles I desired. I soon found that it was necessary to select animals whose skin was in a good state, well-nourished and vascular, and to exhaust a good deal more time and labour to insure perfect success than I had at first thought necessary. Properly done, vaccination of animals with bovine virus may be said to be invariably successful, so very rare are the exceptions. I think it may be said that a 'stock' of animal vaccine in the hands of a competent propagator is fully as secure from loss as one of humanised lymph. An important fact is, that while to obtain animal virus in the most efficient state for human vaccination, it should be collected at a certain and brief period of the vesicle, that taken at a much later stage of the eruption is found to be quite efficient for the vaccination of other animals. If, as is the best and much the most expensive method, animals are vaccinated directly from each other with warm fluid virus, the operation can be done with more facility than if dried lymph is employed, but still very considerable time and diligence are requisite. When points or quills are used, the labour is much greater, and more time is required to ensure perfect solution of the virus. It must be acknowledged that the vaccination of animals and collection of virus require for their best accomplishment a very decided degree of technical skill, patience, and experience. With these, nothing can be more certain in its results, and failure of animal vaccination conducted by physicians of proper experience need not be feared. The great reasons why Dr. Seaton was led to consider the vaccination of animals a precarious process were that in 1869, in Europe, tube-lymph was almost exclusively employed, and when points were used they were of a very small size, and on this account were difficult to handle, and held too small an amount of virus. Neither was it then understood how necessary it was to take a good deal of time and care to dissolve the dried lymph and to effect its perfect insertion. To ensure the best results in vaccinating animals, virus should be used very freely, and with patient diligence; with these, success is very certain."

4. *Failures in the Human Subject.*—One of the great objections of Dr. Seaton to the use of calf-lymph was its frequent failure to infect the human subject, even when the operation was performed by experienced operators and with lancet direct from calf to arm; and that, when it did take, the measure of success attained was not anything like that attained by vaccination performed from arm to arm at English vaccination stations. Indeed, this may be said to be his principal objection, since whatever may be the advantages or disadvantages of animal vaccination in other respects, the crucial question is how it protects the vaccinee from subsequent small-pox.

The difficulty, however, of successfully inoculating the human subject with animal lymph has now been surmounted by experience; and, as will appear from the statistics in another part of this report, animal lymph may now fairly vie with humanised lymph as regards the proportion of successes obtained. But Dr. Seaton has also objected (page 168 of his Report) that a vesicle does not rise to every puncture with the same regularity in animal vaccination as in arm-to-arm vaccination. I regret that no statistics are available to enable me to follow the

Medical Officer of the Local Government Board through this argument; but I cannot but think that he has somewhat over-estimated the success systematically obtained throughout England and Wales with humanised lymph. The experience of the National Vaccine Establishment was reported by Dr. Seaton to be that, in vaccinations performed from arm-to-arm, vesicles rose in every point of insertion in considerably more than 90 per cent. of the children reported on; that the proportion of cases in which a single vesicle only resulted from the four, five, or more insertions made in each case was about 1 per cent.; and that failures did not occur on an average above once in 170 times. These results are, however, admittedly obtained only by the most careful and experienced vaccinators we have, and I have reason to believe that throughout England and Wales results of so exceptionally good a kind are not systematically achieved with humanised lymph. I should be the last to decry our present system of vaccination, and I am equally anxious not to say anything that should cast even the slightest slur upon it; but when objections to animal vaccination are based upon the alleged immense superiority of humanised lymph, it may be well to attempt to examine whether this is in fact the case. So far as I am aware no statistics have ever been published showing what is the particular quality of the scars resulting from vaccinations performed throughout the kingdom at large, and I have therefore had to fall back upon my own resources in attempting, so far as figures will serve me, to find out how much of the vaccination in this country comes up to the official standard of excellence, the grade, in fact, which the Local Government Board designate, for the purposes of grants to public vaccinators, as "first-class", *i.e.*, scars thoroughly well-marked in their foveation, and having collectively at least half a square inch of total area. The results of my calculations are to show that not more than a half of the vaccinations in England and Wales are up to this standard. Indeed, it is notorious, from the experience of all our small-pox hospitals, that a large proportion of vaccinations, although "successful" in the legal sense of the word, are so ineffectually performed as to afford by no means that perfect security against small-pox which thorough vaccination effects. Into this question, however, it is beyond my present purpose to go; but, as the statement made above may very possibly be combated, I deem it important to give the figures by which I have arrived at my conclusion, though I am afraid that, without a lengthy statement, I shall hardly render myself perfectly intelligible.

If it is objected that my figures relate to different periods, I answer that comparatively little variation takes place from year to year; and I have endeavoured to make every allowance for differences of this kind. On reference to the last published report of the Local Government Board, I find that, of the 887,694 children whose births were registered in 1876, 763,277 have been successfully vaccinated. Unfortunately, the returns as to the number of public vaccinations performed from year to year are, for some inscrutable reason, made up to the 30th September; but, having regard to the limit of time during which a child is allowed to remain unvaccinated before legal proceedings can be taken, we shall not be out of the way in regarding, as fairly comparable with the 1876 births, the return of public vaccinations performed in the year ended the 30th September, 1877. From this I find that, during that period, 498,577 public vaccinations were successfully performed on children under one year of age. Now, these public vaccinations would all come under Government review during the years 1877 and 1878—the inspec-

tion of public vaccination in each Union being made biennially; and, for such of them as presented sufficiently satisfactory characters to come up to the official standard of excellence, awards would be given. Adding together the sums gained in this way during 1877 and 1878 (£11,994 and £15,231), and dividing this amount by two, as to exclude the vaccinations of the children born in 1877, I find that, at the rate of a shilling a case, a total of 272,250 vaccinations were deemed to be so good as to come up to Government standard and deserve recognition. In other words, only 272,250 vaccinations, out of 498,577 public vaccinations performed, were of the first quality. There are several sources of error, however, in this calculation, the arithmetical value of which cannot be measured, and which act in different directions. Thus, some public vaccinators are reported as disqualified from getting awards by their irregularity of attendance, carelessness, etc., though their quality of vaccination may be good; and a few get a less sum for each vaccination than a shilling per case, under circumstances that cannot be detailed. On the other hand, those who do get awards undoubtedly get paid for some cases which are not up to the proper standard, since the Government Inspector can only inspect a certain proportion of cases in order to see the general style of the public vaccinator's work. To examine critically the vaccination scars of half-a-million babies every year would be rather too much to expect of Government inspectors; and they must, therefore, take a great deal for granted.

On the whole, it may, I think, fairly be said that a little over a half of the number of public vaccinations in England and Wales are of the first quality. But we have to deal, not only with public, but with private vaccinations; and the latter notoriously yield less thorough results than the former. Taking, therefore, the whole of the vaccinations in this country in a given year, I think the figures fairly show that, to say that a half only of these vaccinations yield really protective results, is to err on the side of over-estimating the proportion. At the same time, I am conscious that, in this calculation, a great deal has to be taken for granted; and, with a view of clearing up some of the difficulties which still obscure the actual facts, it would seem desirable to procure a Parliamentary return, giving the figures as to each public vaccinator's work, and the reasons which disqualified him for award. This I shall endeavour next session to obtain through the intervention of some friendly member of the House of Commons.

5. *Preservation of Calf-Lymph.*—The objection of Dr. Seaton that calf-lymph does not keep well was founded on the fact that, in the early history of animal vaccination, fluid lymph in tubes was alone employed. There can be no doubt that calf-lymph preserved in tubes does not give satisfactory results, unless it be defibrinated by the method now adopted by Dr. Warlomont at Brussels. Dr. Warlomont used formerly to mix the lymph with glycerine, and separate out the more solid matters in the lymph before putting it into the tubes; but he now, by an extremely simple manœuvre, defibrinates the lymph before putting it into the capillary tubes, and nothing is added to it. The tubes, which are of the ordinary capillary sort, are then hermetically closed. Vaccine thus prepared keeps pretty well, but a much shorter time than human lymph collected in tubes. Dr. Warlomont says that one can hardly count upon it for a week; and it is so much the surer in its results in proportion to the shortness of the interval between its collection and its use. For these reasons, Dr. Warlomont much prefers

the method of keeping lymph dry on ivory points, which is too well known to be described. The points, first dipped in a solution of gum Arabic, are coated with one, two, or sometimes three applications of lymph. They will then preserve all their power for weeks, months, and even years.

At the Bureau d'Hygiène of Brussels, however, the lymph employed is that purchased at Milan. It is furnished by the contents of the vesicle which has been cut off the calf, and is sent by post in sealed quills mixed with equal quantities of glycerine. This lymph is largely patronised by the best practitioners of Brussels and other parts of Belgium; it is exclusively used at the vaccination-stations of the Hôtel de Ville; and my own observation, as well as all available reports, and the personal assurances which I receive from Professor Hyernaux and other eminent practitioners, testify to its excellence and to its unvarying efficiency.

Dr. Martin expresses a strong opinion that calf-lymph in tubes is unreliable within twenty-four hours after its collection. He does not give the reasons for his views, and I am unable, therefore, to comment on them, except to say that he is probably unacquainted with Dr. Warlomont's mode of defibrinating the lymph. Dr. Martin says that dried lymph on ivory or bone points or on quills keeps as well as any other, and so does the virus in the form of the dried vesicle or scab; this latter, however, seems rather a nasty plan, and I think it is not a desirable way of sending out lymph, except under necessity. Animal virus sent to California every day or two during the summer of 1877, to the amount of many thousand points, proved, so far as is known, efficient, although much of it was kept nearly three months in that warm climate without particular precaution. Points of animal virus sent also by Dr. Martin to New Mexico, Constantinople, the West Indies, Peru, and to England, are reported by him as having been invariably used with success after arrival.

On the whole, there is a certain weight of evidence in favour of not trusting to tube-lymph, as that on points or quills is equally efficacious, and is not liable to undergo the alterations which tube-lymph may undergo. M. Lanoix, who says that animal vaccine lymph will generally keep in tubes, is in the habit of recommending that it should always be used, if possible, within twenty-four hours of its being taken, and that puncture should not be trusted to for its insertion, but abrasion only employed.

6. *Expense.*—It may and has been objected that calf-lymph is expensive and difficult to obtain, and that its use will necessitate the devotion of certain persons to its propagation, from whom alone it can be obtained; whilst every primary vaccination affords an abundant supply without any expense or trouble beyond the slight labour of collecting it. But is this altogether an objection? Our object is not to supersede vaccination from arm-to-arm altogether by animal vaccination, but *to provide for the frequent renewal from a central office of the stocks by which series of arm-to-arm vaccinations are commenced, and to facilitate the employment of calf-lymph as an alternative method in cases where parents desire it, or when, from any cause, arm-to-arm vaccination cannot be carried on.* It is of very great importance to the profession to be able to draw material for vaccination from a known responsible source, to which all complaints of those vaccinated can be referred; and the alleged expense of propagating calf-lymph, which is, however, much

exaggerated, is a reason for its being under the direct supervision of Government, whose interest it would, of course, be to maintain such an institution in the highest state of efficiency.

I have entered into these details in endeavouring to furnish the answers to the objections raised against animal vaccination, because it has appeared to me that these would be the greatest difficulties that would be officially cast in our path in our endeavours to bring about a remodelling of the present National Vaccine Establishment. But I have thus left myself but little space for the discussion of the advantages of animal vaccination. This, however, is a matter of the less consequence as, at the forthcoming Conference, these advantages will be fully brought out and discussed by others. I therefore confine myself to a mere categorical statement of them. 1. Animal vaccine fresh from the calf induces a more perfect development of *vaccinia* than follows the use of virus of long humanisation. Whatever opinions may be held as to the degree and permanence of the protection afforded by long-humanised vaccination, it can hardly be doubted that the nearer the intentionally produced disease approaches in its phenomena to that casually produced on the hands of milkers, and which has alone been *proved* to be permanently protective, the safer are we in assuming for it a like permanent protective influence. The opinion is now very widely, though not universally, held, that the results of vaccination are not such as they used to be during the earlier years of the practice of vaccination; in fact, that, by repeated human transmissions, the virus has become weakened, and that the pocks produced by the introduction of lymph which has passed through a large number of human beings are not so fine or so perfect as those which result from the use of lymph derived recently from the cow. It was on this ground that the Commission of the Belgian Academy of Medicine reported in favour of animal vaccination. Jenner himself was not without apprehension that the repeated transmission of vaccine lymph from one human being to another, without recurring to the cow, might impair its virtue; and Mr. Simon has stated some strong reasons for suspecting that the "occasional impermanence of protection may depend upon impairment in the specific power of vaccine contagion—an impairment arising in the transmission of that contagion through many generations of men".* There seems indeed to be much ground for this opinion; and it is strongly upheld by Dr. Martin, who has devoted immense attention and pains to the subject. 2. The advantage, and in fact necessity, of being able at will to renew a "stock" of vaccine by return to the animal, which can only be had by the maintenance of one or more perfectly reliable services of animal vaccination in continuous operation. 3. It affords means to the physician of tracing the whole pedigree of the lymph he is using; so that doubts as to its quality can be silenced by detailing its entire history. 4. True bovine lymph is certainly free from all possibility of syphilitic contamination, such as has been alleged against humanised lymph. 5. Animal vaccination can furnish large amounts of lymph regularly and at very short notice. The supply need only be limited by the demand, as all that is needed is a multiplication of the animals vaccinated. One calf alone will furnish sufficient lymph for the vaccination of about four hundred persons. During the late epidemic of small-pox in the metropolis, the medical papers constantly contained complaints of the difficulty of procuring vaccine lymph from head-quarters, and the paucity of the supply

* *Papers relating to the History and Practice of Vaccination*, p.xxxvi.

when obtained. The vaccination of an extra calf or two on occasion would have saved all this angry remonstrance, as well as much over-draining of vesicles that were used for supplying lymph. 6. An additional advantage in this connection would be derived from the less frequent occasions on which the vaccinator would be obliged to tap vesicles to obtain lymph, thus allowing the vaccine disease to be developed without interruption in a larger proportion of cases than at present. 7. True bovine vaccination is, according to the experience of Dr. Martin, entirely free from erysipelas. 8. Animal vaccine induces unmistakable vaccinal effect in a very large proportion (larger, it is alleged, than humanised lymph) of revaccinations. This is a very general experience, though I am not now able to adduce any comparative statistics to prove it. Dr. Martin affirms that the number of those revaccinated with animal virus and virus of very early human removes is, in his experience, a fraction over 80 per cent.—a much larger percentage, it must be confessed, than obtains with lymph of long humanisation. He believes that the difference in the percentage of success of the two lymphs in revaccinations approximately represents the number of those insensible to the enfeebled influence of long-humanised virus, but sensible to the intense contagion of small-pox just in the same degree as sensible to the intense power of bovine virus and that of the very early human removes from it. 9. Calf-lymph produces, in primary cases, a clear and characteristic scar, equal, if not superior, to the best of those produced by our most careful vaccinators with selected human lymph.

III.—Suggestions for Future Action.

The reform which I wish to suggest, and up to which the preceding statement leads, is not a very large one, but it is one which, in my opinion, will afford a satisfactory solution of the principal difficulties which are at present felt. Briefly, it is this: that, instead of our National Vaccine Establishment distributing, as it does at present, lymph of long humanisation, it should distribute only lymph direct from the calf, in the same way as the Belgian Institut Vaccinal de l'État. By this means, medical men who are obliged to appeal to Whitehall for material to start their vaccinations would not feel that they were inoculating their patients with matter of which they must take the previous history for granted, and the Government, on the other hand, would be able to assert much more satisfactorily than it can at present that the lymph which it sends out is absolutely pure. Any subsequent mischance must necessarily be due to the carelessness of the operator himself, and the present shifting of blame from one person to the other could not take place.

Under such a system, the Government would establish a central vaccinal establishment at which a small series of calves would be maintained, and from week to week fresh vaccinations of such heifers would be made. This would take the place of the two vaccination-stations now maintained by Government, the services of the present able vaccinators being retained for this new work. The lymph collected would be distributed upon demand, as at present, without payment to public vaccinators, for maintaining arm-to-arm vaccinations at their stations, and to all registered private practitioners on payment of a small fee, such a sixpence per tube or per ten points, a rate of payment now recognised by the Local Government Board under certain circumstances. In

this, the public vaccinators would always have at their command, for the service of new stations, a supply of lymph of undoubted purity of source and protective energy; while the private practitioner could for an insignificant sum secure for his patients the like privilege. This would place the vaccination system of the country on a larger and firmer basis than it now occupies, and would relieve both public and private vaccinators from many of their present difficulties, while it would cut away all solid ground for that mischievous agitation against vaccination which gives so much trouble to legislators and magistrates, and does much to interfere with the means necessary for the extinction of small-pox.

No doubt an objection will be made here, based on a supposed great increase of expense that will ensue from the cultivation of calf-lymph by the Government. Let us see how this argument is borne out by facts. Our present National Vaccine Establishment costs the country £1,700 a year. Of this, £400 is spent on the salary of an assistant-inspector; £300 on the remuneration of two vaccinators; and £1,000 for the purchase of lymph, ivory points, tubes, and other apparatus. Now, I have the authority of the opinion of Dr. Warlomont for the assertion, and, after personal examination of all the facts, I have no doubt, that for £1,000 a year a perfectly satisfactory animal vaccine service could be established in London. It seems to me a very reasonable estimate; and, even allowing a considerable margin in excess of it, it will be seen that the reorganisation of our present system so as to supply from headquarters animal vaccine only would be productive of little, if any, additional expense to the country. All this could not be done in a day. No doubt much care, patience and experience must be brought into play before perfectly successful results can be attained; but that they are attainable is, I hope, manifest from what has preceded.

I must apologise for the length of this report; but, in entering into these details, I have been actuated by the desire to lay before the Committee, and through it to the Conference and those who may take part in it, as complete an examination of the subject as is possible within reasonable limits of space. I trust that the particulars which I have collected and the conference which, with the authority of the Committee, I have succeeded in organising for Thursday next, the 4th instant, at 4 P.M., at the rooms of the Medical Society of London, may be of some assistance in facilitating the discussion, and in securing a long-wanted reform in our English vaccination system.

Offices of the British Medical Association,
161A, Strand, W.C., November 26th, 1879.

ANIMAL VACCINATION.

REPORT OF CONFERENCE HELD ON THURSDAY, DECEMBER 4TH, BY THE PARLIAMENTARY BILLS COMMITTEE, TO CONSIDER DR. CAMERON'S BILL FOR ANIMAL VACCINATION.

Speeches of the Chairman: Dr. Warlomont: Dr. Cameron, M.P.: Sir Thomas Watson, Bart.: Mr. Ceely: Mr. Greene: Dr. Stevens, etc.

ON December 4th, a conference, summoned by the Parliamentary Bills Committee of the British Medical Association, was held at the rooms of the Medical Society of London, to consider Dr. Cameron's Bill to authorise animal vaccination side by side with the arm-to-arm system, and to discuss the advisability of specially recognising vaccination from the calf in Great Britain. The attendance was very large; all the standing room was occupied; many were excluded from want of room. Mr. Ernest Hart, Chairman of the Parliamentary Bills Committee, presided, and was accompanied by Professor Warlomont of Brussels, to whom a hearty recognition was given. There were also present Sir Thomas Watson, Bart., Sir George Burrows, Bart., Professor Harvey of Aberdeen, Professor Sinclair of Dublin, Mr. Ceely of Aylesbury, Mr. Greene of Birmingham, Dr. Braidwood of Birkenhead, Dr. Cameron, M.P., of Glasgow, Dr. Ballard, representing the President of the Local Government Board; Surgeon-General Mouat, C.B.; Dr. Alfred Carpenter, President of the Council of the Association; Dr. Bristowe, President of the Society of Medical Officers of Health; Dr. A. P. Stewart, Dr. R. Liveing, Dr. Wiltshire, Sir Joseph Fayrer, Dr. Joseph Rogers, Dr. A. Collie, Dr. Bucknill, F.R.S., Mr. Sibley, Dr. Walter Dickson, Dr. W. Squire, Dr. Bowles of Folkestone, Mr. J. N. Radcliffe, Dr. Parsons of Dover, Dr. Drage of Hatfield, Dr. Hope, Dr. D. Nicolson, Dr. L. W. Sedgwick, Mr. John Gay, Dr. Hawksley, Dr. Dowse, Dr. Fancourt Barnes, Dr. Cuolahan, Mr. G. D. Brown of Ealing, Mr. Jabez Hogg, Dr. Cory, Dr. A. Grant, Mr. Gramshaw of Gravesend, Dr. J. Macpherson, Dr. Ligertwood, Dr. W. J. Collins, Mr. S. R. Lovett, Mr. N. Stowers, Dr. J. H. Stowers, and nearly two hundred others.

Mr. F. FOWKE, General Secretary of the Association, read part of the minutes of the last meeting held by the Parliamentary Bills Committee, including the resolution summoning this conference.

The CHAIRMAN said that the circumstances under which the meeting had assembled made it unnecessary for him to say more than a few words of explanation, detailing the steps which had brought about that conference. It was within the knowledge of all that, in the last session of Parliament, Dr. Cameron introduced into Parliament a Bill for the promotion of animal vaccination. This Bill, though it did not reach the stage of consideration of the House of Commons, came under the notice of the Parliamentary Bills Committee, and it was his (Mr. Hart's) duty, as Chairman of that Committee, to consider the purposes of the Bill. On thus considering the subject, he found that the actual informa-

tion to be obtained readily was neither complete nor decisive, and he took two opportunities of visiting Brussels in the summer, and other parts of the continent subsequently in the vacation, in order to investigate on the spot the actual operations of the system. He found many stations, and witnessed the whole means by which the system could be carried on, proving to his own mind conclusively and clearly that the system was one capable of being practically employed up to a certain point in this country. [*Cheers.*] Having ascertained this, he considered that the facts ought to be laid before the Association, and the Committee thought that the information he had had the opportunity of collecting, including a summary of a great mass of documentary evidence, should be presented in the form of a report. The report affording this information had been printed in the JOURNAL of November 29th, and was now laid before the conference in pamphlet form. The printing of that document would render it unnecessary for him to offer any remarks on the details of the system, especially as their *confrère* and associate, Professor Warlomont, in spite of the bitterly inclement weather, had crossed the sea to give the conference the benefit and advantage of his experience—[*cheers*]—and the proofs of the success the system had attained where it had been practised. [*Cheers.*] Dr. Cameron, also, who, with great energy and skill—[*cheers*]—had arrested public attention, was present, and would follow Dr. Warlomont. [*Cheers.*] The assemblage had also the advantage of the presence of Dr. Ballard of the Local Government Board; of Mr. Ceely of Aylesbury, who had devoted many years to the investigation of this subject, and might be considered the greatest English authority on vaccination; of Mr. Greene of Birmingham, whose labours in the same direction were well known; and many others distinguished in this branch of science, that it would be invidious to particularise further. He would now call upon Professor Warlomont to address the meeting.

M. WARLOMONT, who was received with great cheering, speaking in French, said that he desired to express his profound admiration for the great energy and ability which the Chairman had shown in this matter. He had shown his own devotion to the cause by his presence that day, and he asked Mr. Hart to read a translation in abstract of the paper which he had prepared, being assured that it could thus be most readily followed and understood.

The CHAIRMAN remarked that M. Warlomont had added to the devotion he had shown in travelling so far in this terrible weather to meet his brother medical men—a duty he had undertaken in the cause of science and humanity—[*cheers*]—by foregoing the oratorical triumph he would have gained in reading his paper; and though the paper would only be read in abstract, the gentlemen present should have it in their hands printed in the full text, so that all present at the conference would have the advantage of possessing Professor Warlomont's views and words. [*Cheers.*]

The following is the full text of M. WARLOMONT'S PAPER:

Gentlemen,—In rising to speak before this assembly, I feel that my temerity is great in discoursing to you on vaccination in the country of its birth, under the sky which has seen the growth of that to which we owe the most stupendous benefit with which the genius of man has ever endowed mankind. Permit me, before commencing my subject, to fulfil a religious duty in at once saluting the great name of Jenner. Jenner was struck with an idea which doubtless would have passed through a commonplace mind, but which was destined to fructify in his intellect.

What were, in fact, the elements of this discovery which was to protect the world from the most frightful of scourges? They were of the simplest. It was known that an attack of small-pox generally preserved from an attack of the same disease; that, in short, it only once invaded the same person. Now, Jenner had by chance discovered another malady having in its fundamental external characteristic the closest analogy to the small-pox pustule. The distinctions between this affection and that of which it was the type, and which it so strikingly resembled in its outward aspect, were the almost complete absence of general reaction, and its entire powerlessness to spread the infection itself. To give intentionally this mild disease, which in the animal economy was equal to an attack of true small-pox, and thus to create in it an immunity during a certain duration of this specific processus—such was the idea which inspired Jenner, and from which he evolved the marvellous fact of vaccination. The history of this discovery is too well known to need to be here related. I only wish to point out—and this will not at all diminish the honour which will eternally attach to a venerated name—that Jenner was only able, notwithstanding the trials made during his lifetime, to lay down the bases of his method, and to form hypotheses as to the extent of its application, the duration of the acquired immunity, and the necessity of renewing the inoculation after a certain interval; in a word, he was not able to lay down the conditions of revaccination. This task was left for future generations. To enlarge the application of the method, to make it benefit the greatest possible number of persons, to create a legislation for the purpose of procuring this extension, to multiply the sources able to furnish the preservative matter—such were the duties left to us. In accomplishing this task, in completing the work, the successors of Jenner do nothing for their own glory; the little that they add to the edifice with which this commanding genius has enriched the world will only serve to still further increase his renown. For myself, in coming here to speak of vaccination, I have no other ambition.

Primary vaccinia is the product of an affection capable of being developed spontaneously in the horse or in the cow (in both, perhaps, but this point is not quite settled), whence the name of horse- or cow-pox which has been given to it. Transferred to the human subject, it developes in a regular fashion; and after a lapse of time, varying between six and seven times twenty-four hours, the vesicle which it has caused furnishes in its turn inoculable lymph. The exceptions to this rule are very rare; few subjects are insusceptible to a first inoculation, if the lymph be of good quality and of proper age. The rule, on the contrary, is that the power of the lymph is weakened the further we get from the moment that the vesicle begins to enclose it. If it be inserted from a vesicle of more than eight days from the date of vaccination, failure is to be feared. Thus, by proceeding with care (and Jenner had already given some instructions with regard to this which have never been altered) each subject can be made a factory of the material for protecting others as it has just been itself protected. Thus the process maintains itself, following a course which carelessness alone can arrest. This is, in fact, what is known as vaccination from arm to arm.

In speaking of this for the first time, I wish to make a profession of faith, which will be sincere, as will be everything that I shall have the honour of saying to you. Although I have come to speak to you on the method of so-called animal vaccination, I am anxious, above all things, to tell you the whole of my ideas as to the part which it is ex-

pedient to assign to each of the two methods. In my view, animal vaccination should have no tendency to forcibly supplant vaccination from arm to arm. The latter ought, on account especially of the facilities afforded by it, principally in the countries where the population is much scattered, to be scrupulously observed. They are, in fact, two sisters, which must not be separated.

This proposition is based upon a fact without which it could not be maintained—the perfect identity between the lymph of the child and of the calf, so far as regards their active principle. The vaccine matter is composed of two principal elements, a vehicle, serum, and some special granulations which represent the vaccinal power. This last fact has been quite recently placed beyond doubt by the experiments made at the vaccination establishment of Amsterdam by MM. Carsten and Coert, with the assistance of M. A. H. Pareau. These gentlemen report as follows.

"Some animal lymph" "was filtered through filter-paper, and through some small plates of porous porcelain, by the help of the pneumatic machine. Microscopical examination showed us that the filter-paper retained the epithelium-cells, the fibrinous clots and other solid particles, but that it allowed to pass globular molecules, which are found in great quantities in animal lymph, and which are supposed to be schizomycetes. The porcelain plate does not allow either these molecules or any other morphological particle to pass. We repeated these filtrations in different ways, and we were able to ascertain on each occasion that the inoculations practised on calves with the serum, deprived by filtration of its globular molecules, only gave negative results. When, on the contrary, these molecules had been preserved in their vehicle, the inoculations were constantly successful. We have mixed and washed the lymph with plenty of water, to separate these molecules from other solid constituents that might adhere to them, and which might have been considered as equally endowed with some virulent property; and we have then passed through the porcelain all that the latter allowed to pass through. Inoculation with the matter remaining on the filter was again followed by positive results. Thus it is evident that the virulence is inherent in the globular molecules."*

These results fully confirm those which M. Chauveau had already obtained by other means with regard to human lymph.

The identity is therefore perfect as to the nature of the active principle of the lymph, whether it is derived from the calf or the child. It is in both cases a figurate granulation, perhaps a microbium, suspended in serum. This serum, however, differs a little; it is more plastic in the calf, perhaps because the lymph yielded by the latter has had to be expressed by a force which expels more fibrine; hence a tendency to coagulation, which renders more difficult its keeping in the liquid state, or rather its expulsion from the capillary tubes into which it has been put.

This identity is established, if possible still more completely, by my own personal experience. During six months, I successively transmitted the same lymph from the calf to the child, from the child to the calf; and, after twenty-five transmissions thus crossed, I found the lymph still to possess all its original qualities. This fact,

* *Animal Vaccination in Holland: Some Provisional Experiments made at the Vaccinating Station at the Hague on the particular qualities of Vaccine Virus.* By Carsten and Coert (Medical Congress at Amsterdam, 1879).

well established in the way that I have just related, enables us to formulate the proposition that human lymph and calf-lymph can render each other mutual aid and assistance.

But, it will be asked, if the two lymphs are of equal value, why call to the aid of humanised lymph, the supply of which never fails, the assistance of animal lymph? The answer is that this help is especially necessary to satisfy doubts, fears, imputations, and perhaps prejudices. It has been said that lymph degenerates by passing through the human organism; so that what was introduced by Jenner has now lost a part of its power. This is only a simple assertion, and its truth has not been proved. There is perhaps some merit in my acknowledging it, but I myself, rashly I fear, but honestly, brought forward this idea some years ago. At the present time, nothing proves to me, nothing tells me, that lymph can degenerate. As long as its globular molecule—its microbium (?)—is preserved and is healthy, there is no ground for asserting that it has degenerated. Have small-pox and syphilis lost their vigour by lapse of time? However this may be, the feeling exists, many physicians share it, and I think it must be respected. If to their mind animal lymph promises to those vaccinated with it a more certain and more durable immunity, what right have we to refuse it to them? Again, it has been said, and this is much more serious, that human lymph taken from a syphilitic subject can transmit syphilis to the vaccinee. The fact is only too true, and certainly it is not in England that it is necessary to strive to establish it. Vainly is it maintained that lymph from a syphilitic subject is innocuous, if it be taken with the necessary care, and without the admixture of blood. But who of us, gentlemen, would like to expose his children or his grandchildren to such a danger?

The physician ought, then, to guard himself against such a possibility; and he can indeed only do this by imposing upon himself the obligation only to make use of the lymph from infants he has under his own eyes, and of the state of whose health, as well as that of their parents, he can be positively assured. We will not insist too strongly upon the necessities in this direction; but we believe that the practitioner can in no other way ensure complete security. This being so, he ought not to be allowed on his own responsibility to make use of any human lymph collected by any other person than himself; and he should impose upon himself as a line of conduct that, when a family requests him to perform vaccinations or revaccinations, the family should itself provide him with the inoculating matter. In this way, and in this way alone, can the physician protect himself from future responsibilities and claims. I am fully aware that this method of procedure faithfully followed would have the result of increasing and exaggerating the mistrust already existing in the public mind. But what is to be done? Physicians are by no means anxious to offer themselves as a holocaust to the ill-feeling of families, always disposed to attribute to the lymph employed all the maladies which may subsequently attack their children; and the prudent course which I recommend to them is the only one which can at once really cover their responsibility, and at the same time screen them from unjust reproaches.

I know full well that I shall be accused of an excess of precaution. At vaccination establishments, I shall be told, the collection of lymph from the arms of infants is done under conditions calculated to offer every security; the persons charged with this office quite appreciate the importance of the duty confided to them, and not a tube of lymph

escapes their hands which has been taken from a doubtful source. What a mistake is this assertion ! Does not the moment always arrive when the most attentive, the most scrupulous of men, relaxes his vigilance? So, when the question is of human lymph, this rule must always be rigorously observed: Do not vaccinate any subject unless you can take lymph for its vaccination from the arm of a child present, whom you have yourself carefully examined. Now, this condition cannot be always observed. Too often stocks can only be kept up by means of preserved lymph collected from subjects intended to serve as vaccinifers. These conditions apply indiscriminately to all countries in which vaccination is voluntary, but there recourse to it can be dispensed with until opportunity serves. In those countries in which vaccination is compulsory, it is not the same ; it is necessary to submit within a fixed period to the lancet of the vaccinator, one's children or grandchildren, without, in the majority of cases, having the time—we are speaking especially of the poor—the power, or the means to inquire if the matter to be used for vaccinating fulfils all the conditions of harmlessness which one has the right to demand of it. I do not hesitate to repeat—I say repeat, because I have already said and written many times—that this is not right. In the countries where vaccination is compulsory by law, the duty of the State is to put in the hands of the public a lymph which should be free—I will not say from all adulteration—but from all suspicion of diathetic adulteration. Like Cæsar's wife, it ought always to be above suspicion. I know that nothing is so blind as the prejudices of the public; but, here, are these prejudices inconsiderate? We see a little pink and white baby, the idol of all who surround it; it is radiant with health and beauty. You take its arm and instil into it a strange principle, of which you, the physician, are doubtless certain, but of which the family knows neither the source nor the purity. And you do not like that the family should ask for every possible guarantee; and that, not obtaining such, it should rebel and resist. But it is in human nature ; and you all know it well—you who have witnessed for some years a rising tide of opposition to the Vaccination Acts, which you either disregard or despise. If these prejudices be not unreasonable, then give to the public the satisfaction which it demands. Give it the calf and its lymph ; give it, at the same time, that confidence, that security which it has the right to exact from you, and you will see, from day to day, this opposition give place to the most perfect submission ; for confidence in vaccination is a matter of conscience for every mother.

But are we, then, in the right in saying to families, "Come to the calf, it will not betray you"? The reply cannot be for a moment doubtful. We answer with the most entire confidence : "No, the calf will not betray you; you can go to it *citò*, *tutò*, *et jucundè*." It is not, however, that contrary opinions have not been expressed. It has been said, amongst other enormities—and the allegation has come from those even who scout the possibility of vaccino-syphilis, which makes the matter more absurd still—it has been said by those who do not believe it themselves, that lymph taken from a tuberculous calf can transmit tuberculosis. They did not take the trouble to ascertain whether there had ever been found a microscope powerful enough to reveal the presence of a tuberculous element in the vaccine vesicle; and, in default of such an authentication, whether tuberculosis could be transmitted otherwise than by the engrafting of that disease itself. All this mattered little; it was necessary to cast a doubt on the new method. They did not stop

to think that this suspicion, if it had any foundation, must fall with all its weight upon humanised lymph itself. Let us say at once that the argument was not long maintained, and that those who had put it forward now practise animal vaccination.

Vaccinal glanders has also been talked of. The following article appeared recently in the *Lyon Médical*, June 22nd, 1879, and was written by an author otherwise sensible, but sufficiently careless and thoughtless to publish it, without the least proof in support of its assertions.

"Epidemic of Vaccine-Glanders.

"The following fact has seemed to us too serious not to be brought immediately under the notice of our readers, for it is of a nature to singularly damp the zeal of the apostles of animal vaccination. On April 22nd last, the authorities of San Quirico d'Orceia asked a semi-official vaccination committee at Rome for some tubes of lymph, which arrived on the 24th. On the 26th and 28th, the local doctors vaccinated with this lymph thirty-eight children, all aged less than twenty months. Whilst they were awaiting the incubation of the vaccine pustules, they soon perceived that they had inoculated one of the most horrible of maladies, and that they were the involuntary authors of a real massacre of the innocents. The gentleman who sent these particulars to the *Gazzetta d'Italia*, betook himself to San Quirico. He saw the victims. He observed vast phlegmons, laying bare the muscles and penetrating into the joints, accompanied by eclamptic symptoms. To him it appeared to be very probably an epidemic of glanders. If this really was the case, all the responsibility must rest upon the Roman committee. One cannot excuse men of skill who use a glandered calf as a vaccinifer. If it were a question of another malady, which it was not possible to diagnose, animal vaccination does not appear less compromised." This is what it was wanted to bring out. The article ends thus: "In any case, we shall endeavour to make known to our readers the results of the inquiry, which is being actively pursued."

This inquiry has, in fact, been made, and it has resulted—so runs a letter, dated June 15th, addressed to Senator Professor Palasciano by Commander Constanzo Mazzoni, member of the Board of Health sitting at Rome—that the facts above reported have been audaciously misrepresented: the inquiry having established the perfect state of health of the calf that had furnished the inculpated lymph. This is what happened. Certain institutes in Italy still deliver—(though it is a detestable practice, against which we have always protested), pustules cut off the calf, and send these scraps of skin to larger or smaller distances without any care about the state in which the pustules may arrive, trusting no doubt to the sense of smell of their correspondents. In the case of San Quirico, such pustules, and not tubes, as stated in the *Lyon Médical*, were sent to the local doctors, who did not use them for five or six days after they had been cut off the animal. And this in the height of summer! The vaccinators, indeed, admitted that from the pustule was exhaled a musty smell (mucedo), but this did not deter them from using it. As a matter of fact, if they had wished to purposely propagate septicæmia, would they have proceeded otherwise? The practice, we repeat, is deplorable, and it is inconceivable that responsible persons still consent to adopt it. We know that those who practised it were indeed the first promoters of animal vaccination, and as such, claim indulgence at our hands; but we are amongst those

who think that, from however exalted a source an idea springs, it is not on that account infallible. If the method of Negri had not been freed by us from its original conditions, it would never have been able to acclimatise itself far from its place of origin. It is in reducing it little by little to its most simple elements, and in approaching in its operations to the traditional method, vaccination from arm to arm, that we have made it a simple proceeding by a logical and easy application. The cutting off of the pustules, which has a long time encumbered it, has never troubled us. We have never put the method in practice. The occurrences at San Quirico d'Orceia prove sufficiently well that we are right in prohibiting it. A great thinker and justly celebrated author, Alexandre Dumas *fils*, has said that, to spare himself illusions, he had taken the part of considering men as being naturally bad. If he met a good man, it was an agreeable emotion that he felt. This emotion the *Lyon Médical* has not given us. We still await, as we have done since June 29th last, its publication of the result of the inquiry.

But may we not ourselves be ranked amongst the mischievous persons of whom we have just spoken, and have we not perhaps sometimes given proof of it, in admitting too readily, and spreading abroad without sufficient proofs the statements as to vaccino-syphilis, of which we ourselves believe only half? We are not quite sure of our perfect innocence in this respect, and we ask ourselves if, in echoing the stories —often untrue and nearly always exaggerated, we have not made ourselves culpable accessories to this discredit. If we have been attacked by such a mania, let us cure ourselves of it as soon as possible.

The possibility of the transmission of anthracoid affections by animal vaccination has also been spoken of; but, besides that nothing is rarer than these affections in very young bovine animals (and it is these only that our method makes use of), besides that such an affection could not escape the supervision of the experts who inspect the markets, it has been perfectly proved to us that proper vaccine pustules cannot be developed upon animals suffering from this generalised disease. This is, in fact, one of the most characteristic features of the question. In the vaccination of cows, the appearance of the pustules alone shows the state of health of the vaccinifer calf. From the moment that the animal suffers, the vaccine pustule suffers, and it is doubtful whether a vesicle could ever prosper upon an anthracoid subject. As a general rule then, one ought to be able to utilise without fear lymph taken from good pustules, because proper pustules never rise on sick animals. We know that it is not the same with regard to the infant; a subject highly syphilised can show vaccine vesicles perfectly irreproachable in appearance. Let us add that, less favoured than the advocates of septicæmia, the champions of anthrax have yet to find a single fact to bring against us, and that their objection is up to the present time purely speculative.

Syphilis remains, and of that, and all the world is in accord on this point, we have no fear. Civilisation has not yet penetrated so far into stables as to leave there its most characteristic mark; and to the humble and pure calf may equally be applied the old adage: "*La plus jolie fille du monde ne peut donner que ce qu'elle a.*" But the objectors to animal vaccination are not content with this adage. They have wanted to prove that the innocent calf can give syphilis, although not having it, and to do that they have only to delicately pervert facts. We have read somewhere an article entitled "Transmission of Syphilis by Animal Lymph". It was a sensational title. Now, nothing can be more

easily explained than this transmission. It is sufficient for the contamination of the lymph that the vaccinator, inoculating a series of children, transfers blood from a syphilitic subject by means of his instrument to the animal pustule into which he plunges it to get a fresh charge. But the poor animal is perfectly innocent of the mishap; the author of the mischief is the vaccinator, who has not taken the needful care with his instrument, and who has not cleansed it, as he ought, after each vaccination.

It is not, however, sufficient that the lymph from the calf be harmless, it must be inoculable and preservative against small-pox. It must be inoculable. But how can it be otherwise? What was it, in fact, but animal lymph which caused Jenner to make his immortal discovery? When Jenner had the inspiration which has made his name revered, what had he before his eyes but a person who, having had the abraded epidermis brought into contact with an animal-vaccine pustule, had been inoculated with the matter of that pustule? This person had thus unwittingly practised upon himself animal vaccination. Animal vaccination is, then, the progenitor of all other vaccination, present, past, and future, and if it had not been efficacious, vaccination would have been unknown. Of what use is it to push demonstration further? Animal vaccination is—and we profit by this opportunity to define it—nothing else than the maintenance of original vaccinia (cow-pox) upon its native soil, where it is cultivated by successive inoculations, without ever having recourse to other sources. It is not, as our opponents are pleased to say, thinking thus to overthrow our proceedings, lymph taken from children, and replanted on calves (a method known as "retrovaccination"), but lymph which has never received any other aliment than that of its native soil. How then could it lose its qualities, and what analogy could be pleaded for the belief that it was necessary that such virus, to live and prosper, should be cultivated upon strange soil?

Perhaps I shall be asked to adduce, in support of my statements, comparative statistics. I should regret that such a request were addressed to me, for I should feel bound to take no notice whatever of it. I would never consent to furnish as proof such an element of appreciation, because I should reject it as coming from my opponents. Comparative statistics are only valuable when all the conditions of a proper comparison can be brought together. It would be necessary, to arrive at any reliable result in this respect, to have identity of vaccinated subjects, identity of condition in the lymph employed (living or preserved, in the dry or liquid form), identity of the age of the lymph; identity, moreover, of the capacity and judgment of the experimenters. I shall wound no one, I think, by remarking how very important it would be, in such a question, for statisticians to put on one side their predilections, and also what difficulty there would be in getting identity of conditions, all of which are indispensable. Comparative statistics, even if they were made by Aristides, would only satisfy himself.

It would not be quite the same with statistics giving absolute results, since they cannot be left to the caprice of opinion. The subjoined appears to me to unite the good qualities of absolute exactitude and truth. In 1870 and 1871, thirty-six of the most trustworthy physicians of Belgium acquainted me with the results obtained by them in vaccinations and revaccinations with animal lymph on points sent out by the State Vaccine Institute at Brussels. These are the results: 1. In vaccinations, out of a total of 500 cases, 479 successes, or 96 per cent.;

2. In revaccinations, out of a total of 5,425 cases, 3,419 successes, or 62 per cent., a result superior to those shewn in all statistics. In England, the best vaccinators only calculate upon 90 per cent. of success in vaccinations performed with human lymph in tubes, and 95 per cent, with the same lymph on ivory points.

I shall here finish what I have to say about statistics, without wishing on that account to cast any doubt or disparagement on the comparative figures adduced by men whose character I respect too much to think of doubting their sincerity.

But it is not sufficient to adduce figures: it is necessary to know at what time and under what conditions they have been brought together. We should wish to say a few words on this subject. Innovations, new methods, are not introduced without much groping in the dark and the committal of mistakes. Animal vaccination has not escaped these gropings or these faults. At the commencement, no doubt, it was not modest enough in its pretensions. From this have arisen attacks, which its adversaries have perhaps pushed too far; and from it especially have arisen the prejudices which are not yet extinct, and which justified to a certain degree the hesitation of early days. Thus, in certain circumstances, in certain places, the use of matter taken from vesicles the value of which had not yet been ascertained by experience, whether with regard to development or age; the employment of lymph too old or too young, or that of lymph taken from animals which did not fulfil the desired conditions—all this has given rise to disappointments, which have been used, not without some reason, but perhaps with too much eagerness, against the method.

As a matter of fact, animal vaccination has, in our minds, during the fourteen years that we have followed this tedious business, not without having removed all the objections to it, made, in our hands, daily progress, both with regard to the cultivation of the lymph, its results, and the preservation of the product. After having tried to preserve it in a liquid state, we were obliged to abandon this method, because the lymph coagulated in the tubes and could not be got out. We then adopted the method of keeping the animal lymph on ivory points, drying it rapidly, for delivery in this form to vaccinators. Nothing is more practical for expeditiousness and preservation. But it was necessary, in order to get from this lymph all the desired effect, to introduce the matter thus dried into sufficiently wide openings in the skin. On this account, the so-called English mode of scarifications has since been largely adopted.

This method, nevertheless, has itself had to encounter adversaries; it has been reproached, and will continue to be reproached, with causing exaggerated traumatism. Here, again, we have supplied the corrective: a "vaccinateur trephine", with which even the heaviest hand or the most presbyopic eyes can make a circular incision of a depth sufficiently small to protect from accident. Finally, we have borrowed from M. Chambon, who has been kind enough to communicate it to us, a most simple means of defibrinating the animal lymph before its introduction into the capillary tubes, and of thus preserving all its limpidity and its fluidity. For several years, we have thus furnished, to whomever has asked for it, liquid or dry lymph, thus allowing practitioners to choose for its insertion whichever method—scarifications or punctures—may suit them best. All these improvements should, it would seem, have annihilated an opposition which, having at first some measure of foundation, has now no *raison d'être*. It is, however, by no means so, as you know.

As to the vaccination of the calves, several years passed without my arriving at anything which was perfectly satisfactory to me. I vaccinated—and things happened at Brussels as they happened at Paris and Milan—an animal on a given day; then I vaccinated children from this animal on the fifth, sixth, seventh, or eighth day, according to the temperature, to the habits, and a little according to the convenience of the inhabitants. From the beginning, I have adopted the following course. I inoculated a calf on the Friday, and, on the Tuesday or Wednesday following, the children came to be vaccinated. Full of confidence in the results which I had at first obtained with good calves, I did not give sufficient attention to the variations which occur in eruptions; and it has more than once happened to me that, when the public had arrived at the station, I vaccinated without being sufficiently careful as to the choice of vesicles, of which, as further observation has taught me, some may be fit and others inert, or nearly so, in the same animal. On some children, the vesiculation was admirable; in others, it miscarried. The great fault of this arrangement was that, having caused often a large number of children to assemble for vaccination, and finding ourselves before an animal which did not supply us with all that we wanted, we performed the vaccinations nevertheless, and with lymph which we ought to have rejected. This practice has been the cause of a great depreciation of animal lymph—not at Brussels, because I soon stopped myself, pursuing my observations and correcting my practice, but elsewhere. At Paris, during the year that preceded the siege, and during the siege itself, grave faults were committed: often a single calf served for the vaccination of more subjects than it ought; and I think the conscience of those who proceeded in this way cannot be quite easy. When it was a question of vaccination, the evil was not so great; if they did not succeed, they began again. But it is quite different in revaccination. Then it is really a matter of conscience, and it is necessary to have lymph which can be thoroughly relied upon. What has passed at Paris continues, I must say, to weigh cruelly on animal vaccination in France, where it has not yet succeeded in resuscitating itself, notwithstanding honest and conscientious efforts.

For ten years, I have proceeded on a plan which completely protects me from such mishaps. I always vaccinate two calves at once. They progress in a parallel course; if one of them give doubtful vesicles, the other gives good ones, which enables me to be always perfectly sure of my vaccinations. For twelve years, I have vaccinated each year from eight to twelve hundred children. Every one will corroborate my statement that, when I vaccinate fifty children in half an hour with living animal lymph by simple puncture, taking the lymph from selected punctures, of which I am perfectly sure, not one of these punctures fails. Thus, when I see the criticisms that are made, as much abroad as in this country—when I read parallel facts as to the two vaccinations, in which the parallel is always unfavourable to animal lymph—I shall be allowed, it is indeed my duty, to combat the objections made to the latter.

These objections are ranged under three heads: 1. The transmission of animal lymph, even from the calf to the arm direct, is less certain in its results than that of lymph taken from arm to arm; 2. Animal lymph does not keep so well as humanised lymph; 3. The transmission of lymph from calf to calf is liable to frequent interruptions, even in the hands of the best operators.

1. *The transmission even from calf to arm is uncertain.* This assertion is the result of an inquiry made ten years ago, when the method

was yet in its infancy, and when experience had not yet laid down its principles. In 1869, it was not known, as it is now, that the vaccine vesicle gives a product which is more active in proportion as it is younger. In more than one institute, lymph was then still used which had been taken from vesicles seven or even eight days old. Now it is no longer the same; it is in the course of the fifth day from the inoculation that the lymph is taken, whether for preservation or for immediate vaccination; and since then the results have completely changed. As I said a moment ago, no puncture fails when all the conditions are observed. I shall refrain from bringing forward, in support of this, copious statistics; I prefer to call to witness all those who have watched my operations—Mr. Ernest Hart, for example, who has seen my results—I should prefer, in short, to confine myself to a simple affirmation, resting on my honour. This result is now so certain that the vaccinators of the Brussels district send to me, each week, children to convert into vaccinifers. There has not been a single instance of these children being sent back on account of failure. And here I would make an observation that must not be omitted. In the same way as animal lymph, that derived from the arms of children is more active the younger it is; but in the child it is difficult to have recourse to this early taking of lymph without occasioning pain, and perhaps unpleasant traumatism. Moreover, how much lymph can be got from a vesicle on a child before the end of the seventh day? It is with difficulty that one gets at the lymph, and however little pressure or probing is used, blood comes. If, then, it were shown that lymph is only really active when taken five or six days after inoculation—and opinion takes this direction—it would soon run short, not only because the crop would not be abundant enough, but because the greater proportion of mothers would refuse to allow the hardly developed vesicles to be touched. Neither of these difficulties hampers animal lymph, for the pincers express at the fifth day innumerable drops of the most limpid and active lymph from the vaccine vesicles on the animal.

2. *Animal lymph does not keep so well as human lymph.* This assertion, like the preceding, belongs to the legend of the past. From the first, it was never true as regards dry lymph on ivory points. During the twelve years that we have made use of it in this form, it has shown a longevity comparable to that of human lymph in whatever form it was kept, and it is to it that the Belgian physicians owe the success of which we have spoken above. It is to it also that many colleagues living in the most distant countries—India and America—have had recourse many times, with success, for renewing their stock from ours. But it has not been always the same with regard to lymph preserved in tubes. At the commencement of our work, our failure was such that we had one day to utter this cry of distress: "If we do not succeed in preserving liquid animal lymph better than before, tubes will be the ruin of the new method." And indeed the matter, taken directly and without any preparation from the pustule, rapidly coagulates in the tubes and cannot be expelled therefrom: to such a degree in fact, that for several years we only sent out points, failing constantly with lymph in tubes. It is different since, by a most simple method, we have introduced the animal lymph into the tubes only after it has been defibrinated. It is thus kept in a perfect state of limpidity, and maintains its activity so well (the tubes are closed without the use of heat) that we have been able lately to inoculate a calf without any failure with tubes which had been filled in this way several months before. Let us, then, hear no

more of this old stereotyped argument, which, true ten years ago, is now obsolete and no longer deserves any credit. Animal lymph defibrinated and inserted with the needful care into tubes closed without heat, by paraffin or an artificial capsule, keeps as long and as well as humanised lymph.

3. The third objection remains: *the transmission of lymph from calf to calf is liable to frequent interruptions, even in the hands of the best operators.* In order to reply to this, I would ask permission to reproduce the following passage from a report which I addressed some months ago to the Minister of the Interior at Brussels, on the administration of the State Vaccine Institute, the direction of which is confided to me. The question which was put to me by the Government was this: "The aim of the State Vaccine Institute has been principally to promote the production and gratuitous distribution throughout the whole country of vaccine lymph. To what extent has this aim been attained?" I quote from my reply: "To answer this question, it will be sufficient to inform you, as to the first point, that, since the establishment was created [its formation dates from the 11th July 1868] it has continuously produced, without a day of intermission, all the lymph necessary for the requirements, however extensive they might be, of vaccination and revaccination throughout the country. The production of lymph has not then been promoted merely, it has been realised without interruption and without limits. As to the second point, there is not a doctor in Belgium who, at whatever moment he might require it, has not been gratuitously put in possession of lymph asked for by him for the renewal of his stock. In what measure have practitioners profited by this permission? Their demands have increased from year to year; so much so that, of nearly 2,000 medical men practising in Belgium, all of whom do not vaccinate, rather more than 1,200 have, during the year 1878, had recourse either once or more to our establishment with a view to the renewal of their stock. The regularity and promptitude of dispatch have left nothing to be desired. With very rare exceptions, the lymph asked for by letter has been sent by return of post, and practitioners have been thus put in possession, within twenty-four hours, even in most remote parts of the country, of the animal lymph asked for by them. Many times, under urgent circumstances, doctors have made demands by telegraph. Never have these demands remained an hour uncomplied with. The service to the public has been performed with the same rapidity and punctuality. Once, during the serious small-pox epidemic of 1870-1, which brought requisitions without number—as many as five hundred a day for a considerable period—the same punctuality and promptitude characterised the despatch. I may be permitted here to say incidentally, as an example of the immense service rendered to the country by the State Vaccine Institute, that revaccination, that prophylactic measure of so great an importance as to be equalled by no other in the vast field of public or private hygiene, is one of its best results; and that this fact dates from the day when the service was created. Up to that time, revaccination had only been recommended, or at least demanded exceptionally. To escape a danger that they preferred to doubt, people refused to submit themselves to an operation of which they were pleased, on the other hand, to exaggerate the peril. Now, the repugnance to the insertion of human lymph has given place, conquered by animal lymph, to favour. In Belgium, revaccination has now taken its place in the customs of the intelligent

part of the community, who are henceforth quite ready to obey the word of command that we have given to the public, and which we have formulated as follows:—'Revaccination is a safe rampart against small-pox, if the resistance it ensures be proportionate to the violence of the attack'. Now, a recent successful revaccination gives this impregnable resistance. It is necessary, then, to be revaccinated every time that there is an epidemic of small-pox in the neighbourhood, and the more scrupulously in proportion as the epidemic is intense. For all those who follow this prescription, and the number of them is now great, small-pox,—that most terrible of all maladies—has no danger. The security given to families ought to be carried to the credit of the Institute as an inestimable benefit."

I shall here conclude this quotation, which I have used as a preface to my reply to the objection under discussion; but, before making this reply, I shall be allowed, I think, to remark that England, in systematically rejecting animal vaccination, as it has officially done up to the present, has thus neglected to deprive revaccination of the principal obstacle which has been obstinately thrown in the path of its general acceptance, and that it has by this neglect committed a fault for which public opinion has, perhaps, the right to reproach it. However this may be, the objection founded on the difficulties of execution is disposed of by the facts already stated. If he who speaks to you has been able during more than ten years to preserve his animal vaccination service from all interruption, the pursuit of a similar object and the execution of a similar programme cannot be beyond human power. What has been done in Belgium can be done in England. But will the organisation and the direction of such a service be an easy task? Very far from the truth would he be who had such a notion. One can, indeed, hardly realise all the zeal, the care, the incessant supervision exacted by such an enterprise, and in default of which all the wheels of the machine will stop at once.

It is especially necessary that care be taken to inoculate new animals at the precise moment when the vesicles of the vaccinifer are in all their activity, in default of which the risk is incurred of only having an unsatisfactory vesiculation, or even a totally abortive one. It is necessary to watch with a constant solicitude the health of the animal in use, the loss of which when the stock has but one branch would stop the whole of the working. It is necessary, in short, to collect the lymph oneself, so as to take it from good vesicles and to avoid the irregularities and the faults of inexperienced or unscrupulous assistants. My experience has shown me the importance of care even in the very smallest trifles.

During the year of my novitiate, only one calf was, as a rule, brought each week to the establishment and inoculated. But it happened more than once that the single animal, on which rested all the hope of the work, gave defective or insufficient results; perhaps because it was in poor or bad health, or from some other cause. From this arose great annoyance and great mischief, against which it was necessary to be constantly on the watch. Since 1869, the Direction has taken the excellent course of always maintaining a double source of supply by means of two calves each week; moreover, it has made arrangements with a foreign correspondent, who every week sends it some tubes from his own supply. In this way, interruptions in the working are almost impossible. Since these measures were taken, the Director of the Brussels Institute can go to rest with a light heart, and without being

condemned at the first failure to be buried alive after the fashion of negligent or unfaithful vestals. Thus, so far from wishing to deny the difficulties of the enterprise, we are the first to recognise them. It is because they are real that the greater number of isolated experimenters, having only their zeal and insufficient experience to support their efforts, have almost invariably failed, to the great detriment of the reputation of the method, which they hastened to impugn. Animal vaccination was worth nothing, they said ; when it was only those who performed it—and performed it badly—who should be held responsible for its constant unsuccess.

From this have arisen premature judgments, which continue to weigh upon a method as yet imperfectly understood. We formally lodge an appeal against the conclusions of Dr. Seaton's report of 1869 ; but we think it right to state the spirit in which this appeal has been made, and the grounds upon which it rests. We are only doing our duty in paying merited respect to the high impartiality, the wisdom, the great experience of the author of that report. His deductions spring naturally from the facts ascertained by his researches ; but let us say at once that what might have been correct ten years ago is now so no longer. The method has thrown off its swaddling clothes ; it is no longer a child, but a full grown man, who has outgrown all the imperfections of youth.

Animal vaccination can, then, proceed henceforward with a firm step ; but on the condition that it is confided to trusty guides. These guides should possess three essential qualities—experience, accuracy, and the sinews of every enterprise, "ways and means". Confide the creation of a vaccine institute to inexperienced hands, and you will condemn it beforehand to sterility ; put it in able hands, and success is assured, if you do not cripple its resources. And let it not be thought that the necessary expenditure for such an institution attains considerable proportions. I estimate that, for an annual expenditure of a thousand pounds, London could keep up a first-class vaccine institute, and derive immeasurable advantage from it.

There still remain two points for me to touch upon. We have already seen that animal vaccination has been reproached with being uncertain in result ; in other words, with wanting in activity. We know what this allegation is worth. But there are others who reproach it with having too great an activity. An university professor, otherwise a very estimable man, repeats every year to his pupils in the same unvarying tone, that humanised lymph is preferable to animal lymph, because the latter is too strong, because it gives rise to phlegmons, etc. What can we understand by all this, if not that he has confounded the method in its principle and in its applications? If he had compared the two lymphs by employing them according to the same method, this notion would never have possessed him ; but he has been spoken to about the scarifications made for the purpose of utilising the lymph on points, and the disasters (!) which they cause. He has been shown pustules made by means of lymph inserted into deep, wide, and painful incisions, sometimes ingenuously made with the badly sharpened end of the ivory points themselves. And he has believed all this, and has arrived at the conclusions which have just been quoted. So there is not enough activity on one side, and too much activity on the other. All this would be unpleasant if we had not, to cut the matter short, the high authority of Dr. Seaton, which cannot be impugned. Dr. Seaton says : "Neither in the size of the vesicle, nor in

the intensity of the local symptoms, nor in the length of period which the eruption takes to run its course, is there any notable difference" between animal and humanised lymph. And this is the truth. If any do not share in this opinion, it is because they have observed badly and have not understood, for example, that if very young animal lymph give rise to a luxuriant eruption upon which we must congratulate ourselves, it would doubtless be the same if human lymph equally well chosen were made use of, and that the contrary would take place under opposite circumstances.

Let us pass to the conclusions. Does animal vaccination preserve from small-pox as does humanised vaccination? Up to the present, no one has contested this, and we have no taste for fighting windmills. We confine ourselves, therefore, to what we wrote five years ago on this subject. "Out of more than ten thousand children vaccinated at Brussels with animal lymph, from 1865 to 1870, and who went through the terrible epidemic of small-pox which in 1870 and 1871 frightened the world, not a single one was, to my knowledge, reported as having been attacked by the disease. The same immunity was shared by those —a much larger number—whom I had revaccinated, and who, at the same period were living in epidemic centres." Three years later, in 1878, wishing to have a clear conscience, we appealed to our colleagues, at a meeting of the Belgian Academy of Medicine, in the following terms. "I have said before that no such case had been reported to me. I repeat it; and, up to the present, none of the numerous practitioners that I have questioned on the subject have contradicted me. Have there not been any? It seems to me impossible. However this may be, I appeal to the medical officers of hospitals and charities to clear up the point, which, on account of the deductions to be drawn from it, requires to be strictly verified." This appeal has remained, and still remains, without reply. Such a silence is what I hope to inspire in you as the most eloquent testimony in favour of the method of which I am the most confident defender.

In spite of all this, there are yet found men, high in scientific and public opinion, who, relying upon distant experiences, badly done and badly construed, and upon opinions which they maintain because they have not the courage to abandon them, persist in repeating, every time that they have the chance, that animal vaccination is a bad thing. Let us content ourselves with answering them—relying on the reasons that we have just brought forward—with this other formula, which is just as distinct and is perfectly true, that animal vaccination is a good thing.

I will conclude by stating precisely the position that I recommend should be assigned to animal vaccination. This position has not the exclusive character that might be inferred. In the recent report which I addressed to the Minister of the Interior of Belgium, and to which I have referred above, I have thus frankly explained it. The State Vaccine Institute, whilst being the supporting column of vaccination in the country, ought not to have any thought or claim of substituting itself for the traditional practices. Vaccination from arm-to-arm, strong in its ancient rights, is, and will long yet remain, the greatest strength against small-pox, and nothing ought to be omitted to encourage and regulate it. Animal vaccination ought now only to be its faithful auxiliary, but an auxiliary so useful, that it would be as unjustifiable to pass it by as to desire to upset suddenly the classical method.

These are, gentlemen, the considerations which I have had the honour of placing before you. If I am permitted to come from so far

to bring them, it is not because I had great confidence in my feeble resources. But I have thought that your kindness would not fail me; and I remember especially that I am in the country where one of its greatest orators, I think, Mr. Gladstone, has said those charming words, which come so appositely to screen my insufficiency: "The success of the orator is in the feeling, not of him who speaks, but of him who listens."

Dr. CAMERON, M.P., said that he had been invited to attend the conference for the purpose of explaining the provisions of the Bill regarding animal vaccination which he had introduced last session. His position simply was that, so long as vaccination remained compulsory—and he thoroughly approved of its being so—it was the duty of the State to provide its subjects with the option of a form of vaccination which was at least as efficacious for the prevention of small-pox as that usually practised, every necessary for which could be provided at a very trifling cost, and which was free from certain risks and drawbacks that had raised a strong popular prejudice against vaccination, and had practically proved fatal to the spread of revaccination in this country. The admirable and exhaustive report which the Chairman of the Parliamentary Bills Committee of the British Medical Association had prepared, showed the perfect practicability of animal vaccination—that it could be practised at a very moderate cost, and with a success quite equal to that which attended our present system. It was quite as important for the extinction of small-pox to encourage revaccination as it was to compel primary vaccination, and it was remarkable to how large an extent revaccination took place in countries where animal vaccination was practised. In Brussels, in the years 1865-70, upwards of 5,400 revaccinations with animal lymph took place, against 10,000 primary vaccinations; in Holland, in 1869-75, there had been 10,500 of the former against 42,000 of the latter; and in Italy, according to a statement quoted in Mr. Hart's report, the proportions were 90,000 and 115,000 respectively. The cause which operated to prevent revaccination in this country was the fear of infection with other diseases. Until very recently, this fear has been considered groundless. Direct experiments seemed to show that it was impossible for vaccine lymph, whatever its origin, to communicate any other disease, and isolated cases in which syphilitic complications had been observed, viewed by the light of this preconceived conviction, were regarded simply as cases of constitutional disease which had all along existed, though it might have been excited into increased activity by the operation of the vaccination. In France, long before this theory was exploded in our country, M. Depaul, the chief of the Vaccination Service of the French Academy of Medicine, became alive to the danger of the spread of syphilitic infection through vaccination. In a paper which he published in 1867, which embraced the record of little over a year's experience, there were enumerated half-a-dozen more or less extensive outbreaks of vaccinal syphilis, in the course of which upwards of 160 children had been infected, and several had lost their lives. It was not until 1871 that a case of wholesale syphilitic invaccination, brought before the Royal Medical and Chirurgical Society by Mr. Jonathan Hutchinson, incontestably proved to the medical profession in this country that the theory on which they had long relied was unsound. The public were naturally inclined to believe that isolated cases of vaccinal syphilis, even in Great Britain, were much more common than was generally supposed, and to attach weight to M. Depaul's assertion that a child

on whom no symptoms of disease were discoverable might be the vehicle for conveying specific infection. Referring to the precautions taken at the National Vaccine Establishment to secure purity of lymph, Dr. Cameron contended that they were at best based upon a very questionable theory, and were altogether inadequate to prevent the collection of lymph from infants in whom disease could only be detected on a close and minute examination, such as those who had proved the source of so much mischief in Mr. Hutchinson's and some of M. Depaul's cases. He had no wish to magnify the frequency of this unfortunate complication, which he believed to be so rare, that if we had no alternative between the abandonment of compulsory vaccination and the incurrence of the risk now run, he would unhesitatingly advise the continuance of the present system. But animal vaccination rendered any such mischance absolutely impossible, and he had referred at some length to the matter for the purpose of showing that those who demanded the option of animal vaccination had sound scientific reason on their side. His Bill proposed that the Local Government Board should afford that option, that it should be incumbent on that Board to supply such persons as wished with animal lymph, and a duty of public vaccinators to vaccinate with it such persons as desired. If the department thought proper, there was nothing to prevent them from perpetuating their present arrangements for the cultivation of their existing stock of humanised lymph. The one system could be worked quite well alongside the other. His proposal would in nowise interfere with arm-to-arm vaccination, which would in many cases, especially in the country, be practised with lymph a few removes from the cow; but he would like to see, as in Holland, calf-lymph establishments opened up in all our large towns where those who desired it could be vaccinated direct from the heifer with living lymph. The opponents to vaccination were of two classes; those who considered it a filthy and unholy practice, whom nothing could reconcile to it, and who constituted but a very small minority; and those who regarded it with dislike and suspicion on account of the risks which they believed were attendant on it. The objections of the latter would be completely removed by allowing them the option of vaccination direct from the calf, and the nation would gain by a marked decrease in the number of our unvaccinated population, by an increase in our revaccinations, and by the introduction of a lymph which many acknowledged authorities on the subject considered of much superior protective power to that now in use.

The CHAIRMAN here stated that, when the conference was proposed, and the time of its being held announced, he had the satisfaction of receiving two communications from gentlemen of great authority. One was from Sir Thomas Watson, who had shown his warm interest in this subject in many ways, and who had expressed his great desire to see animal vaccination introduced into this country as part of our national system of vaccination. Sir Thomas Watson, in his letter, referred to a very interesting article in the *Nineteenth Century*, as containing his views. Sir Thomas had honoured the meeting of that day by attending—[*cheers*]—and Sir George Burrows also—[*cheers*]—who had told him that he came after reading the report to show his sympathy with its objects, and to support animal vaccination. Sir Thomas Watson did not feel equal to the exertion of addressing the meeting at length, but had just sent a line to him (the Chairman) to the following effect: "I accord entirely in all that has been said in favour of animal vaccination." The meeting would regret not hearing Sir Thomas Watson. [*Cheers.*]

Sir THOMAS WATSON, who rose amid renewed cheers, said: My feelings upon this subject are very strong, from my being convinced that, by this system of animal vaccination, and by the vaccine lymph being thus cleansed, we may drive small-pox entirely out of this country. [*Cheers.*]

The CHAIRMAN added that Mr. Simon, C.B., would have attended on that day but for the dangerous illness of a near relation; and would have come to express his own sentiments, which were, that a change had to some extent come over his views in this matter. Mr. Simon had stated that, if he had been in power now as the medical adviser of the Local Government Board, he should have considered it part of his duty to introduce, in some form, the principle of this system; and, without, of course, committing himself to the details of the Chairman's report, Mr. Simon had arrived at a conclusion warmly in favour of more recourse to animal vaccination as a central system. [*Cheers.*]

Mr. CEELY here rose, and said that, having been named, he should offer a very few words, having come from Aylesbury expressly to attend this meeting. He had been using animal vaccination for many years. He had had the points from Brussels, and matter from Mr. Greene. He entirely approved of a more direct introduction of animal vaccination.

Mr. GREENE said he should endeavour, though an upholder of animal vaccination, to advance something that might be said from an opposition point of view. But before he did that, there was one part of the question to which he attached most importance, and upon this he had prepared a statement. His experience of animal vaccination had taught him that the method had the approbation and sympathy of a considerable proportion of the medical profession in this country, and that the wish to use this lymph was strong enough for pains and trouble to be taken to obtain it. More significant still, this desire was persistent, after repeated experience of its efficacy. A demand then existing, it became a duty to ascertain to what extent it was right and wise to yield to it. Eighty years ago, when Jenner, having gathered the traditions of the farmyard, proclaimed his discovery to the world, the whole truth concerning cow-pox was not known. It would be strange if later facts and experience did not further induce us by the new light to make some addition to, or modification of, the method of procedure. Certain of these new facts were not fully recognised by continental physicians, therefore the more urgent was it that they should be firmly upheld in this country, and form the basis upon which any alteration or addition was sought. He alluded chiefly to the demonstrations that cow-pox may be produced from variola; which have been succeeded by many confirmatory and independently repeated experiments. He had taken variolous virus from the human body, conveyed it forthwith to the cow, thence through two calves, and from the latter back to the human subject, producing typically perfect cow-pox and nothing more. At this date, in England, there could be no reasonable doubt that cow-pox was the casual variola of the cow, and vaccination a benign modification of the old inoculation of Lady Wortley Montague. Dr. Jenner said that an inoculation from a weakened or imperfect variola would not safeguard the system from a possibly malignant attack. The same thing must apply, but with greater force, to an inoculation of a weakened or imperfect vaccinia. Bearing in mind this connection between the old inoculation and the new, it was essential that this radical bovine modification should not be carried

further by the various inimical circumstances that must arise. The greatest enemies of vaccination were those who asserted that no change took place in the course and effect of cow-pox by long continued descent, if judgment and care were exercised. If it were possible for judgment and care to be ubiquitous, there must still be that in the nature of cow-pox, as of small-pox, which, influenced by unknown causes, would lead to fluctuations in value, in coping with which empirical selection would always be a step behindhand. Certainly, a standard of cultivation was rightly aimed at, but it was a conventional standard, and differed in some material points from the descriptions of early vaccinators. The best vaccination was that performed with lymph of the most active kind possible consistent with maintaining its essential and safe bovine modifications; and in aiming to attain a definite notion of this degree of activity, greater attention ought to be paid to the percentage of truly exanthematous secondary manifestations. He believed that a time must come, in the practice of every vaccinator, when renewal from a primary stock of the most active kind would be needed. The best of all vaccination for the million was that of human arm-to-arm, provided that animal vaccination were partly joined thereto as a help to excellence, but strictly kept in the background. This might be accomplished with perfect safety to the cause of vaccination. Those opponents of the method who feared that its mismanagement might imperil the protection of the people against small-pox by limiting the production of the lymph to one place and to one management, might be reassured by a thorough arrangement of the details such as would discourage a too easy resort to it. The advantages of the method, would, he trusted, ultimately range authoritatively on the side of the movement, in order wisely to control it. Animal vaccination, carried on with the skill and experience now attainable, was satisfactory to the fullest extent. The cultivation of the lymph required a special skill, and more unceasing care than in arm-to-arm vaccination—a powerful argument for its restricted application, but not for its suppression. In its best form and with care, it acted on the human subject with a certainty little inferior to that of ordinary lymph. The subsequent course was thoroughly Jennerian in its constitutional and its local effects. It was never in children followed by erysipelatous inflammation or ulceration. In adults, he had a few times seen such results, but these were traceable to a fault of health in the patient. On the other hand, without skill, constant care, and ample resource, mischief would speedily arise, either by sudden extinction of the stock or by propagation of a weakened lymph. These dangers, were, however, wholly avoidable. A question must arise as to whether Government or the public should take this matter in hand. He gave the preference to organised private and philanthropic effort. But to whomsoever the duty might fall, three possible sources of preliminary supply would present themselves: 1. Existing stocks of primary cow-pox in animals; 2. Primary casual cow-pox; 3. Induced cow-pox. Of these, neither would possess any superiority from the simple fact of its origin, but only by its nearer approximation to a standard fixed by experts as upon the whole the best. Probably, at the outset, choice would be limited to the great existing stocks of transmitted cow-pox in animals. One or two competent persons should be delegated to visit and study the methods in vogue on the continent and in America. Examination would be made as to the behaviour and characteristics of the respective lymph-stocks with a view to the selection of the best, if there were any preference on an average result. The

model ever present to his mind was the original Esneaux lymph of 1868, superseded somewhat capriciously in 1870. He was indebted to Dr. Warlomont for a frequent supply of the lymph at present cultivated in Brussels, which he was glad to use when occasion demanded. The Brussels stock, in spite of the drawbacks of preserved lymph, and distance to travel, gave very good results; but, if it were desired to provide an opportunity of renewal from what Jenner called "the most active kind of virus", or, as might be said, for a safe step nearer the original exanthem, then he would prefer that of Esneaux. He was, however, speaking solely of the effect of preserved lymph. It should be almost a *sine quâ non* that the standard of 1868 should be accomplished by those who desired to establish the supplemental method here on a firmly beneficial basis. The next source of possible supply of primary cow-pox was the discovery of a so-called spontaneous case. He had travelled hundreds of miles to examine all sorts of vesicular eruptions on cows, without having been once successful in the search; nevertheless, a little money might be advantageously spent in taking such steps as would make spontaneous vaccinia difficult of occurrence without coming to the ear of authority. It was certain to happen in time somewhere; and to be on the alert was the best way to secure the expected benefit. The last possible source, and the most promising, was that of induced cow-pox, or the affection successfully induced on the cow by inoculation of variola. This operation had mostly been difficult to perform, but sometimes it had seemed very easy. The best and cheapest way to make this valuable resource available would be to offer a substantial premium for its production to members of the medical profession residing in dairy districts. Any gentleman desiring to make the essay should receive the free aid of an appointed officer, who should obtain and have responsible care of the variolous virus, and be at the same time a witness to fact. In this way, a new lymph would not long delay to be ready for further modification if needed, and for multiplication on heifers. He believed that this transformation had been effected very much oftener than was thought, even remembering the numerous recorded instances. One surreptitious success had come to his knowledge. A surgeon of position in an English county had two rich patients who refused to be vaccinated in the ordinary way, but offered to submit to the operation, provided the surgeon would inoculate a cow with small-pox, and employ for their cases the lymph proceeding therefrom. This was successfully done. The virus set up a great deal of inflammation in the patients' arms, but no general eruption. The surgeon declined to publish the case, because he heard that such an act might be thought by some to be illegal. This gentleman might now possibly be persuaded to publish particulars. In conclusion, it might be safely affirmed that, even with a restricted access to the new method, the Vaccination Acts would work with somewhat less of friction and public scandal than at present; but whilst strongly insisting on the absolute necessity of the step under discussion, growing out of the change of circumstances, the arrangements of detail were more difficult than the enunciation of the principle. A debt of benefit was owed to Jenner and vaccination, which must now be repaid by giving labour and thought to this important matter. Mr. Greene then proceeded to say that Mr. Hart's report on Animal Vaccination, printed in the BRITISH MEDICAL JOURNAL of November 29th, and now in the hands of those present, was a most valuable document, showing a vast amount of industry and energy; but no one had said anything about the method

of practising animal vaccination, and he insisted that this subject should be gone into. He saw by the report that the successes on the continent were pretty equal to those obtained here. But let them look and see what this amounted to. He noticed that at Rotterdam and Berlin accounts were given of the pock-marks coming after the insertion, and he contrasted the results obtained by the National Vaccine Establishment. He took it that Mr. Hart's report assumed that the chief bulk of English vaccine cases did not, in successes, come up to the standard of the National Vaccine Establishment. It might be granted, for argument's sake, that a considerable portion of our vaccine was as bad as the figures seemed to show; but, in so doing, he should only grant that our vaccine was equal to the best of the animal vaccine. Therefore, it was apparent that humanised lymph was superior to animal when used with vaccinating skill, which the report gave to the officials of the National Vaccine Establishment, and which it claimed for the continental animal vaccinations. But was the bulk of our vaccine, for which no statistics were available, as bad as it was said to be? His own experience said it was not, and every medical man in the room who vaccinated was competent to judge whether it was so or not; and he appealed to them whether the successes in England were only equal to 39 per cent. for every point of insertion. Then there was a side issue in regard to the uncertainty of animal lymph, and there were two causes of failure. The first cause of this was the haste with which the medical man was compelled to do his work. He had a number of children before him, and he could not keep the calf upon the table too long, and he was therefore obliged to take the matter very rapidly; and, supposing that the matter should coagulate, there was then the chance of failure. Where the medical man did not have to unduly hasten, there the matter would take perfectly; but there were calves and calves. Some would be quiet enough; but there were evil-spirited calves, and pugnacious calves—calves full of "rowdyism" and violence, leading them to struggle violently against the unavoidable. This continuous struggling obliged the vaccinator to hasten his operation; and, if he did not, the animal became thoroughly exhausted. He had seen a calf go into a violent struggling, rendering it impossible to continue, the pocks drying up under observation, and, even where they had not done so, he had had the calf taken off the table. When it was brought on again, the next day, he had found that the result of this violent exercise on the part of the calf was, that the matter did not give the same results as before the violence had changed the matter. The second cause of uncertainty was the comparative insusceptibility of the bovine as compared with the human nature. They had heard what Dr. Martin had said of the failure in primary vaccination, and he himself had proved this: that failure in carrying out the primary vaccination of infants with human lymph was a very uncommon event—the infantile nature took the virus readily; but with the bovine lymph there was not this certainty. He gave some matter from a calf to a friend, who vaccinated the arm of a clergyman's child. Around the original insertion, there was a complete recurrence to cow-pox, for there were some twenty to thirty supernumerary cow-pox vesicles. He quoted the report by Mr. Hart in proof of his assertion that considerable technical skill was required, and added that when an animal vaccinator succeeded, he said, "I am clever"; when he failed, he said, "What different matter, and what great skill is required!" It was not to be denied that a certain amount of success had attended animal vaccination; but he desired to

point out, and to press the point, that the susceptibility was an uncertain quantity in the bovine species, but that it was a comparative quantity in man.

Dr. STEVENS, of the Local Government Board, said he was not aware of the intention to hold this meeting until too late for him to come prepared with facts, and he did not see Dr. Cameron's letter in the *Times* until the previous night. He gathered from Dr. Cameron's letter that Dr. Cameron considered the continuance of small-pox in the country to be largely due to the deterioration of humanised lymph. Upon that point Dr. Stevens claimed to speak. He had seen more vaccinated children than any man either alive or who had lived; and he was engaged in the work during the transition period through which the country passed in regard to vaccination. All his experience led him to the opinion that the arm-to-arm system practised in this country was as nearly perfect as a system could be made, and as efficacious as could be desired. He had some statistics bearing upon the question, in which the deaths from small-pox in different periods were in groups of ages. Now the epidemic which commenced its invasion in 1876—in the last quarter of that year especially—gave that year a total mortality of 735 of all ages. Of these deaths, 88 were in children under one year old; 128 in those between one year and five years; 175 in those between five years and twenty years; 269 between the ages of 20 and 40; 69 between the ages of 40 and 60; and 9 in persons above sixty years of age. It was a very curious fact, that the percentages of deaths from small-pox, in the ratio of the different ages, appeared to have relation with the ratio of deaths in the year 1877; for the deaths of those under one year in 1876 were as 11.9 to the whole number; in 1877, the figures stood at 10.0; while in 1878 they stood at 12.2. In the group of ages between 1 and 5, the ratio of deaths stood in 1876 at 17.0; in 1877 at 17.2; and in 1878 at 1.6. In the next group of ages, between 5 and 20, the deaths stood in 1876 at 23.8; in 1877 at 28.1; and in 1878 at 30.2. In the next group of ages, between 20 and 40, the deaths stood in 1876 at 36.5; in 1877 at 33.8; and in 1878 at 31.3. In the group of ages between 40 and 60, the ratio of deaths stood in 1876 at 9.3; in 1877 at 9.1; and in 1878 at 7.7. In the cases of death above 60, the death-rate was 1.2 in 1876; in 1877 it was 1.4; and in 1878 it was 1.6. These figures showed the death-rate of children under one year, the age at which some children would not be vaccinated, to be fairly uniform. In the next group of deaths, between one and five years, it would be seen that the latest year showed a vastly lessened rate of mortality—a lessened rate which did not bear out the suggestion that the lymph had deteriorated. In the next group of years, between 5 and 20, would be included the deaths of the irregular classes who escaped the vaccinators—the street Arabs—and the importations of Irish emigrants. Then, too, it would be seen that the Small-pox Hospital returns gave the mortality at the ages of 31 to 36 as the chief of the mortality between the ages of 20 and 40; and, as the total mortality between these ages had lessened from 36.5 in 1876 to 31.3 in 1878, it would be seen that there was a great improvement. [*Hear, hear.*] Now, these statistics spoke very well for the way in which vaccination was carried out in this country. Another thing he might mention, to show that there was no falling off in the protective powers of humanised lymph, was the fact that the mortality of the epidemic which had lasted until the present time was not half that of the epidemic of 1870-71; for, while the death-rate of 1870-71 stood at 10,615, that of 1876, '77, '78,

and '79 was not above 5,000. With regard to the supposed weakening of the humanised lymph, as stated by Dr. Cameron in his letter to the *Times*, it was that humanised lymph which had effectually protected the nurses in the small-pox hospitals, for not one of the nurses so protected had had small-pox. Dr. Stevens did not wish to asperse bovine lymph, because he knew it to be very valuable; but if it were thought, by the adoption of this system, to satisfy the anti-vaccinators, it would fail. With regard to its use being a protection against the inoculation of syphilis, he had investigated allegations brought forward by the anti-vaccinators in cases where it was said that children had received syphilis in the vaccination, and he had not brought home the syphilis to the vaccination in any one case.

Dr. A. CARPENTER asked Dr. Stevens if he had seen any case of syphilis among the vaccinated children.

Dr. STEVENS replied that he knew of cases, but he had not seen one such case in the whole of the inquiries and investigations he had made for the Government. Then with regard to the present position of the vaccination question, this demand for animal lymph was an appeal made to the laity by some members of the medical profession. He acknowledged that it was incumbent upon the Government to obtain from the best sources the matter for the vaccination of the people; and that it was a fair subject of inquiry by the medical men of that large and important meeting, called by the important Committee formed of members of the large and important body of the British Medical Association, to see if the Government should or should not be pressed to take up this lymph; but to tell every person who was about to have his child vaccinated, that it was right to go to the cow for the lymph, was both illegal and mischievous. The proposition, he held, was largely due to the antivaccinators. The antivaccinators urged that they should have the right to go to the cow. For instance, a man who was fined repeatedly for not having his child vaccinated, said he would go to the cow, and have the vaccination performed from bovine lymph. One of the guardians gave him half-a-sovereign to buy the lymph; and then the man said that he would not have it done at all. The strongest of the objections he had heard against vaccination was, "You shall not give us the disease of a beast." He had told them that they ate the flesh of the beast and drank the milk of the beast; but the reply was, "We do not care about that; you shall not give us the disease of the beast". The danger of communicating by vaccination what were termed "accidental but formidable affections", was, as many gentlemen were fully aware, infinitesimally small; in fact, the danger could hardly be numerically represented; and as to the weakness of the humanised lymph, he did not believe it, for he found it unsupported by trustworthy facts. He would add, with regard to the allegations respecting the communication of syphilis by vaccination, that there were too many checks to admit of this communication; and the legislature might better study the health of the people by providing proper conveyances to and from the vaccine-stations for the children, than by providing an alternative system of vaccination itself. He opposed the proposals of Dr. Cameron to give the choice of the alternative system, and contended that the Government should be responsible for obtaining the best lymph.

Mr. HENRY LEE then addressed the meeting, which, he said, was there to ascertain facts. Dr. Warlomont had come from Brussels, and wished to dissipate any prejudices which any of the British public might

have against vaccination generally or against the system of animal vaccination, and Dr. Warlomont had taken this course in order that vaccination might have its full scope in the future in this country. The speaker gathered, from the information which had been afforded the meeting, that it was the received opinion that, if any poison were taken from the human subject and inserted in the calf, the matter used from the calf upon the human being would be perfectly safe, and free from syphilitic poison. But he had known cases where animal vaccination had been tried, and the persons vaccinated had received a disease which had lasted for months. His opinion was, that the matter should pass through three or four calves, or else any original human disease in the matter would come back into the human family through the calf. Then as to the statement that syphilitic contagion by means of vaccination was not known before 1871, his (the speaker's) book came out before that year, and he mentioned the subject. Then as to revaccination; he had seen a great number of cases where persons who had come to be vaccinated had large sores upon their bodies, and had them for years; and he could not impress too much upon practitioners the care they should exercise in vaccinating syphilitic persons.

Dr. DRYSDALE said that he had seen some of the advantages of animal vaccination. The British medical man had to deal with a large uneducated public, and when the legislature compelled the people to be vaccinated, it was but fair that they should be allowed their choice of taking the vaccine matter from the animal, which could not be suspected of physical delinquencies. As to the question of the contagion of syphilis through vaccination, he thought this danger might be left out of the question, for, with the exception of Mr. Jonathan Hutchinson's case, there was little evidence. But that one case had an important influence upon the mind of the public, and raised such a dislike to vaccination, that they should not be forced to adopt only the humanised lymph and the arm-to-arm system. He had tried the ivory points, but did not find them successful, and he found that the same thing had resulted in Brussels—that the dry points did not succeed so well as could be wished. If animal vaccination were to be successful, it must be done from the calf upon the table.

Dr. BALLARD moved the adjournment of the meeting until the 18th instant, at four o'clock, in the same rooms.

This was carried; as was also a cordial vote of thanks to Dr. Warlomont and to the Chairman, which was moved by Dr. CAMERON, M.P., and seconded by Dr. ALFRED CARPENTER of Croydon.

THE adjourned meeting on Animal Vaccination was held at the rooms of the Medical Society of London, Chandos Street, on Thursday, December 18th, at 4 P.M. The Chair was occupied by Mr. Ernest Hart, Chairman of the Parliamentary Bills Committee; and among those present were Dr. Cameron, M.P., Dr. Alfred Carpenter, Dr. Robert Cory (of the Local Government Board), Dr. E. Ballard (of the Local Government Board), Professor J. B. Simonds, Dr. Hinckes Bird, Dr. Bridges (of the Local Government Board), Dr. Drysdale, Dr. George Henry, Dr. Collins, Mr. E. R. Denton, Mr. Ceely (Aylesbury), Dr. G. Wyld, Dr. E. Crisp, Dr. D. Nicolson, Mr. H. Lee, Dr. J. H. Gramshaw (Gravesend), Dr. Symes Thompson, Dr. Bowles (Folkestone), Mr. G. D. Brown (Ealing).

The CHAIRMAN stated that since the last meeting he had received numerous letters agreeing with animal vaccination, and he laid before the meeting a reply by Dr. Warlomont of Brussels to the speech made on the last occasion by Dr. Stevens of the Local Government Board. Information had also reached him of the existence of a flourishing animal vaccination service at New York, the Board of Health of which city maintained a farm in New Jersey for this purpose. He had also learnt, through Dr. Pietra Santa, of the existence of private animal vaccine establishments in Spain—at Barcelona, Vittoria, Alava, Seville, Valencia, and Havannah. It appeared that in 1874 Dr. Lanoix himself inoculated with his lymph a calf at the veterinary school at Madrid; and that the general centre of vaccination in the State, instituted in the capital in 1875 at the instance of the Royal Academy of Medicine, had as its aim the cultivation, preservation, and distribution of both kinds of lymph, humanised and animal. As regarded Russia, Dr. E. T. Wilson of Cheltenham had kindly drawn attention to an article in the seventh volume of the *St. George's Hospital Reports* (1872-74), in which particulars were given, from his own personal observation, of the successful working of the St. Petersburg animal vaccination station. Adverting to the conclusions arrived at by Dr. Seaton in 1869, Dr. Wilson stated that, as regarded the first difficulty of transmitting from calf to calf without interruption, it had been overcome at St. Petersburg, where the lymph had at the time of his visit been transmitted from calf to calf for the previous five years. At St. Petersburg, by taking the lymph with great care at the fifth and sixth days of eruption, the failures from calf-lymph had been reduced from 12 to 2 per cent. The St. Petersburg experience was the same as that at other places as to the keeping of the calf-lymph; but some lymph which Dr. Wilson brought over with no special care succeeded in the hands of a public vaccinator and produced well-developed vesicles. With regard to the number of vaccinations that could be performed with the lymph from a single calf, Dr. Frobelius, the superintendent of the St. Petersburg station, mentioned having made one hundred insertions, all successful, from five vesicles; and it was not uncommon to find from sixty to one hundred and twenty vesicles on a single heifer. Calf-vaccine was started at the Foundling Hospital of St. Petersburg in 1868, and had continued side by side with Jennerian lymph up to the present time. A heifer-calf, from two to four months old, was taken every fourth day; the abdomen was cleanly shaved on a table specially adapted for the operation, and from sixty to one hundred and twenty insertions were made in regular rows of from ten to fifteen pricks a-piece. A light bandage was then applied, and the calf rejoined its companions in a clean and well-ventilated stable. On the fourth day, the vesicles were ready. The lymph, however, was better on the fifth day, and none should be taken upon the seventh. It was pressed from the vesicle by means of a small tenaculum; and Dr. Wilson was assured that the effects were equally satisfactory, whether the vaccination was performed in the summer or in the winter. This information he (Mr. Hart) had thought it right to lay before the meeting. Among the letters he had received was one from Dr. J. S. Bristowe, President of the Society of Medical Officers of Health, who said: "While fully believing in the efficacy of arm-to-arm vaccination, and that the vaccine virus has lost none of its original virtues by repeated transmission from man to man, I am entirely satisfied, from the evidence which has been adduced, that vaccination direct from the heifer, properly prepared, is as certain, as effi-

cacious, and at least as free from danger, as vaccination direct from the arm". Mr. Simon, of whom it was said at the previous meeting that, if he had continued in office as the medical adviser of the Government, he would have been prepared to recommend the use of the system, had written to say: "It is a fact that, before leaving office, I had been very desirous to make experimental study of the system of animal vaccination, in order to see whether we could practically get over the serious disadvantages which in 1870 prevented me from approving it; but whether I could wish to introduce the system for any of our national uses, would have been an entirely open question with me till I had gained the fuller knowledge which I thought necessary." Dr. Braidwood of Birkenhead, who was entitled to be heard on this question, said: "The example set me by such pioneers of medical science as Sir Thomas Watson and Mr. Ceely of Aylesbury seems the best under the circumstances; and I would, therefore, merely express thus my entire concurrence with your efforts to establish animal vaccination in this country."

The paper by Dr. WARLOMONT, in reply to Dr. Stevens, was then laid before the meeting. It was as follows.

I regret exceedingly that I shall not be able to be present at the adjourned discussion on the subject, whether it be expedient for the English Government to introduce animal vaccination officially into that country. I purposely state this question with precision, because it appeared to me to have been ill understood by the speakers who followed me at the meeting at which, thanks to you, sir, I was received with so cordial a welcome, for which I desire to thank my kind hearers.

I had, indeed, no thought of raising then all the questions relating to vaccination; such, for example, as that of vaccino-syphilis; that of the degeneration of lymph, human or other, by the lapse of time; the question, in short, which has given rise to so much and such lengthened discussion, of the transformation, still admitted by men of ability, if hotly contested by others, of the virus of small-pox into vaccine virus by the simple transmission of the former through the system of the cow. These are all points which, in order to clear the path, we may provisionally disregard; they will come up for discussion later on. I should then have had much pleasure in attending the meeting on the 18th, before the same assembly, in order to try to bring it back to the consideration of those fundamental principles which I have already laid down to them, and which seem to me to have been too much lost sight of.

One speaker only appeared to me to have kept to the true direction for the debate. His speech, full of spirit, wit, and appropriateness, in which he in very truth took "the bull by the horns", reopened the great line of thought, which we should do well, I think, to follow more closely if any good is to come out of the inquiry upon this burning question, to which public attention, not only in England, but throughout the whole world, is directed.

Ought the Government to introduce animal vaccination officially into England? Dr. Stevens, Government Inspector of Vaccination, speaking, however, only for himself, examined the question in a very logical manner, and treated it from an elevated point of view. He commenced by establishing—what we had not contested—that lymph has not degenerated; the complete protection, said he, which vaccination actually affords, in a considerable proportion of cases, is sufficiently proved by the subjects who have been submitted to it. Is it necessary, therefore, in view of an improvement, which is as yet not clearly made out, to substi-

tute a new practice, which has not been proved efficacious, for a practice which is fully satisfactory? This was his argument.

It would be easy to reply to this gentleman that, if he wait for these proofs to come to him, he will wait a long time, if he do not obtain personal experience (on which alone he is resolved to base his opinion) of the new method. And, if he do not do this, ought he not to take into consideration the experience of others? Now, the proof of the efficaciousness of animal vaccination needs no longer to be established.

I know that the speaker is not convinced, and that he takes refuge in the maxim, "Better is the enemy of well"; but nothing is more annoying than this dictum thus applied. So long as vaccination shall not have annihilated small-pox, it has not done all that it ought or can do; and we are very far from this. The epidemics of small-pox which follow each other almost uninterruptedly prove to us that the better is certainly still to be searched for as regards prophylaxis.

Dr. Stevens is too enlightened a man, too capable and too conscientious an administrator, to wish to remain under whatsoever circumstances in the beaten track; and nevertheless, unconsciously perhaps, he desires not to forsake the high road. But he seems to forget—and he will pardon my saying so—that there is in every language a word to express this constancy to the track of the past; viz., routine. Dr. Stevens, let me say at once, is not a man to whom such a term would be appropriate. It is, then, necessary that he should seek with us that "better" which he still refuses to recognise, and which certainly animal vaccination is capable of affording him.

Dr. Stevens does not admit that the public should be allowed to make its choice as to the kind of lymph it should demand from the State. The latter, he says, ought to choose the best guardian of its children, and not offer it any other. It would not be possible to express a better sentiment; but in this matter other things must also be considered. If we had to make our choice, it would not take long to make it: the calf would immediately be found everywhere as the only admissible vaccinifer. Why, then, do we maintain vaccination from arm to arm? Because it is more practical, and is necessary to help us to tide over the period of transition in which we find ourselves at present. Vaccination, as a general rule, ought always to be done in preference with lymph taken directly and immediately, living and warm, from the selected vaccinifer. Now, we are still very far from the time when in each town, village, and hamlet, a vaccinated calf can be placed at the disposal of the vaccinator or of the public. Up to this moment, the infant must fill the place of the calf; but, be it said, as a makeshift only. We desire, indeed, to declare that if we have, in all our writings, demanded the maintenance of vaccination from arm to arm, it is simply because we cannot yet do without it. In proportion as the new method extends, the old one will gradually be extinguished.

If, then, we take our stand from the point of view chosen by Dr. Stevens, and have to choose one or the other lymph to recommend to the public, to the exclusion of the one rejected, we shall have to face the difficulties of application and to count their cost. These difficulties compel us to give in. I would suggest, then, to Dr. Stevens and to the department in which he so worthily occupies a distinguished position, the Belgian system, respecting which I propose to say a few words, necessary to a right understanding of the subject.

The State Vaccine Institute of Belgium has specially for its object the cultivation of lymph on the calf, and its distribution gratis,

as seed, to all the practitioners of the country as frequently as they need it to renew their stock. To allow the annual renewal of this stock by strengthening it from the animal which seems the most fit for the purpose, and in keeping up without break this seed at the disposal of practitioners, is the special function of the Institute. It does not then, as might be thought, furnish vaccine matter for as many vaccinations as there are subjects to vaccinate, but only the seed for the purpose of preventing interruption of the service.

As to the public, the State does not furnish it gratuitously with animal lymph, though it may choose to prefer it; but the Director is authorised to furnish it on payment of a fee fixed by the decree constituting the institution. For this fee, every person who is well off, desiring to have original lymph, whether for the performance of vaccinations or of revaccinations in his family, can procure it. But the State has nothing to do with the details; that is the business of the Direction. It is the same with regard to vaccination from arm to arm; the State has no concern with it. To carry out effectually such a practice, it would be necessary to have as many institutions as there are populous centres. It would be necessary to go into matters of detail which only concern municipalities.

All that the State does in this direction, and these are the limits of its action, is to authorise the Director of the Institute to admit to vaccination at his establishment all the subjects who have a preference for calf-lymph : the poor are admitted gratuitously. This is all the State can do. Beyond the Brussels district, the poor must content themselves with the lymph cultivated by the vaccinators, who renew it every season; and the well-to-do with the same lymph, or with preserved animal lymph obtained from the Institute. This system is far from being perfect, since the poor cannot have their choice. It must not, however, be forgotten that in Belgium, vaccination not being compulsory, the State has fewer duties towards the public in this respect than in countries where compulsion is the law. Here there is an absolute moral obligation, which Belgium would not disregard if vaccination were compulsory. Its first duty, and it would not seek to evade it, would then be to put a supply of animal lymph gratuitously, and in a supplementary manner, at the disposal of practitioners of whom the poor demanded it.

Thus established, the institution could immediately commence operations in Great Britain, and be of immense service. London would be the first station, and some other great centres would be provided with stations in their turn. The London establishment would be the central institution : it would never allow its stock to fail, and would be always ready to renew or to help provincial establishments, which, for the sake of economy or other reasons, might from time to time suspend their working.

We differ, then, as will be seen, from the opinion expressed by Dr. Stevens. According to him, the public must not have any option between the two lymphs; but we hasten to say that this option would not occasion any inconvenience, since, according to our view, both lymphs, properly cultivated, are equally efficacious. In leaving the option to the public, and in giving to every one the means of carrying out his choice, we shall be doing wrong neither to the individual, nor the State, nor to public opinion. The latter, on the contrary, will be satisfied in a manner which has long been desired and waited for.

I beg my honourable opponent not to persist in his opposition. No one respects it more than I do, no one understands better than I what

it costs an official charged with a grave responsibility to lay a rash hand—and it is so for him—on an organisation which gives him comparatively excellent guarantees; but no one is more assured than I am of the truth of the precept which I love to recall to mind, that in such a matter not to advance is to recede.

Dr. BALLARD said that, if there were lurking in the mind of anybody present, consequent on some things which he had read, some sort of suspicion that the department of the Government which was charged with the control of public vaccination in the country was actuated by any feeling of prejudice against the system of animal vaccination, his presence that day, as a representative of the Local Government Board, by direction of the President, might be taken as in some way doing away with that suspicion. Other Inspectors of the Board were more experienced than he was in the public arrangements of the country, and could speak much more forcibly and with more effect than he could. Nevertheless, when it was suggested to him that he should be present as the representative of the Board, he hesitated to accept the charge on two grounds: first, because he was much more apt at working than at talking, and next because he thought that possibly his views on the subject might be in advance of those of the Board; hence, at his request, his friend Dr. Cory, Chief Inspector of the National Vaccine Establishment, was associated with him. He hoped that this conference would hear something from that gentleman before the evening was closed. In the first place, it appeared to him that something should be said about the grounds on which the demand made in the proposed Bill of Dr. Cameron was founded. One of these grounds was the alleged deterioration of the humanised vaccine as now propagated. This, however, was withdrawn by Dr. Cameron at the last meeting.

Dr. CAMERON said he did not withdraw it, but left it for the purpose of being criticised.

Dr. BALLARD said he took the liberty of criticising some of the arguments Dr. Cameron used in support of his view. Dr. Cameron held, on various grounds, that the humanised vaccine lymph had deteriorated. He (Dr. Ballard) did not think he should have been very much disposed to say anything about this, had not Dr. Cameron given his reasons in letters to the *Times*; and, although the inference he drew might be good, his reasons were not equally good. He said it was all very well to describe the last severe epidemic of small-pox as exceptional, but during the twenty-two years in which there had been compulsory vaccination it ought to have made some impression; and he also said that statistics showed either that the protective virtues of the lymph were mythical, or that there was something radically wrong in our national system of vaccination. The epidemic of 1871-72 was exceptional; but there was a reason for that which Dr. Cameron did not seem to have taken into account. The epidemic arose in one of the worst vaccinated districts in France, and its ferocity was exceptional, and it spread in France, Germany, all Europe, England, and America, and it carried with it wherever it went its intensely ferocious character. For this reason, the epidemic was excessively fatal. He had before him tables, constructed for him in the Registrar-General's Office, showing really that the mortality from small-pox had, during the vaccination period in this country, been gradually and steadily lessening, with the exception of the particular epidemic period of 1871-2. Between 1838 and 1842, the mean annual death-rate from small-pox per million was 571. From 1847 to 1849 it was 303. In the next five years—1850 to 1854

—when compulsory vaccination was the law, the mortality was 274; in the next five years it was 198; in the next five, 190; and in the next five years, during which the Vaccination Acts were amended, it was 145. In the next five years came the epidemic of 1871 and 1872, and then the mortality rose to 445; but in the next four the mean annual death-rate from small-pox had fallen lower than it had been before, viz., to 97, and yet during 1877 there was a recrudence of small-pox. There had been a gradual and steady diminution of small-pox mortality; and if they were not to say they were to judge by total death-rate, but to take the mortality as it had occurred in recently vaccinated persons—say, children under five years of age, what was found in the non-epidemic years? Why, an improvement in the protection of children. From 1853 to 1856, the mean annual death-rate from small-pox in children under five years of age was 653 per million. Between 1860 and 1870, omitting the epidemic years, the mortality was 419 per million of infants under five years of age. From 1873 to 1876 it fell to 182. That did not look very much like deterioration of vaccination. He did not say that vaccine in the humanised propagation was all that it ought to be or all that it might be over the kingdom, or that there was not a deterioration of the lymph in places. He knew there was, and that in the hands of some medical men vaccine did deteriorate; but that was in the hands of careless men. He had seen vaccine propagated which, on the eighth day, had produced vesicles having a broad areola, and he had seen it propagated where the areola had been declared on the seventh day. That ought not to be. There was a way in which the lymph might be deteriorated, apart altogether from any inherent character that might deteriorate it. The Local Government Board had for some time taken care to improve the vaccine of the country, not in quantity only, but in quality, and to stimulate the local vaccinators to better work by instituting a system of rewards. But sometimes in poor neighbourhoods among the labouring population, if he found a public vaccinator thoroughly well vaccinating and producing good large marks and scars, he saw in a number of instances some practitioner rising up and saying to the mothers: "There is not the slightest use in having your children punished in this way; take your child down to my surgery." Well, the child was taken down, and one prick was put upon the arm, and the mother was told that that was sufficient. It was sufficient, no doubt, for registration. He said, "Shame on such men!" he could hardly think of them without indignation. Every tyro knew the results of inquiries on that subject made by Mr. Marson some years ago, which had been confirmed in the hospitals round about London. Every student had been told the results of Mr. Marson's inquiries. There were two ways in which diminished protection might occur. It might occur locally, but that had nothing to do with what Dr. Cameron referred to in his letter. Dr. Cameron fell foul of their revered old friend Mr. Ceely, who, he was happy to say, was present to defend himself, and was quite capable of doing so. He (Dr. Ballard) objected to the term in this letter "small-pox lymph" when speaking of the lymph, he was going to say, created by Mr. Ceely. He thought that term ought not to be used, and he also thought that Dr. Cameron himself would be disposed to withdraw it. He said the vesicles were undistinguishable from the genuine article. Well, if not, he should be disposed to say they were the genuine article. He would take the liberty of leaving Dr. Cameron in the hands of Mr. Ceely and his esteemed colleague and friend Dr. Cory, whose book should be in the hands of every man

who wanted to know anything on the subject. The next subject he had to refer to was the chance of syphilis being communicated. He did not think he need say much about that; he had already said all that was necessary. But, after all, the risk of syphilis in humanised lymph was infinitesimal, and might almost be put out of the question. It had been supposed that the introduction of the system of animal vaccination would induce parents to have their children vaccinated who declined to have them vaccinated now. What did that mean? It would appear to be based on this notion, that the deficient completeness of vaccination in this country was due to some really reasonable objection that people had to vaccination. He did not think anything of the kind. After all, the last returns brought the unaccounted for in vaccination among children born in this country to about 4½ per cent.; and what was the reason? Those 4½ per cent. were not vaccinated, not because the parents objected to vaccination, but through accidental circumstances—through neglect. The time for vaccination came round, and perhaps the weather was wet, or the mother was engaged in a day's washing, or she had to cook her husband's dinner, and in that way the time passed by, and then, perhaps, they removed to another place. In some places, no doubt, there were objections to vaccination; but this was only in places like Cheltenham, where there were agitators on the subject. He did not believe that, if human vaccination was entirely superseded by animal vaccination, they would get a single anti-vaccinator to have a child vaccinated. He was not there in any way to apologise for the Medical Department, for that department, even in the matter of animal vaccination, had no shortcomings to confess; but, on the other hand, he claimed for the department public gratitude for what they had done, and, he might add, public gratitude for what they had not done. Think what the state of things was now. Think of this—1838, 1839, 1840, 1841, and 1842, which were not particularly epidemic years, but small-pox then carried away 571 per million of the population. In 1871, 1872, 1873, and 1874, two of which were epidemic years, and ferocious epidemic years, the mortality from small-pox was 445, actually less than it was during the first five years of the registration period in this country. Was not there in that matter to be grateful to the Government for? In 1840, the first Vaccination Act was passed. In 1853 was the time of the first Compulsory Vaccination Act. In 1867, that Vaccination Act was amended, and it was not till 1871 that the arrangement we had now in force was perfected. It had taken all that time, and the Government of the country had been working to perfect the system, and the objects which the Government had in view had been, and it intended to have them in view—first of all, completeness of vaccination, as near as possible, to have every child in the country vaccinated; secondly, efficiency, that every child vaccinated should be vaccinated thoroughly; and, thirdly, that every child should be vaccinated safely. Completeness, efficiency, and safety were the three objects. Had not these objects to a very great degree been attained? First of all, as to completeness; he did not think there was very much to complain of in 4½ per cent. escaping vaccination; and he felt that number would be diminished. As regarded efficiency, it was his experience that efficiency was improving even during the time he had been inspector. He could see a great difference in his districts, and he could say that the character and quality of the vaccination was improving all the way through as to safety; and, with the exception of that unfortunate occurrence which they all knew of, he was not aware

of a single case of syphilis having been communicated through vaccination. Dr. Stevens had never met with it; and he (Dr. Ballard) had never met with it at all. He believed humanised lymph was practically safe.

A gentleman asked whether the 4½ per cent. unvaccinated meant that percentage of births.

Dr. BALLARD said it did. He did not know whether every one present understood what the arrangements of the Local Government Board were for the attainment of its objects, but he wished it to be known that there was a system of looking after the children. Every child was registered, and was never lost sight of until it was vaccinated, unless the parents had submitted to the legal penalties for non-vaccination. In one of his letters, Dr. Cameron said the children were vaccinated only at intervals of six months, in England. In sparse populations, vaccinations only took place twice a year; but, in rural districts sufficiently populous, once in three months. In town districts, where there were eight or ten vaccinees, it was done weekly. The National Vaccine Establishment did not supply all the lymph which was in use in the country. Every public vaccinator was supposed to keep up his own supply, and was supposed to know the child from whom he got it. He was responsible, and was made responsible; but the National Vaccine Establishment would supplement the supply where a man lost it. Nevertheless, the department expected every public vaccinator to keep up his own supply. He (Dr. Ballard) had brought with him some of the papers which contained instructions for public vaccinators; and, if anyone had not read them, it would be just as well that he should, because it appeared that no precaution could be suggested which was not contained in those instructions. Further than that, those instructions were not only given, but the following them was enforced. He was sorry to say that, on several occasions, he had been the means of public vaccinators being requested to retire from the office they held, because they had not followed their instructions sufficiently to come up to the requirements of the Board. Public vaccinators must do their work properly and efficiently, or they must give up their office. For the reasons he had given, he repeated that the Local Government Board had no shortcomings to confess. As to animal vaccination, he wished it to be understood that Government was not in the same position as those who composed the present meeting, for it had serious responsibilities. Before it could accept or adopt any other method of vaccination than that which was now adopted, it must be satisfied that equally good results would follow from its use. It must first be satisfied on the scientific aspects of the case; next as to the administrative practicability of the adoption of animal vaccination. The first question it asked, for instance, was whether the adoption of vaccination in the heifer would give equal or greater protection, or greater permanence, than the humanised vaccination now in use. On that point, the Government at present was not satisfied. Dr. Seaton's inquiry was some years ago reported in the Fourth Report of the new series of the medical officer of the Local Government Board; but, last year, Dr. Seaton was again on the continent, and the results of his inquiry there were not so satisfactory as to lead the Government to think that equal or greater protection would be given by animal as by humanised vaccination lymph. He made inquiries at Amsterdam, the Hague, Rotterdam, and Berlin. He would mention some of these results obtained with fresh calf-lymph. At Amsterdam, complete success at all insertions was

obtained in only 34 per cent. of the children vaccinated; at Rotterdam, it was 54 per cent.; and at Berlin, 21 per cent. At Surrey Chapel station, where fresh arm-to-arm vaccination was employed, the success was 97.8 per cent. It could scarcely be said then that animal vaccination, as far as knowledge had come to the Government office, was so satisfactory as arm-to-arm vaccination practised by an experienced operator like Dr. Cory. Then, as to complete failure, at the Hague, it occurred in 2.2 per cent.; at Rotterdam, the percentage of failures was not stated; but, at Berlin, they were 7.1 per cent. At Surrey Chapel, out of 1,000 children vaccinated with human lymphs the complete failures were simply none. As to insertion success, the calculation of what was attained at Amsterdam was 700 or fewer vesicles out of 1,000 insertions with animal lymph. At Rotterdam, the number was not stated. At Berlin, it was 678. But, at Surrey Chapel, with humanised lymph, it was 978. It was remarkable that the numbers 678 at Berlin, and 700 at Amsterdam, were so much alike; it did not appear as if any imperfection arose from the mode of operation. The success, therefore, as far as the knowledge of the department went of animal vaccination did not appear to be so good as to warrant them to recommend a preference for it over humanised vaccination. Administratively, were certain difficulties in practice in establishing animal vaccination in the first instance. Moreover, they wanted to know more about the preservability of the lymph. Dr. Warlomont had said something about it, and he thoroughly welcomed Dr. Warlomont's speech. Then came the general question, the practicability of the proposals of Dr. Cameron's Bill, one of which was really to give parents an option with respect to animal or humanised lymph. That, he was afraid, would be found very difficult in practice to carry out. The Board considered that such an optional arrangement was quite inapplicable under the circumstances of our population. It might do very well for such a place as Belgium; but think of the population of England, Wales, Scotland, and Ireland—how many heifers, and experienced vaccinators by the new method would be necessary to meet the option of such a population? He thought the meeting would see the difficulties which crowded round the Government with such a proposal. The Board had no objection to animal vaccination in itself, or to vaccinators employing animal lymph. It might be had in England. Only within the last day or two, a colleague of his said a vaccinator had used animal lymph; and, at West Bromwich, a friend of his had done the same. So far from the Board having any objection, they were very glad those vaccinators had improved their stock. No objection was raised; or likely to be raised. What the Board objected to was being required at once, and before it had sufficiently matured its arrangements, to adopt a system of animal vaccination. For several years, it had been working at, and inquiring into, the subject. Dr. Seaton, several years ago, went on to the continent for the purpose, and made a report which was unfavourable. He went again; and, at the present time, Dr. Klein was engaged in a series of inquiries to settle, if possible, the relation between cow-pox and small-pox, which was in dispute. The Board was patiently and steadily continuing its inquiries; and he could not see what more could at present be wanted. It seemed to him to be perfectly unreasonable to expect that the Board, with its responsibilities, should be forced, as it were, into a line of action which it was not yet prepared to take. The efforts of the Board were to do the very best it possibly could to improve the vaccination of the country; and, if animal vaccination were the

best method for obtaining that result, he had not a question in his mind that animal vaccination would, if practicable, be adopted by the Board. He was not saying the Board would do it, but that it was so anxious to do the best it could, that the public might depend upon it it would adopt what was best. One word for his chief. Dr. Seaton being ill, he felt bound to say a word on his behalf. Judging from certain statements which had appeared in print, and especially from the terms in which he had been alluded to, an impression had gone abroad that Dr. Seaton was bigoted. Of all people in the world, he really thought that Dr. Seaton was as free from bigotry or anything like it as anyone could be. He was the prime mover in the work of vaccination in this country; he had done more than any man in this country to promote the completeness of vaccination; and a debt of gratitude was due to him, and had yet to be paid to him, for it. Very much more would no doubt have been done if he had not been taken ill. Things had been standing where the public might have expected them to be moving; but he did not think that was to be put down to the failure of Dr. Seaton, who was not prejudiced, but had a complete honesty of purpose; and following, as he did, the most cautious administrator that was to be found—Mr. Simon—he thought Dr. Seaton had acted wisely in not pushing on anything in the line of experiment in connection with the public service of the country.

Dr. ALFRED CARPENTER (Croydon), said that it was quite evident to him that, if Dr. Ballard were not in the trammels of office, he would himself be promoting the measure they had met to discuss. The few observations which fell from him towards the end of his very interesting speech satisfied him (Dr. Carpenter) that, at any rate, he had strong feelings in favour of the course that the conveners of the meeting had thought proper to take. He (Dr. Carpenter) was about to mention a circumstance which occurred to him in early life, which convinced him that it was possible there could be deterioration of lymph. The circumstance could not perhaps arise now, under the more perfect knowledge we had; but it did arise then, and he had very little doubt it had helped to increase the mortality from small-pox after a nominal vaccination. When he was a young man, there was an epidemic of small-pox, and a great call for vaccination, both of adults and children. Two adults had been previously vaccinated, and, when revaccinated, they had very fine arms, from which he took vaccine lymph and used it extensively. Two years afterwards, there was again an epidemic of small-pox in the same district; and several of those persons whom he had vaccinated with the lymph taken from the revaccinated adults had small-pox. They were not protected by that lymph as they were by the lymph taken from children. It was possible that, at the present time, a large number of adults were under the impression that they had been vaccinated with satisfactory lymph when they were not protected at all. Under the department superintended by Dr. Ballard and Dr. Stevens, adult lymph would not be taken; but he believed it was taken still in private practice, because occasionally vaccinated adults had very fine arms. He never could understand why there should be deterioration, until he looked more particularly into the character of the matters which produced this disease, and then he could see an explanation. The disease was of a vegetable origin, and the germs (as Professor Cohn had published to the world) were liable (in a manner similar to all vegetables) to have a sort of hybrid production. When hybrid lymph was used children were not protected in the same way as by the pure lymph which

was taken from the cow. He was satisfied that it was necessary occasionally to have the lymph from the animal taken afresh, so that they might go back to the old stock and keep it among the people. That vaccination would never be protective against small-pox was self-evident, because small-pox would not protect entirely. The very worst case of small-pox he ever saw was in a man who, twenty years before, had had a severe attack, and at the time of his second seizure was pitted extensively. He died of small-pox in a very few days. We should never be able to remove it entirely; but, by going to the cow and having the lymph from the fountain-head, they were much more likely to keep up the protective influence that Jenner made out to be the case with cow-pock. The question of communicating syphilis by vaccination should not have been brought into this discussion. It had happened to him to see once a case where syphilis had arisen in a vaccinated arm; but the origin of that case was very clear. The nurse with whom the child had been sleeping had syphilis; and there could be no shadow of doubt that the syphilitic matter had been given by the nurse into the arm of the child after the vesicle had risen, and there was an abrasion. That was manifest; and it was the only case in his long experience in connection with vaccination that he had seen, where there had been the remotest possibility of anything like syphilitic infection being present; no medical man would be likely to take lymph from a similar arm, except by accident, which might arise immediately after local infection; and it was an unfortunate thing that this subject had been mooted, because from this meeting it would be spread broadcast that medical men had the opinion that it was possible to take syphilitic matter from a child born of syphilitic parents and to propagate the disease to another by means of lymph. He did not believe it possible, or that any one could bring forward a single proof of such a thing. There would be no evidence to show such a possibility as Dr. Stevens' answer to the question which he put to him showed very clearly. There was no more reason for shutting the door against vaccination on that account, than for closing all the druggist's shops in the country because, by possibility, the dispenser might mix some poison with the medicine he was dispensing. He thought it a great mistake that the subject had been introduced. A number of persons, of honest good intentions, were under the impression that they might receive infection by vaccination. He knew of several who would have their children vaccinated with lymph taken from the cow, and those persons should have the power to exercise an option. There was one thing he would like to see introduced into Dr. Cameron's Bill, which was, that, when a person was brought before a magistrate for refusing to have his child vaccinated, instead of being condemned in a fine and costs, the magistrate should have the power to order the child to be taken out and vaccinated there and then. Fines were a mistake. If the individual sent to the public vaccinator insisted on having vaccine from the cow, he would have the power to insist upon it if Dr. Cameron's Bill became law.

Mr. CEELY said they would not be able to annihilate small-pox, and he defied any one to show that he had claimed such a result. From the experience he had had, no such thing could or ever would happen. He had no prejudice in favour of the lymph. His object was to ascertain a pathological fact: whether it was true, or likely to be true, that variola and vaccine had any affinity? His opinion was that vaccine, in the spontaneous disease of man, was modified by the cow. He had proved

it, and Mr. Badcock had done it more frequently than any man in this kingdom. Animal vaccination was now in operation at Brighton. They had produced first from one cow. The operations that had failed in Lyons had been simply the insertion of small-pox matter by Dr. Chauveau into a little pouch. It had been taken out again unaltered, and transferred into the arms of children. He must say that the manner in which he and others had been spoken of as propagating disease was perfectly ridiculous. If he had time, he could show the natural disease of the cow and the disease created by his and others' operations; but he was afraid it would take too much time. With regard to animal vaccine, he was in favour of it for this reason, that he thought it was an advantage now to recur to the natural disease of the cow. He liked to see good arms, and, when the lymph was not satisfactory to him, he liked to have recourse to the cow. When arms were not so good as he desired, he preferred to do them again. Very few people asked him for the animal lymph, but they were mostly private persons. In his district, they could not now find cases of natural cow-pox, but, forty years ago, dairies were full of it. He was very fond of animal lymph, because it gave such good results. He thought, when a vaccinator could not select his humanised lymph, or found it in any way failing in perfect results, he ought to have recourse to the cow. He did not think he and other like advocates were chargeable with disseminating small-pox among the people by taking the inoculated lymph from the cow.

Dr. DRYSDALE inquired how often Mr. Ceely had vaccinated the cow with the pox.

Mr. CEELY said twice only; once by dry means and once by liquid.

Dr. CAMERON asked how often Dr. Badcock thought it necessary to pass it through the cow.

Mr. CEELY replied that once was enough. He did not approve of animal vaccination as an exclusive system. It was impossible. He liked to see good arms; and, when he found good arms, he took the lymph from them.

The CHAIRMAN: You like a supply of animal lymph to produce stock for subsequent arm-to-arm vaccination.

Mr. CEELY: Yes; it should be kept up by all means for that purpose, and be always at hand.

The CHAIRMAN said he was sure the meeting would have heard with great interest an explanation of Mr. Ceely's beautiful drawings; but Mr. Ceely had evidently felt, as he himself had felt, that they had better be discussed on a future occasion.

Dr. CORY said the death-rate from small-pox was much greater after bad vaccination than after good. After good vaccination, it was almost infinitesimal. If by having animal vaccination they were running the danger of a larger death-rate, they should be very cautious before adopting it. Facts and experiments were, therefore, needed. Dr. Ballard said there were two things not mentioned in the epidemic statistics. The proportion of attacks in ordinary epidemics of small-pox among the unvaccinated was 35 per cent.; but the proportional deaths in the great epidemic was 77, which showed the virulence of the epidemic. In vaccinated people in hospitals it was only 6 per cent. Another thing also to be noted was, that with that epidemic the deaths occurred in people over 15, which included people who had been vaccinated prior to the vaccination laws being improved. As to deterioration of lymph, he had been vaccinating three or four years at Surrey

Chapel, and he had seen no deterioration whatever. Besides that, the lymph had been used there since 1866; it had been passed through every week, child by child; and the characters, as far as one could judge, were precisely now what they were then. He did not think, where they had a sufficient number of cases to select from, that they got any deterioration, however many arms it passed through, if they selected their cases well. Dr. Carpenter mentioned one of the proofs of deterioration of lymph, which he (Dr. Cory) did not think to the point; for they knew the spurious results which were not from vaccine vesicles at all, but from secondary lymph, where there was a hard crust—places produced by irritation from the matter put in. Mr. Ceely had been asked why it was more easy to propogate calf-lymph by inoculation from calf to calf than to inoculate the cow with the small-pox matter. There was a reason, probably, for that. When they took the lymph from small-pox cases, it was taken from the general eruption on the body, and not from the mother-vesicle.

Professor SIMONDS said he might first observe that, in entering the room, it did not occur to him that he should be called upon to make any observations. Having been asked to do so by the Chairman, however, he should be glad to contribute his opinion on the subject. The first question he would ask with reference to this matter was, What was the origin of cow-pox? All who were acquainted with the subject were well aware that there were some erroneous views originally held by Jenner with respect to the conveyance of that particular disease from one animal to another—from the horse to the cow; and it was in consequence of that conveyance that the cow became affected with a disease that he called cow-pox. In the present day, perhaps, it was unnecessary for him to say that among veterinary surgeons, who were acquainted with the lower animals, that opinion had always been negatived. He was of opinion that Jenner saw the disease of the animal, and that it was of a repetitive nature, which, by his own observat ons, he was well aware, did not possess any particular quality. Jenner saw variolous diseases in the cow, one only of which was of the genuine kind. To his (Professor Simonds's) mind, it had always been a question of doubt as to whether the cow herself was to be regarded as the animal only liable to her own variola. He was not there to say she was not; but he was there to say that, after an experience of something like forty years, frequently as he had seen eruptive diseases in the skin of the cow, he had never been able to recognise any of these as variola. He was, therefore, inclined to think that the cows which Jenner originally saw were cows not with generated disease, as it were simply *sui generis*, but that they had become accidentally infected with small-pox matter in consequence of the great prevalence of small-pox at that particular time. If they looked to what was then being done, they would see that inoculation was practised throughout the length and breadth of the land, and that Jenner week by week inoculated children to protect them against natural small-pox. They saw then the prevalence of small-pox in the country, and they knew full well that small-pox inoculation was practised, and there came a great diffusion of disease and greater malignancy. Then, again, they looked to Jenner's own statements, that it was not one particular dairy or two dairies that were affected, but many cows in that district. The disease was easily communicated from one to another, and from the cows to the human subject. In this way they were dealing with a disease which was continuous; but they had not seen such cases

lately or at all. They had looked for the disease year by year, and had failed to detect a natural small-pox. Therefore, he was of opinion that it was a kind of accidental conveyance from the human subject to the cow, the cow being susceptible of it when the exposure to small-pox variola was so great; and, that being so, they saw, to a certain extent, how they had succeeded since then by the inoculation of the cow with small-pox matter. Mr. Ceely and Mr. Badcock had told them that there was new lymph introduced which had one origin—the origin by inoculation of the cow with small-pox matter; and if these gentlemen of experience could detect no difference between the lymph which was introduced by Jenner and this lymph, he thought they now saw identically the two things. Then they came to the peculiarities of variola in other animals, which led to a question whether they had a genuine variola in the cow and doubtful in other animals. He could best answer that question by saying that, with the exception of the sheep, he knew of no other animal that was affected with variola. There was an equine variola which was produced from the cow, but he had never seen variola in the horse. He knew it had been stated of late that cases of that disease had occurred in France, but all he said was that our observations had been extensive and minute, and they had seen nothing approaching to it in a horse or a dog, or any other animal except the sheep. Variolous eruption he had seen in the sheep. The peculiarity with regard to the eruption in the sheep was so marked that he thought Mr. Ceely would remember that, as far back as 1847, when small-pox was prevalent for three or four years, the late Dr. Gregory of the Small-pox Hospital saw at the Veterinary Hospital some sheep that were affected. In his mind's eye, he could see Mr. Ceely now examining it, and he said, "If ever I saw small-pox in my life, I see it there". Mr. Ceely would bear him out now, that, as to the period of incubation of the disease in the sheep and the manner in which the inoculation of the sheep comported itself, it agreed exactly with the disease of small-pox out of the human subject. With reference to the probability of the disease being one which was communicated accidentally to the cow, and that the cow had no variola of her own, some few years ago, he had the opportunity of speaking with Mr. Simon; and, in talking the matter over with him, he asked him if it were not strange, if the cow were the subject of a variolous disease herself, they never saw anything of it in the male, and never heard of bull-pox? How were they to account for a variolous disease which only affected one of the sexes? They would be hooted down in the streets if they were to talk of bulls and steers being affected. No; it was nothing but the poor unfortunate cow alone. With respect to animal vaccination, it appeared to him that they could only use lymph of that kind to supplement the current lymph of the day; and he quite agreed with the remarks of Dr. Ballard that, if the Government saw its way to that lymph being obtained with full facility, they would be the first to introduce it. It might be that there had been some such cases occurring in the cow, which had been referred to, which were called natural cases, and that they were conveyed to the calf, and that the lymph was being used in that way. He was, however, strongly inclined to think that they would find there was inoculation of the bovine animals with small-pox matter. With regard to the susceptibility of bovine animals to infection with small-pox matter, there was a grave difficulty in producing the disease at the present time by simple inoculation. Although Mr. Mason and himself inoculated many cows, they did not succeed at

all. Mr. Ceely succeeded two or three times. Mr. Badcock succeeded several times, but he had had something like one hundred cows to inoculate, and he did it with six or seven punctures each. Nevertheless, he only succeeded five times, which showed the insusceptibility of the cow to take that disease. But one case was quite sufficient to show how it was communicated by one to the other. If they were to look to these things more closely than they had, they would see the series of calf-lymph had precisely the same origin and the same qualities as that of Jenner; and there were a great many practical difficulties in the way of carrying this new proposition out, for supplying lymph for the protection of the country against small-pox. He believed there would be no more protection than at present. He repudiated altogether the idea of syphilis being carried from one individual to another by lymph which was used. There might not be sufficient care in selection. Dr. Carpenter had alluded to lymph being taken from revaccinated persons, and had explained that it had failed because a spurious disease was communicated, the person not being so susceptible at that time. It was an important question; and if he could in any way promote the objects of this conference, of getting a supply of lymph from the calf, he should be exceedingly happy to do so. At the same time, his view was that they would not succeed in obtaining better lymph in many respects than that which was now current; but if it were only a means to supplement the present supply, and to meet an emergency like an epidemic of small-pox, that would be something to attain.

Dr. CRISP moved the adjournment of the debate. Those who advocated the system of animal vaccination knew nothing about it. They were special pleaders. He had conclusious to disprove what the Chairman had written in the report printed in the BRITISH MEDICAL JOURNAL; and on that account he was anxious that the discussion should be deferred, as he had much to say about the calf and its purity. They were told they must come to the calf for protection—the poor and humble calf. Now, they knew that the calf was anything but humble, for he would give a man a kick, and laugh at him afterwards. It was perfect nonsense and conceit. He would be glad if the meeting would give others an opportunity of exposing some of the errors which men in high authority had endeavoured to propagate.

Mr. BAKER said so much had been learned during the last two meetings, that there was evidently a great deal more to learn. He seconded the proposal for adjournment.

Dr. CAMERON said, with reference to Mr. Simonds' observation as to the origin of cow-pox and of small-pox, that gentleman seemed to have overlooked the experiments made by the Lyons Commission, which operated on a very large number of cows in two or three Government establishments. They would have fallen into precisely the same error as Mr. Simonds, had it not been for a mere accident. In the course of their experiments, they inoculated some animals with small-pox and they got no results. The animals were put aside, and, in the course of further experiments, they did it with vaccine matter. They had observed on one of these animals a slight eruption. They gave M. Chauveau information, and he did it to others and got some eruption. Taking the lymph contained in the pouches, he inoculated human beings and cows, and he found in human beings a vesicle in no wise different from the vaccine vesicle. Then Mr. Badcock said, how could it be said it was not the true thing? If they read Chauveau's book, they would know more about it. Chauveau vaccinated back from this vesicle to the cow, and he got the papule. He then got a vaccine eruption, which was a

totally different thing. In that way, they had a very simple means of testing to what extent there was variola. Let them go to the innocent cow and revaccinate her, and say in what percentage they got a vaccine eruption and a variolous eruption. Professor McCall, having occasion to make experiments of that sort, said he got no results during a prevalence, which looked as if that matter was variolous matter. He did not want to dogmatise, but to know the fact. Dr. Ballard had told them what the Local Government Board had done; but, notwithstanding they seemed to have done everything, they had not reduced the death-rate of small-pox. The death-rate had not diminished in anything like the proportion of the vaccinations. The death-rate in cases of small-pox occurring in vaccinated persons was a point to which attention had not been directed. He found by Mr. Simon's book that in the original days the deaths were *nil*. Coming down to the first statistics, from 1830 to 1840, the death-rate was only one per cent. in vaccinated persons. Dr. Ballard, while denying the possibility of deterioration of vaccine lymph which had been transmitted in an unnatural soil for so many years, supported the opposite proposition of increased inactivity in small-pox matter occurring in an unvaccinated population; and, as he remarked, it was fed on blood. The small-pox epidemic of 1872 originated in a badly drained district, and fed on blood. It came on and was extremely fatal. On what ground could he support the extreme activity of small-pox where it was fed on blood and where it was fed on water? Dr. Ballard had told them he recommended public vaccinators to improve their stock of lymph from the animal. A very curious example occurred in Glasgow. A vaccinator there, getting a point of animal lymph, used it and improved his stock. He had no theory on the matter; but he had since got a fresh supply, there being some little hitch in the pedigree of the cases previously. There was a passage in Dr. Seaton's report as to the failures of animal lymph, but Dr. Seaton directly contradicted the reports of the persons engaged. He said that in Amsterdam there were ten punctures made. Did it not stand to reason that there would be some failures? The French Academy went into the matter, and they came to the conclusion that animal vaccine was not in the least behind the humanised vaccine. The commission reported that, taking the proportion of vesicles and punctures, the success of animal lymph was fully equal to that of humanised lymph. Dr. Warlomont's report claimed for the calf a higher percentage of success than was got in this country. If they looked at the Berlin report, it claimed success in every case with animal lymph. He did not say which of the results was right and which wrong, but he quite agreed with Dr. Seaton's report on the subject. It was all very well to say Dr. Seaton was not prejudiced: he did not wish to say he was, but he made equally positive assertions opposed to those for animal vaccination in the report of 1868, and these would be proved to be fallacious. Every one of Dr. Seaton's arguments would be overruled and shown to be incorrect; and the result of the matter was, that now he objected to calf-vaccination. In consequence of the great number of non-successes, the vaccinators after ten years claimed perfect equality in the matter of success; and, so far as security was concerned, they claimed in many cases a great deal more. The deterioration of humanised lymph was one of the reasons which induced the Belgian Government to institute calf-lymph. On the strength of six months' transmission and retransmission alternately between the calf and the human subject, the opinion of the Belgian Government was arrived at, and a commission was instituted. He expressed regret if he had said anything with regard to variolous

lymph which had given offence to Mr. Ceely. No one could have had less intention of wishing to depreciate Mr. Ceely's labours in advance of the science of vaccination. With respect to Dr. Seaton's book, they must remember that it was possible to look at a subject from two sides.

The meeting was then adjourned till next Wednesday, at 4 o'clock, at the same place.

THE concluding meeting of the conference on this subject was held on December 31st, at the rooms of the Medical Society of London, Chandos Street. Mr. ERNEST HART, Chairman of the Parliamentary Bills Committee of the British Medical Association, presided.

The CHAIRMAN, in opening the proceedings, said that this was the second adjourned meeting of the conference called by the Parliamentary Bills Committee for the purpose of hearing the opinions of members of the Association in regard to the Bill brought into Parliament in the last session, and proposed to be introduced next session, by Dr. Cameron, for the purpose of legalising the system of vaccination from the calf, and making that system part of the British official system of vaccination. The adjournment of the last meeting was moved by Dr. Crisp, and the present meeting would proceed from the point where it last broke off. Dr. Crisp would take up the discussion; but, before he resumed the debate, a few words of explanation as to the course of proceedings were necessary. It was to be borne in mind that this was primarily a meeting of members of the British Medical Association, convened by the Parliamentary Bills Committee of the Association; and if there were members of the profession present who were not members of the Association, and desired to speak, he had no doubt the meeting would be glad to hear them, if they spoke upon the subject directly before the meeting. But he had received communications from gentlemen, who were not members of the profession, asking if they could attend and speak; and, in reply, he had told them that they could not speak at that meeting, it being a special conference for the medical profession only—of members of the British Medical Association by right, and of other members of the medical profession by courtesy. If there were persons present who were not members of the profession, he had no wish that they should retire; but they must distinctly understand that they could take no active part in the proceedings.

Dr. CRISP, resuming the debate, said he wished to correct a part of the report of his remarks when he moved the adjournment. He was reported as saying that the "humble calf", as spoken of by Professor Warlomont, "was anything but humble, for he would give a man a kick, and laugh at him afterwards"; and the correction Dr. Crisp regarded as necessary was to add, if the calf could have laughed, he would have laughed. He had been misunderstood, too, to say that vaccinators were conceited; for, if he had said so, people would suppose he was in his dotage. He had attended these meetings because he had paid a great deal of attention to vaccination generally, and to the diseases of animals. He had performed with vaccine matter, and with small-pox matter, more inoculations than any man living; he had performed more operations upon animals than anyone present, and he had paid a

great deal of attention to the diseases of the lower animals, so that he could speak on the subject by the light of his own experience, and he did not speak from experience gained from books. The profession had been invited to discuss whether it was desirable to introduce animal vaccination—whether, in fact, it was well to upset the arrangements at present existing in favour of the system as in Belgium. He thought the meeting was a great mistake in the beginning. The Association should have been consulted before the step of holding the meeting was taken; for he thought the meeting would tend to produce a great deal of discontent among the people, in leading to the idea that the doctors themselves were dissatisfied with the present system of vaccination. At the last meeting, it was said that the French Academy of Medicine had reported in favour of animal vaccination; but, as he read the report (of 1869 or 1870), there was no such expression of favour; but it upheld the efficacy of the protection afforded by humanised lymph, and attributed any lessened effects to the want of care on the part of operators. This was the experience in other countries; and, having performed many operations upon the cow during the cattle-plague, he must say that he should be sorry to take matter from the vesicles which appeared in the animals, for they did not appear to him to resemble the Jennerian vesicle. With regard to the nine inferences drawn in the report of the Parliamentary Bills Committee, and given in the JOURNAL, if those inferences had been debated upon more directly than they had by the conference, there would, in his judgment, have been a better practical outcome of the conference, and the results would have been better than would be the results of the speeches which had been given. For himself, he should take up these inferences. In the first place, it was said that humanised lymph had lost its efficacy in passing through so many generations of the human being. But what proof was there of this, and what example was given of this? He had been a vaccinator for fifty years, and he could see no difference now in the protective power of the lymph from what there was fifty years ago; and, indeed, he would go so far as to say, by the light of his own and others' experience, that a finer vesicle could not be produced than the Jennerian system now produced. Then, as to the efficacy, it must be remembered that it was never held that vaccination was wholly protective; and, in point of fact, he had it from a friend that, of two ladies who were vaccinated by Jenner himself, one had small-pox after vaccination, and this small-pox by which she was attacked was of a virulent character. But vaccination did lessen the mortality which resulted from small-pox.

Dr. WYLD asked how long after the vaccination the lady referred to had the small-pox.

Dr. CRISP said the medical gentleman who knew the particulars was present, and, if necessary, would answer the question. The instance had been merely mentioned to show that it must be seen that vaccination could not be held to be always a protection; and, therefore, the fact that it did not always protect the vaccinated was no proof that the humanised lymph had deteriorated. Another inference taken by the report of the Parliamentary Bills Committee was, that animal vaccination was necessary in order to provide a larger supply of lymph. Now, this larger supply of lymph he did not consider at all necessary, for he had always had a full supply.

Dr. WYLD asked Dr. Crisp if he had had no difficulty in obtaining a supply of lymph during periods in which there were epidemics of mall-pox.

Dr. CRISP replied that he knew it was said that difficulties with regard to obtaining lymph had arisen in times of epidemics; but he did not think that the position would be improved by having recourse to animal lymph. With regard to the objection made as to the vesicles with humanised lymph—that some of the insertions did not take—the fact was the vaccinators tapped some, and left others untouched. It was declared that the vaccination by animal lymph had more lasting effects than the vaccination with humanised lymph; but of this there was no proof. He held, indeed, that it might just as reasonably be expected that the poison of scarlatina or measles would have lost some of its force as that the virus of the lymph should deteriorate. Then it was declared that it was not clear syphilis was not introduced from a syphilitic offspring into a non-syphilitic offspring. Now, he would not deny that this might occur; but then he would urge that calf-lymph was not altogether safe. He could declare that not one of the inferences of the report had been borne out, with the exception of that with regard to the vaccination of a non-syphilitic child from a child which had syphilitic taint; but even in this matter he would remark that the French authorities had vaccinated many children from syphilitic persons, and none so vaccinated had taken the poison with the vaccination. Then Dr. Warlomont had talked of coming to the "pure and simple calf", saying that there could be no deception with the animal. Mr. Greene remarked upon the insusceptibility of the calf; and Dr. Warlomont had acknowledged that, in consequence of bad health on the part of animals, they had not always produced the effects he had expected. It was necessary, therefore, that the profession, on being asked to adopt matter from the bovine race for the vaccination of humanity, should look into the nature of the diseases to which the bovine race was subject; and perhaps some members of the profession would hear with surprise that there were more diseases among the bovine animals than there were among even pigs; for, though pigs were dirty in their habits and feeding, yet the bovine race was subject to such diseases as the murrain, for instance, which would swiftly sweep away whole herds. Then there was the foot-and-mouth disease, the entozootic asthma, pleuropneumonia, the class of diseases called charbon, splenic apoplexy, and the hoose, or husk. He proceeded to speak of the action of these diseases in detail; and said that, though it was not pretended that they could be communicated to the human body, yet, as their presence in the animal betokened impoverished blood, it would be improper to take matter from the animal so diseased, and transmit it into the human frame. He dwelt upon the characters and qualities of other diseases to which the bovine species were subject, as the milk-fever, the garget, glanders, and occasional inflammation of various kinds, and held that the entozootic asthma might become communicable to mankind. In continuation, he criticised the work of animal vaccinators, and contended that they were most careless, inasmuch as they snipped off from the animal which had been inoculated the whole vesicle, blood and all. Under these circumstances, he thought it was wonderful that something dreadful had not resulted in the communication of bovine disease. He charged the animal vaccinators with being animated by a trading spirit—that their philanthropy was in connection with their pocket. He added that he was not opposed to animal vaccination as such; but he thought it would be ruinous to vaccination to introduce it in this country, for there was a feeling among the lower orders of this country that this was an endeavour to introduce matter from the brute creation into the human body. He

knew that the people were ignorant, and that their idea on this subject was mere prejudice; but they had come to this conclusion; and, if it were attempted to bring about the legalising of animal vaccination, there would be muddle and confusion, which would be injurious to vaccination, and so injurious to the public at large, and to the science of medicine which had laboured to advance the health of the public.

Dr. WYLD remarked that Dr. Crisp had spoken at length upon the variety of diseases to which the bovine race was subject; but would Dr. Crisp have it inferred that the calf could come under the hands of the vaccinator at two periods, and be subject to diseases which would not be apparent to the vaccinator?

Dr. CRISP replied that he could believe that the calf might have some forms of disease which would not be apparent.

Dr. WYLD asked if Dr. Crisp really meant to say that a calf could have diseases which would not be patent to the eye of a veterinary surgeon?

Dr. CRISP said that the animals were supplied by the butchers, and were not seen by the veterinary surgeon.

Dr. WYLD denied that this was the case; and said that the objections urged by Dr. Crisp were of no value, inasmuch as if animals were affected with disease, it would be easily discoverable, and they would not be used by the vaccinator for his operations. Then, with regard to Dr. Crisp's allegation that it had not been difficult to obtain lymph in periods of epidemics, his own experience was the reverse; for, when he wrote to the *Times* saying that he could give supplies of lymph, he had four hundred letters at once begging for supplies. With regard to the action of animal vaccinators being due to the "philanthropy of the pocket", all he could say was that, so far as he was concerned, he was free from that aspersion, for he had lost at least £200 a year by his supplies of animal lymph.

Mr. BAKER, a barrister, then rose, and desired to address the meeting.

The CHAIRMAN informed the meeting that Mr. Baker was a gentleman, not connected with the profession, who held very strong views on the subject of vaccination—views which all there would respect. Mr. Baker had attended on what he termed an "invitation"; but what he had shown was an unaddressed card. Mr. Baker had been informed by letter that the meeting was a medical meeting; and that the subject to be discussed was the one which the programme set forth—whether the profession should urge upon the Government and the legislature the extension of the vaccination system by the adoption of means of animal vaccination. To this subject the meeting must be confined; and Mr. Baker could not claim to be heard in a meeting of professed medical men on a medical subject.

Mr. BAKER still asked that he should be allowed to read a paper, saying that he had been allowed to second Dr. Crisp's motion at the last meeting for the adjournment of the debate.

The CHAIRMAN, supported by the meeting, declined to hear Mr. Baker, Dr. CRISP observing that no professional meeting of barristers would tolerate a doctor intruding on them in the discussion of a point of law.

Mr. HENRY LEE said that any resolution of the meeting would doubtless have great influence upon the Government Board, upon the profession, and upon the public. But, in order that it might have that influence and that weight, it was necessary that the question should be considered in all its bearings, and a sound and deliberate judgment

given. There had been several statements made in the course of this debate which had not been calmly considered, and which, if they went forth to the public without that consideration, would tend very much to prejudice the object, namely, to ascertain and to satisfy the public as to the actual facts of the case. Professor Simonds, in a very able and interesting speech, had given his opinion that small-pox and the vaccine disease depended upon one and the same poison. If that opinion were endorsed by the meeting, it would have the effect of making many practitioners and a very large section of the public wish to have the lymph which they used removed, as far as possible, from its original source, namely, small-pox; and would be one very practical reason against the adoption of a resolution in favour of animal vaccination. Professor Simonds had asked why the disease did not appear in the bull? But the very same difficulty, if difficulty it were, presented itself whether the disease were called small-pox or cow-pox. If variola could be communicated to the cow, why not to the bull? It was stated at the last meeting that the vaccine-disease was of vegetable origin. If that were so, it appeared to afford a simple, and perhaps a satisfactory, answer to the supposed difficulty. No animal had so large a surface of bare skin habitually exposed, with the influence of warmth and heat, to vegetable action. The bare skin of no animal was left so long in undisturbed contact with the ground. Again, it had been said that the identity of the two diseases was shown by their having on some occasions appeared at the same time. But this surely was what was observed in all diseases of the same type. When erysipelas was rife in hospitals, it was not surprising if, at the same time, there should be a larger proportion of cases of puerperal fever, of peritoneal inflammation, of pyæmia, or of scarlet fever. But surely no one would conclude that, therefore, these were all essentially one and the same disease. It had been said that the question of animal vaccination should be discussed apart from any collateral questions. Vaccination in its various forms has been so discussed since the time of Jenner; and the public at large, or rather a section of the public, especially in some of the midland counties, were not satisfied. In Mr. Simon's report upon the subject, there were several medical men mentioned who had given it as their opinion that they had seen syphilis follow vaccination. Those, therefore, who had stated that they had never seen it had proved that they had not had an opportunity of seeing any large number of patients at the time that syphilis after vaccination naturally developed itself. But there could not be a large proportion of medical men, engaged in extensive general practice, and who knew the disease, who had not seen a syphilitic eruption follow vaccination. The very great majority of these cases consisted of instances of hereditary syphilis, where the fresh action in the patient's system had developed and given fresh life to the latent disease. Such a contingency was not to be overlooked by medical men; for they were sure to have the credit of having introduced the poison into the child's system. It had also been assumed that Mr. Hutchinson's series of cases were the only ones in which syphilis had been introduced, for the first time, into a patient's system by vaccination. As a matter of fact, the possibility of such an occurrence was now universally acknowledged. In 1862, Mr. Lee published a series of facts connected with this subject; and these, as far as he knew, had never been disputed. He had seen only one case in which syphilis, as far as could possibly be ascertained, was introduced in this way. But, as Professor Simonds observed at the last meeting, one affirmative was worth more than a thousand

negatives. In such circumstances, it was a clear duty to acknowledge the facts as they stood, and, if there were any dangers in vaccination, to explain to the profession and to the public how they might be avoided. The confidence of the public would never be gained by ignoring well-known dangers. But if these dangers were freely acknowledged and guarded against by medical men, the people would then trust their safety in their hands with regard to this, as they did in all ordinary medical affairs. If the lymph, and the lymph only, which had been elaborated in a vaccine vesicle, were inoculated upon a healthy person, the vaccine-disease only would be produced. But, if any elements of the blood (not the red corpuscles only) were introduced at the same time, then another disease might be communicated. Cases had been recorded in which a patient had been vaccinated from another, who in a few hours had developed symptoms of small-pox, and yet the patient vaccinated had had the cow-pox only. The milk of a syphilitic mother or nurse would not communicate syphilis unless there were some abrasion on the nipple, and the pure lymph from a syphilitic child would not communicate syphilis unless mixed with some element of the blood of the patient from whom it was taken. Cases had been recorded where, soon after vaccination, symptoms of small-pox had appeared. Each disease had run its course quite independently of the other, and exactly in the same way as if the other had not been present. If the product of the two had been inoculated upon different healthy patients, who had previously had neither disease, the result would have been quite different. The cases last referred to proved conclusively that the small-pox and the cow-pox were distinct diseases. Many years ago, the late Mr. Babington of St. George's Hospital told Mr. Lee that he recollected the vaccine vesicle as it was in his younger days. It was then, he said, usually much larger and much more fully developed than it was at the time at which he spoke. His observations would refer to about the beginning of the present century. Some change, therefore, had taken place since then. He had one other remark to make, namely, that, inasmuch as vaccination produced a blood-disease, it must extend to the whole of a patient's system, and that whether one inoculation were made or five. If one pock ran its course fully without being interfered with, the patient's system was as fully protected as if a dozen were made. The fact that practitioners often inoculated at five different points indicated an instinctive fear lest some should fail, which no doubt from various circumstances often happened. Taking all these circumstances into consideration, he was firmly of opinion that vaccination was the greatest blessing that medicine had conferred on man; that, like all other great remedial agents, it had its dangers; that if those dangers were acknowledged and guarded against, vaccination was quite safe; that there was a tendency in the vaccine lymph, after passing through a great many generations, to lose something of its power. He would, therefore, heartily support the proposal in favour of animal vaccination, with the single suggestion that the lymph should be passed through two or three calves before it was used on the human subject, because, should the lymph be mixed with any other poison when conveyed artificially to an animal, and should the products be directly reinoculated on man a few days afterwards, another disease might thus be communicated, as happened in the case of M. Diday, who inoculated himself from an artificial sore from the ear of a cat.

Mr. De Berdt Hovell said he could not agree with Dr. Crisp.

To follow his argument, one would almost be led to think that inoculation was calculated to have the effect of producing a number of diseases from the cow in the human subject. Vaccination had been the greatest boon to mankind, and it had been either successful or unsuccessful. If it had been entirely successful, and continued to be so, it was quite true that there was no necessity to reintroduce animal vaccination. If it had been partially successful, there might be a reason why animal vaccination should be reintroduced; but to his (Mr. Hovell's) mind, the only reason for having recourse to it again was that vaccination was the law of the land, and that many people objected to vaccination from other people's children. To such persons, operators were to have the power to say, "Vaccinated you must be; and if you do not like to be vaccinated from your neighbour's child, you must be vaccinated from the calf." He had never heard anything about what was done with the milk from these cows by the dairy people. There were no officers of health in former days, and if the milk were sold, there was no report, as far as he knew, that any sort of disease had been communicated to persons who partook of it. He had had a good deal of experience for forty years in vaccination, and would say, with regard to the two ladies whom Dr. Crisp mentioned, that their case did not enter into his mind as an argument against vaccination. Those ladies clearly ought to have been revaccinated. Dr. Jenner had not lived long enough to be convinced of the importance of revaccination. He (Mr. Hovell) knew some persons who had been vaccinated by his father, and when they were adults they required revaccination. He believed that more care was required on the subject. Vaccination must be done by certain rules. He had respect for the feelings of those who objected to be vaccinated from other people, and he thought they ought to have the alternative of being vaccinated from the animal.

Dr. COLLINS thought that, considering the vested interests that were at stake, and the legal machinery in existence, no subject required more cautious or delicate handling than the present; but facts were stubborn things. The matter under discussion was, in his opinion, really a question of fact, and one that required fully entering into. It was not his wish or his interest to condemn a practice that had been in vogue for the last eighty years, but simply to give the meeting the results of his experience from actual observation, and to elicit a fair and impartial judgment on this so-called protection. As a public vaccinator of twenty years' experience in London, he had had every opportunity of watching the progress and effects of vaccination, and of putting to every possible test its so-called prophylactic properties. After careful consideration, he abandoned the practice for the following reasons; that there was no certainty of action in the vaccine powers; that it often imported or called into activity diseases that would otherwise have remained dormant.

The CHAIRMAN reminded the speaker that, if he persisted in making an antivaccination speech, he was out of order.

Dr. COLLINS said he should come to the calf presently. He knew as much about calf-lymph and vaccination generally as anybody. If the Chairman ruled that these introductory remarks were out of order, he would refer specially to what Dr. Crisp had been saying, when alluding in a very pointed and graphic way to the communication of syphilitic diseases. Dr. Warlomont and Dr. Cameron had published that vaccination as now carried on was only too often the means of conveying syphilitic disease. With a view in some measure to palliate

the gravity of the charge, and remove the stigma from the lymph, and place it on the carelessness of the operator, many medical men and numerous text-books, in ignorance of the fact, and defiance of physiology, had stated that it was only when blood was conveyed through the vaccine virus that there was any danger of communicating syphilis. Now the veriest tyro in vaccination could tell that the lymph came from, and was part of, the blood; nothing separated the two but a thin capillary wall, through which passed the serum of the corpuscles with the greatest possible facility, and with them any virus, animal, vegetable, or mineral. Even supposing it was the admixture of blood that conveyed syphilis, he would ask this question: How were they to account for a syphilitic father infecting the mother, and the mother the offspring, for in neither of these cases was there an interchange of blood? The whole theory was untenable, and was as unsound as it was unscientific. With reference to small-pox statistics, they either proved that the prophylactic properties of vaccination were mythical, or that the lymph had become deteriorated. It had been abundantly proved by Drs. Ballard, Stevens, and Worlomont, and many others besides, that no deterioration had ever taken place. Such as it had been, such it was; and he claimed therefore to adopt the other alternative, and to say the prophylactic properties of vaccination were, and always had been, mythical.

The CHAIRMAN again called Dr. Collins to order, on the ground that he was wandering from the subject. Dr. Collins protested, but desisted.

Dr. ROBINSON said he was a general practitioner, and one of that large body of the profession who had to stand between the public on the one hand, and the repeal of an Act of Parliament on the other. He did not wish to say to people merely, "You must be vaccinated because it is the law of the land", but to give them a rational explanation. He had read in the *Times* the letters of Dr. Cameron on the subject; and, the subject having been introduced in that non-professional manner, the present discussion, although only in the presence of medical men, belonged to a wider circle than theirs. So long as the profession thought it fit or consistent to have one of its remedies enforced upon the population by penal enactments, it must submit to public criticism. Dr. Cameron charged the present system of vaccination with many serious faults, and said, in the first place, that it was not protecting the public against small-pox. He also said that the method was attended with the danger of transferring from child to child constitutional disorders. He likewise said—and it was a very serious charge to make if true; more serious still if untrue—that as a mere authority, apart from principle, the profession was not a safe guide to Parliament. He (Dr. Robinson) came to this conference anxious to see and hear that these three charges were met, first, by leading men of the profession, and secondly by the official medical men in connection with the Government department. He listened to Dr. Ballard, with respect to Dr. Cameron's charge that during the seven years since 1867 the small-pox mortality percentage had increased coincident with more vigorous vaccination as compared with the previous fourteen years, and he was sorry to say that Dr. Ballard, in attempting to answer it, answered it in what was somewhat of an imperfect way, for he said, "If you leave out the mortality of epidemic years and reckon only the mortality of the other years, then I shall show you that vaccination is diminishing small-pox." That would not satisfy the public. If they were to be protected, and if

they were to undergo punishment and danger, surely they ought to be able to be told that small-pox was being actually diminished in the country; not that they must leave out the epidemic years and reckon only the non-epidemic and mild years. He was not satisfied with the way Dr. Ballard met the charge of Dr. Cameron's figures, which seemed to be untouched. With respect to the second point, which had been dwelt upon fully by Mr. Lee and others, that the present method was attended by constitutional defects transmitted from child to child, as he read Dr. Cameron's letter, it seemed that the Bill was to do away with the method; because, if they were to use the calf as a store, or means of replenishing from time to time the stocks of lymph, there were just the same means of transferring from child to child constitutional defects under the calf arrangement as under the old system. He could not see how Dr. Cameron found it consistent with his letter to the *Times* to sanction a sort of mongrel method. Dr. Cameron, to be consistent, must say that no child should be vaccinated from another child, because, the moment you return to the present method, you have the danger of transferring constitutional defects; and therefore he could not see the soundness of the scheme that the calf was to be simply the mode of supplying from time to time the diminished stocks of lymph. It had been admitted, with the exception of two or three cases of transferring constitutional diseases from child to child by means of the arm-to-arm method, there could be none. He must remind Dr. Ballard and Dr. Stevens that Mr. Hutchinson, in his classical work on this subject, stated that the utmost precaution which was to be taken by medical men to avoid these lamentable accidents in future was, that the medical profession should be informed of the fact that there was the danger, and he lamented that there were still, at the time he wrote, some members of the profession either uninformed or unconvinced. It seemed that Drs. Ballard and Stevens were still unconvinced; he could hardly suppose they were uninformed. He preferred the authority of Mr. Simon to that of the gentlemen who at present represented the Government on the Local Board. Quoting the BRITISH MEDICAL JOURNAL, the speaker went on to say that it seemed to be admitted by Dr. Ballard and Dr. Stevens that syphilis could be transmitted from child to child; and it seemed to be admitted by Dr. Cameron that, so long as there was this danger, the public had a right to be satisfied on this question. But, if they went to the calf, what authority was there to say there was no danger? There was the remark by the editor that it was said that by using vaccine derived from the calf the objections to vaccination would be got rid of; but, if it were true that syphilis was communicated by vaccination, why not foot-and-mouth disease? Of course, such an argument had weight with him and men like him; but, when he came to read the BRITISH MEDICAL JOURNAL, he found the same editor saying that the idea of vaccination communicating other diseases was an exploded bugbear. If he (Dr. Robinson) now said that he could not justify the enforcement of an opinion formed in such a way by penal enactment, surely he was not unreasonable; and it was an unfair thing, on the part of Dr. Cameron, to go to Parliament and say that the calf-lymph would be free from the danger of the present lymph. This brought him to the third point, the objection that the authority of the profession, apart from the definite principle, had been greatly at fault. There was no denying the fact that no other remedy had been so long before the profession as the remedy of vaccination for protecting human beings against small-pox. The profession for seventy years sanction inoculation; but it had its

fall, and now inoculation was a misdemeanour. The profession in Jenner's time was warned that it diffused small-pox. It was warned seventy years ago that syphilis and other diseases would be transferred by vaccination. The arm-to-arm method had no sooner sprung up, than the objection was started by Cobbett, whose words were almost prophetic; when we read now what he said, he seemed to be a prophet. In 1853, vaccination was made compulsory, and in 1856 the objection to it came very strongly. The question was put, in 1867, to the profession, "Have you, from your information, ever seen or known syphilis transferred from child to child by a true Jennerian vesicle?" They said No. First, the vaccinators were applied to; then the men eminent in knowledge of syphilis; and then the heads of the profession. Dr. Watson said the question arose, Could the profession, on its mere authority, claim that the public should have enforced upon them another of its opinions by penal enactment with respect to vaccination? It was an unreasonable claim; and he would say to those who were present, apparently honestly believing that vaccination could protect against small-pox, whether the time had not come when they might safely say, "We will not depend on compulsion any longer". In Belgium, vaccination was not compulsory; neither was it in the United States. Dr. Warlomont came from a country where there was no compulsion. Was it not a fact that by a penal Act of Parliament they had killed the vitality of a remedy which, if left to the fierce competition of medical men, would improve and develop? The very fact that they went to Belgium and the United States, where there was no compulsion, proved this. It was a question whether they should not go to Parliament, and ask to make it a legal thing to take away compulsion. They would then be probably supported; but, if they went to Parliament to enforce their second scheme, they would place the profession in a doubtful position. He was not going to be guided in his opinion by negative evidence; but he asked whether it was wise to enforce by enactment? [The speaker was proceeding to discuss the question of compulsion, when the Chairman ruled that he was out of order.] Was the experience they had consistent with that doctrine? He alluded to the Blue Book on the epidemic of small-pox in 1873, when the disease was so virulent that people were seized who were supposed to be protected. He respectfully submitted that it was consistent with a system of transferring from child to child living disease matter, and, that being the case, the time had gone by when vaccination should be enforced by penal enactment.

Dr. HOGGAN said the question of compulsion was part of Dr. Cameron's Bill, and he hoped it would be made public that the question was not allowed to be discussed. According to the terms of the circular which had been sent out convening the meeting, this was one of the questions, and he hoped it would be made quite clear that the matter was not suffered to be discussed.

Dr. HOUGHTON said that, as to the character of the lymphs used, Dr. Watson stated he used small-pox matter for the purpose of inoculating cows or calves, with a view of producing what was called vaccine lymph. At the meeting of December 4th, there were several gentlemen who strongly maintained the view, that a proper and right way of obtaining vaccine lymph to replenish their stock, and having unexceptionable lymph, was to take small-pox matter out and inoculate cows or calves with it, and from them take the vaccine lymph. From Sir Thomas Watson's letter, it appeared this had been going on for forty years; so that there could be no doubt that there had been in cir-

culation a lymph obtained in this manner, viz., veritable small-pox lymph, transferred from cows and calves to human beings. The result of Dr. Warlomont's remarks was to take away any ground of objection to the use of lymph that syphilis might be transmitted. Dr. Cameron had alluded to the experiments of the Lyons Commission, and said that cow-pox was a disease occurring spontaneously in the bovine race. He went on to say that lymph taken from this eruption, inoculated in the human subject, produced a vesicle undistinguishable from the genuine vaccine lymph. Some gentlemen had gone so far as to say that Jenner was entirely mistaken as to the origin of the disease; that he got it by a disease in the horse, and this was transmitted by the milk or by actual contact. At all events, a great portion of the lymph now in circulation was supposed to be from this stock. With this original stock of Jenner, there was undoubtedly a large quantity of small-pox lymph, produced by actual inoculation with small-pox matter. There being no means of discovering what was the true source of the vaccine lymph to be offered to the public, a difficulty arose. Something was wanted which would be free from all objections on the ground of the possibility of skin-affections, or constitutional or enteric diseases, being transmitted. The white corpuscles in the blood, he had ascertained to be present in all specimens that were examined by a friend who undertook this special duty. These might carry any constitutional disease which was at all communicable. Therefore, there could be no doubt in the minds of educated people as to the possibility of such transmission. As it was out of order, he should not allude to what appeared in a medical paper in 1871; but, at all events, they looked forward then to a crisis such as was now at hand. The proposition, that the true origin and source of vaccine lymph was small-pox matter, merely amounted to this: If they could not get a pedigree of the lymph, why were they to regard it as at all different from the lymph in common use? There seemed to be a great tendency for the spontaneous cow-pox to disappear. A gentleman stood up at the last meeting, and stated he had been forty years a veterinary surgeon and he had never seen a specimen of the pox. [*Several voices:* "*There are plenty of them.*"] Whatever cases were used for the purpose of furnishing an entirely new stock for a whole nation would have to be, like Cæsar's wife, above suspicion; and the public, who were looking on with the greatest possible interest, were anxious to read a correct report of the proceedings at these meetings, and would naturally want to know what was vaccine lymph—was it small-pox again; was it, in fact, carrying out the law by breaking the law; was it diluted small-pox, or cow-pox, or something totally distinct, viz., the original vaccine disease which Jenner introduced for use as a protection against small-pox? The public would demand a reply to this question, and would not be satisfied with being told it was a matter of detail. It was not only a matter of detail, it was the source of the whole question; and if it were not answered satisfactorily, not only the unreasonable section of society, but the reasonable section, would take a different view. The Irish Local Government Board had pronounced against the use of calf-lymph, and had written an official letter to the Galway Board that such a thing must not be done, as it would perpetuate small-pox.

Dr. BALLARD said he was not going to reply to all that could be said: but, with reference to the last matter to which Dr. Haughton referred, the stock which was produced by Mr. Ceely, Mr. Marson of the small-pox hospital, who, if ever there were a judge of vaccine, was that judge, used some of that lymph himself. It was introduced by him. This

stock was continued for fifteen years, and during that time there was no evidence whatever that it was small-pox matter that was being used. If this were small-pox matter, it would have been small-pox qualified with primary pox, and then the secondary eruption.

Dr. STEVENS said he came originally with one purpose only, and tried as carefully as he could to keep everything he said to that one point. He objected to the Bill brought in by Dr. Cameron as being, as he (Dr. Stevens) said, illogical and mischievous, and on that point alone he spoke. Of course, incidentally he had had to try to answer some of the objections made to the present system of vaccination, and he did so as well as he could; but it seemed that everything he said was misunderstood—even Dr. Warlomont misunderstood him. He had not said a word against the calf-vaccination. He never in his life heard a paper that he admired more than that of Dr. Warlomont. He had had very little experience in calf vaccination; but he had come to this conclusion—it might be as good as the arm-to-arm system; sometimes it was not so good; sometimes it was alleged to have advantages over it; but this he was not satisfied about. Dr. Warlomont seemed to think he (Dr. Stevens) disbelieved him. He did nothing of the kind. If the Government liked to start a centre for the distribution of calf-lymph in London, it would be a very excellent thing for supplementing the supply of the lymph under the present method. But what he meant to convey to the meeting was, that, if Dr. Cameron's Bill passed, giving the option to everyone to be vaccinated from the calf, they could not supply the want thus created. If that Bill passed, Government would be faced by an expenditure a hundred times greater than at present. There were ninety-three public stations in London. At each of those there were over twenty persons applying daily for vaccination. Mrs. A. or Mrs. B. would say, "I will have it done from the calf". The immediate reply would be, "Very well; I have some calf-lymph, which I have just got from the calf". "Oh no", would be the rejoinder, "I must see the calf—the animal". Then people who wanted to use calf-lymph, or people who had an objection to vaccination on all grounds, would avoid vaccination; and it would be utterly impossible to meet such a difficulty as that. There had been some other statements of his misunderstood; for instance, he had been accused of having stated that syphilis could not be conveyed by vaccination. He never said a word of the kind. What he said was, that the danger was so infinitesimally small, that it did not call upon the Government to upset the very excellent plan of vaccination we had now in operation. He believed in vaccine lymph, and in the natural law of like producing like. He believed that natural lymph could no more produce an unnatural disease, than that a duck could be got out of a hen's egg; but as he understood from reliable authority that syphilis had been conveyed by vaccination, he was not going to deny it; but he said now, as he had said before, that the risk was infinitesimally small; that the Registrar-General sent to the Local Government Board's office all the registrations of deaths that took place which were referred to vaccination as a cause. He inquired into these, and he had never been able to trace any one of those deaths to disease communicated by vaccination. They had constant allegations made that such and such a child in such and such a neighbourhood had received a filthy disease by vaccination; and whenever such an allegation was made, he and his colleagues had inquired, but they had never been able to trace syphilis to vaccination. That was all he said, and all he wished to say.

Dr. WYLD observed that, in the United States of America, 200,000 children were vaccinated from calf-lymph, and the Government could produce enough calf-lymph to sell it at threepence a head. Persons wishing to have their children vaccinated with it would willingly pay for it, so that the Government would not be put to any expense.

Dr. STEVENS said he had inquired into it in three quarters of England at the request of the Government, and he knew very well that the people would not be satisfied. The people who demanded calf-lymph were the very people who wanted to evade vaccination, and they were the authors of this movement. Here was a plain statement of it on the tracts published, and these were the persons they would first of all have to deal with.

Dr. WYLD replied that that might be the statement of the people who wrote the tracts; but he knew a great many who were antivaccinators, but had no objection to vaccination from the calf.

Mr. GREENE (Birmingham) said the meeting had already given him an opportunity of expressing his views, but he had something to say in which he would not repeat himself. He had to congratulate himself that many of his remarks at the first meeting had been endorsed by speakers at the second and present meeting. The remarks of Dr. Stevens he considered most appropriate and fortunate. What he wished particularly to advert to now, was the presumed fact that small-pox and vaccination were alike. It seemed strange that men should, at the present time, say it was an open question—that they should go abroad to France, to the futile and speculative experiments of a Frenchman, and take possession of the inferences he entertained, regardless of those valuable and most beautiful and industrious experiments made by Mr. Ceely, which thoroughly and entirely exhausted the subject to any intelligent mind. He (Mr. Greene) had himself produced lymph from small-pox, and it had produced nothing but cow-pox. He could see that with his own eyes, and any other professional man could see there was nothing else in it. This matter had been continued for six months by a public vaccinator, and during that time he was not able to detect the smallest difference. Last time he spoke, he ventured to state that he had no doubt there were many surreptitious cases of producing this metamorphosis. He had received that morning a letter from a leading surgeon in Derbyshire, a man of mature years, who said, "Dear sir, in reply to your note received yesterday, I beg to say that, seventeen years ago, when small-pox was rife in this locality, and not being satisfied with the vesicles produced by lymph I got from London, I inoculated a heifer belonging to Miss —— with matter taken from a variolous patient in the vesiculous stage of the disease. The result was, a crop of vesicles on the teats very like ordinary vaccine vesicles, which ran the same course and became pustular on the eighth day. This experiment, although not made in the interests of science, established in my mind once and for ever the identity between small-pox and the vaccine disease. The constitutional disturbance in the heifer was very marked, and in consequence of this the bailiff would not allow me to make any further experiments. From the lymph of the heifer, I obtained good vesicles in three instances, and two of these cases were very ill at about the time of the secondary fever." He would like also now, having said thus much, to place on record, in opposition to a remark of Dr. Crisp, that he had inoculated a great many animals—approaching four hundred; and in children, in the course of ten years' experience, he had never

seen one child that had been in any way affected except being vaccinated; and if these terrors were so common as Dr. Crisp would lead them to suppose, surely in that time he (Mr. Green) would have seen some occurrence of them. The terrors which the debaters put before them were enough to make people refuse to drink milk or eat beef. The discussion had wandered over a great tract of matter, and he thought he should consult better the feelings of the meeting if he did not make any further remarks. He was quite satisfied to draw the meeting's attention to the basis of vaccination—that it was small-pox they had to deal with, and that if they wanted to protect from small-pox they must give small-pox. It was true that it was not an entire protection; but, as like cured like, it seldom happened that a person having small-pox had it a second time.

The CHAIRMAN: We shall now close the meeting; and, in doing so, I have only to say that the meeting was called by the Parliamentary Bills Committee, because we considered that the question was one as to which there were a great many persons in the profession specially capable of affording valuable information, and that they were not within the Parliamentary Bills Committee. A conference such as this is outside the usual practice of that committee, which includes representatives of every branch and a number of members elected by the Association; but, although the Committee is so constituted, the subject is one which demands special expert knowledge. The Committee, therefore, were of opinion that there would be an advantage in asking the experience of a considerable number of members of the profession —all those, in fact, who could bring special information to bear upon the discussion. I think we may congratulate ourselves that we have had a considerable amount of valuable and very weighty matter for consideration, conveyed by persons who have given life-long attention to this subject, and who have afforded us extremely instructive information. It is unnecessary that I should recapitulate the names of all those; but I cannot allow this conference to close without expressing thanks to Dr. Warlomont for the trouble which he took in coming over and communicating his experience derived from unique experiments in this matter. Then we have had great advantage from the experience and skill of Sir Thomas Watson, Dr. Ballard, and Mr. Ceely of Aylesbury, who has unique experience and reputation on the subject. To Mr. Greene and many others we are also indebted; and I may mention Dr. Stevens's speech, without which it would have been difficult to arrive at a just conclusion on such a topic. Had the meeting concluded on the last occasion, as I thought it probably would, when we had a full assembly, I should have submitted a resolution which would have been handed to the Parliamentary Bills Committee; but, as we have arrived at a late stage of the third adjourned meeting, when there are but few members of the Association remaining present, and as it is a mixed assembly, I think it would be useless to submit a resolution, inasmuch as it would not be an expression of the opinion of the whole conference, but the partial opinion of a small number of gentlemen left in this room. The Committee will have the duty imposed upon them of drawing from the report of all that has been said and done at this meeting the conclusions arrived at, and they will also be required to find what those conclusions are and to act upon them. I shall now make one or two observations as to what has occurred. I cannot but think that the whole course of the discussion has been very markedly to strengthen the

conclusions that, in some form or other, it will be the duty of the Government to arrive at a solution of the question, in what way and to what extent our system of vaccination may be strengthened by introducing animal vaccination as a source of improvement to the vaccine lymph. I myself am gratified, and I imagine the majority of this meeting are gratified, with the observations of Dr. Ballard and Dr. Stevens. We have heard the last observations of those gentlemen; and I am satisfied with them, because they appear to me to show that, at the conclusion of this conference, these gentlemen—who are not after all merely the official representatives of the Government, but also men of particular, unique, and life-long experience in the matter—have arrived at the conclusion that the introduction of calf-lymph is a thing not only permissible but advantageous, and that it is only an open question in what manner that advantage may best be conferred. Dr. Ballard told us that he was of opinion, and had long been of opinion, that it was not only permissible for public vaccinators to improve their stocks, when they found the humanised lymph failing, by having recourse to animal lymph, but that he encouraged them to do so; and Dr. Stevens told us finally that he did not desire to be understood as disputing any of the conclusions and experiences of Dr. Warlomont on animal lymph, but only as doubting whether it would be possible to introduce it so generally as to meet the requirements of the population when that system was adopted; or whether any attempt to introduce it on a scale sufficiently large would not involve too great an expense. Those, of course, are questions which it peculiarly behoves the Local Government Board to consider, before entering upon a system such as that which has been discussed. I must say that, in the Report which I had the honour of presenting to this conference as the basis of discussion, what was advised was not the introduction of compulsory vaccination by calf-lymph, but the introduction of a Central Station for calf-lymph, which might be distributed as a means of strengthening the sources from which persons might be vaccinated; and in that I did not go the extent of saying that everyone should have the right of demanding to be vaccinated with calf-lymph, but only that the public vaccinators should have adequate supplies of it. As to the administrative difficulty which Dr. Stevens has just stated, that everyone would require to see the calf, I do not think that difficulty would occur to anyone who has seen the system in actual operation. For instance, I have seen in the same city, at Brussels, within a quarter of a mile's distance of each other, the two stations for vaccination, the establishment of Dr. Warlomont, and the station of Dr. Janssens, the communal station at the Town Hall, provided by the city itself. At the station of Dr. Warlomont, the calf is on the table, and the parents have not only the option of having the calf-lymph, but they see the calf, and the vaccination takes place, the calf being present. At the other station this is not the case. The children come into a large room for vaccination, and they are vaccinated from *plaques* which are sent from Milan. The parents do not see the calf. But the number of persons who come to the latter place are considerably more than those who come to the place where they have the opportunity of seeing the calf; so that they do not manifest any preference for having the calf before their eyes. It is also a matter of experience in the same country, that the demand for calf-lymph on the part of parents is limited to a minority. It is not the fact that animal vaccination is universal in Belgium, although everyone could have calf-lymph by asking for it. But the majority of people are reasonable,

and are satisfied with the lymph taken from arm to arm—from children seen, examined, locally known by the vaccinators—and it is only a limited number of people who desire to have the specific guarantee which they derive from calf-lymph. I have no doubt whatever that the same would be the result of its introduction here; that, if Dr. Cameron's Bill were to become law, with the saving proviso that no one at any station should have the right to demand calf-lymph without giving a week's notice, so that the public vaccinator should not be taken at a disadvantage, I believe that it would be amply sufficient to prevent an excessive demand for calf-lymph, or any administrative difficulty Dr. Stevens fears. That is my experience abroad; and that, I believe, would be the experience of practitioners here if Dr. Cameron's Bill pass. Finally, I have to say that, in my endeavours to keep this meeting to the subject-matter which it was called to consider, I hope I have not unduly stretched the authority of the chair. I have had sometimes to be more firm than I wished to be; but I hope it will be considered that I only wished to keep the meeting in order.

A vote of thanks to the Chairman was proposed by Mr. J. N. RADCLIFFE, who said the meeting was under peculiar obligations to him for the valuable Report by which he had facilitated its proceedings, and for the firmness and courtesy which he had shown under occasional circumstances of some difficulty. This was seconded by Dr. HOGGAN, and carried.

6·VI·35