ON THE WORKING OF THE VACCINATION LAWS.*

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THE subject on which, Mr. President, you have requested me to speak this evening is the Working of the Vaccination Laws; and to that subject I shall strictly confine myself.

Compulsory vaccination in England dates from a quarter of a century ago, and the law has in that time passed, if I may so say, through three stages. The first Act, passed in 1853, directed, under penalty, the vaccination of infants at an early age; without, however, designating the local authorities who should put the law in force or the sources from which the expenses of so doing were to come, and without providing any adequate machinery of registration. By a short Act, passed in 1861, power was given to boards of guardians to pay out of the poor-rates for prosecutions undertaken under the Act of 1853, and to appoint persons to prosecute; otherwise the law underwent no considerable change till 1867. It was in that year enacted that boards of guardians not only *might*, but *must*, see the law enforced; the power, however, to employ officers specially for the purpose being still left permissive. A workable machinery for the registration of successful vaccination was then for the first time provided. In 1871, the law took its present shape. The employment of vaccination officers in every union was then made obligatory, and these officers were subjected to instructions to be issued by the Local Government Board. Further improvements were made in the machinery for registering vaccination and in other details.

Each of these measures was attended with a great degree of success. The Act of 1853 produced immediately a considerable increase in the amount of vaccination done in the kingdom, though, from want of a proper registration machinery, it is impossible to say exactly *what* increase; and it produced also this most important result—that, whereas before its enactment the vaccination of children had been left as often as not till they were above a year old, vaccination from that time forth was, and has continued to be, habitually performed in early infancy. It was to the representations of the Epidemiological Society, who insisted on the serious consequences arising from procrastination, and who called prominent attention to the fact that one-fourth of all the deaths from small-pox in England which occurred at that time were in children under one year old, that this great improvement was chiefly due. Systematic practical working of the compulsory law, however, only began with the Act of 1867; and the results of the power—which had been given, indeed, in 1861, but which had only come practically into use under the Act of 1867—to local authorities to appoint special officers for the purpose of this working, were soon seen so remarkably in the places where these appointments had been made, that the Parliamentary Committee, which sat in 1871 to inquire into the operation of the Act of 1867, did not hesitate to recommend that the appointment of such officers be made universal throughout the kingdom. This was done in the Act (passed in 1871) on that Committee's Report.

Since this last Act has come into operation, we have been able to know exactly how we stand with regard to the vaccination of our infantile population. From the beginning of January 1872—*i.e.*, for the last six years and upwards—there has been a regular registration of the vaccination of all infants whose births had been registered, and the result is put annually before you in the Report of the Local Government Board, showing that all registered births are within 5 per cent. accounted for, and finally accounted for, in respect of vaccination; more than 95 per cent. being entered in the registers either as having been successfully vaccinated or as having died in infancy without vaccination. The 5 per cent. which remains includes the temporary entries in the vaccination-register as of the children whose vaccination was, at the time of the return, postponed on medical certificate; it must include many cases actually vaccinated, though the vaccination certificate has not been transmitted to the vaccination officer; it must include many who have died in districts other than those in which the births had been registered, the death not having been notified to the vaccination officer of the district last named. The proportion, therefore, remaining alive and actually unvaccinated, and endangering the community by their want of vaccination, must be very much smaller than the 5 per cent. here indicated.

This account must surely be regarded as highly satisfactory. But is it wholly so? By no means; for the result I have been giving you is the result for the *kingdom at large*—the average of all the districts,

good, bad, or indifferent, as the case may be. There are whole counties, and there are large and important towns, which account for all their births within 2 per cent. or less; there are others where the deficiencies are 6 and 7 per cent. There is this vast metropolis, which, if we take it as a whole, is simply, I am sorry to say, the worst in England, the deficiencies amounting to 8.8 per cent. There is, therefore, a task remaining to be accomplished; viz., to bring up the bad districts to the standard of the good. Not that it is possible to have the same standard for all classes of districts. To expect it would be most unfair. It is not for a moment to be supposed that, in towns like London or Birmingham, children can be traced as easily as they can in, say Hertfordshire or Bedfordshire; or that even large towns may not present important differences one from the other, specially as to the migratoriness of their respective populations; but differences so considerable as those to which I have had to refer as existing between London and some of our large towns, as, for example, Leeds and many of the large and populous towns of Lancashire, in which the proportion of births annually unaccounted for is brought within 2 per cent., are not to be accounted for by mere difference in the habits of the population. In London itself, the results in different unions have been found to differ greatly. The great facility of passing from district to district in the metropolis interposes unusual obstacles, indeed, to the ready working of the Vaccination Acts, and necessitates an extraordinary degree of promptitude and vigilance on the part of the vaccination officers; and of these officers personally there is, I believe, in general, little or nothing to complain. Some of them are, I know, officers of great excellence; but I fear there are not enough of them for the vast amount of work to be done. There are in London but thirty-six officers altogether—a force which, relatively to the amount of births to be looked after, is, even apart from the existence of special difficulties, when compared with the force employed in the rest of the kingdom, very small. Hence the requirements of the instructions given to the vaccination officers to look up each case in default *as soon as the default arises*—*i.e.*, as soon as a child has passed three months of age without vaccination—cannot in London be fully carried out. Frequently children are not inquired about till they are six or seven months old, and thus the mass of unvaccinated children is unduly swollen. Moreover, in the interval, it not unfrequently happens that removal has taken place and the children cannot be found at all. Such defects, then, and others which may exist in particular districts, require correction before we can be completely satisfied with the present working of the law. They are, so far as they occur, defects, not of the law itself, but of its local administration.

And now with regard to the extent to which we may expect that these compulsory provisions of the law, properly carried out, will give us protection, present and future, against small-pox. It is of great importance that these expectations should not be exaggerated. In the first place, it will be seen that the law does not make vaccination universal; it cannot do so. Children are born every day, and I do not believe that any attempt to diminish the time allowed them for primary vaccination would be tolerated. There must always, then, be a stock, which even in large towns would be at the least a three months' stock, and in rural districts a larger proportional stock, of unprotected babies inevitably on hand; for, if many infants are vaccinated, as we know they are, *before* the expiration of the legal period of delay, there are more who are allowed to go somewhat beyond that period before the vaccination is performed. Besides these, we must have, as endangering us for the while, the postponed cases. Then we have, as a more permanent danger, the cases called insusceptible (quite unprotected, as I need not say, against small-pox), happily not many, and, so far as they exist at all, an opprobrium to us. And, lastly, we have the cases—destined, I hope, to become fewer and fewer every year, but of which we must always have some—who escape our notice altogether. The actual number of births hitherto unaccounted for annually in England and Wales has been about thirty-five thousand, of which no fewer than nine thousand have been in London alone. These are by no means, as I have explained, all living and unvaccinated; but there are more than enough of them who are so, fully to account for the six hundred deaths and upwards from small-pox which have occurred between one and five years of age in the present epidemic of that disease in the metropolis.

As to actual protection at the present moment of the population of England by vaccination, we must remember that we have no exact knowledge of that portion of them which is over six years of age.

Second only in importance to the necessity for the vaccination of all children at as early an age as can be effected, as a safeguard to the country against small-pox, is that of having them all thoroughly vaccinated. This is a point on which, I cannot doubt, all here present are agreed. The "due and efficient" performance of the vaccination

* Read before the Metropolitan Counties Branch.

was a cardinal point with Jenner, insisted on by him throughout his writings; but researches made and experience acquired since his time have extended the meaning of these words beyond that which Jenner attached to them, and have given us a standard of success which we must be careful to observe. I cannot but think it a great cause for gratitude, that the magnificent and till lately quite unique resources of the London Small-pox Hospital should have fallen into the hands of a man so able to appreciate the uses (beyond those of the mere treatment of disease) to which they might be put as our late lamented friend James Furness Marson. His retiring habits kept him much from the world; but he has left behind him work entitling him to the gratitude of all mankind. The task he set himself to perform, in determining the influence on the course of small-pox which vaccination, and different degrees and kinds of vaccination, had on persons who, after having undergone the process, had still the misfortune to contract small-pox, was one which called for qualities which he pre-eminently possessed. The most painstaking accuracy of observation, perfect exactness in recording, a power of weighing facts and not merely counting them, sagacity in deduction, with ingrained habits of caution, were all his; and by the steady application of these qualities to the examination of several thousand cases of small-pox in sixteen years, during which there was scarcely one day without recorded observation, he was able to arrive at conclusions on the subject of his studies which he felt he might safely put forward as unassailable. Another sixteen years' observations of the same kind did but confirm those conclusions. The standard which he thus established must ever be our test when we use the words "successful vaccination". Vague applications of that term (such as, I am sorry to say, I see even now, and not unfrequently) can no longer be tolerated.

The extensive official inquiry into the state of vaccination in England which was made in 1860-64, disclosed the very imperfect way in which, according to this standard, vaccination had been performed; and it disclosed also that, notwithstanding that several years had elapsed since Marson's observations had been given to the medical profession, its adoption was but very slowly finding its way into practice, whether public or private. The arrangements, too, under which public vaccination was performed were not found to be such as were most conducive to its successful performance. Under the Act of 1867, therefore, power was taken to regulate public vaccination with special reference to its quality; and regulations were issued—(1) for reconstituting the arrangements for its performance so as to obviate to the utmost the necessity for the use of dry or otherwise preserved lymph, and to secure its habitual performance from child to child under the best conditions of selection of lymph; (2) for requiring of all public vaccinators such performance of the operation as was necessary to the attainment of the required standard; and (3) for making a part of the payment for public vaccination dependent on the quality of the vaccination done. The effect of these regulations has certainly been to produce a most remarkable change in the efficiency of the vaccination now publicly administered.

The time for testing this vaccination in its influence over small-pox epidemics has not yet come. The vaccinated persons who died from small-pox during the epidemic of 1871, and also those who have died during the recent, or I should rather say the present, metropolitan epidemic, have been almost without exception persons above fifteen years of age, and whose vaccination dates long anterior to the changes of which I have been speaking. It is the past, not the present, vaccination which has been on its trial: the vaccination such as was described in the Reports of the Medical Officers of the Privy Council, 1860-64.

The public vaccinators of England have for some years now been subjected to systematic inspection, and from this we are able to affirm that great improvement to which I have referred as having taken place within the last eight or ten years in the quality of the vaccination so done. The genuineness of the vesicles habitually produced, their sufficient number, their regular course, and their characteristic cicatrices, are attested. It is certain that our defences against small-pox, as dependent on the quality of vaccination, are much in advance of what they were; and, as time goes on, the proportion of the population not merely vaccinated, but thoroughly vaccinated, must be a constantly increasing proportion. Imperfections in individual cases there must sometimes necessarily be. The best vaccinator, operating under the best conditions, may in particular cases fail to produce the full effect he desires; and, when the conditions of working are inferior, when preserved lymph has to be used instead of lymph from the arm (as in rural districts must in many cases be), then cases of comparative failure will, of course, be more common. The assertion is not of the universally, but of the generally, satisfactory result. In estimating, however, the effects of these improvements on the protection of the population at large, we must bear in mind that one-third of the primary vaccination

of England is not public vaccination, and that of this third we can give no account. So far as concerns personal carefulness and a knowledge up to the science of the day, we have no right to suppose that the vaccination of private practitioners would, as a rule, be found behind the public work; but, in regard to the arrangements most conducive to the success of vaccination, private practitioners must necessarily stand at a disadvantage. I am afraid this disadvantage sometimes is very considerable and of serious effect. I will give one illustration. In 1874, there were certified in this metropolis two hundred and fifty-one cases as legally insusceptible of vaccination. They had been vaccinated three times without success; but they remain quite unprotected against small-pox. I will undertake to say that none of these cases had been vaccinated at a public station. There is one further drawback to which I must allude, operating still, I fear, in particular places in some parts of the kingdom, in which a certain class of practitioners make vaccination easy by performing it at a low fee inefficiently—*i. e.*, by one or two punctures only.

These sources of occasional imperfection—wherever they occur—render more urgent the application of that process of further security which I do not think should be omitted even in the most perfectly vaccinated, to the importance of which the profession are becoming more and more alive, and which they are more and more advocating every day: the process of revaccination—revaccination not practised spasmodically, if I may so say, at times of present alarm, but revaccination practised regularly and systematically on each person as he grows up.

Revaccination of the general population is not in England compulsory, nor do I know that it would be wise to require it; but there are many ways in which it might with great advantage be made so indirectly. In the military and naval services, and also, I believe, in some branches of the civil service, it is an essential condition for employment. It should be made so throughout the whole civil service, and in all factories, workshops, and establishments under any degree of public control. Large employers of labour have great opportunities (the exercise of which is, I need not say, entirely voluntary) of assisting in this way; and these it is especially desirable they should use constantly and regularly, though it is usually only in times of panic that they are willing to use them at all. Even for this we must for the present be thankful; but what we want above all things is to get *systematic* revaccination established—to get it to be looked for as regularly at fifteen or sixteen years of age as the primary vaccination of an infant is at three months. The law provides for every individual a right to a gratuitous primary vaccination, and to a gratuitous revaccination at the public cost; and it is of the utmost importance that the two kinds of vaccination should proceed regularly together, dependent as revaccination must always be on a supply of primary lymph.

In proportion as we shall succeed in getting the foregoing systematic measures adopted (and we are already, as regards most of them, marking distinguished success), so shall we be free from alarms consequent on epidemics of small-pox. I do not say that we shall get rid of epidemics altogether, for an universally protected population I can hardly conceive; but we shall be taking away from them the pabulum necessary to their extensive diffusion.

The laws which determine the intensity of particular epidemics of disease, whether of small-pox, scarlatina, measles, or other diseases of like kind, are to a great extent unknown to us. We know not why towards the end of the seventeenth century (there was no inoculation then to account for it) small-pox should have been so much more fatal than at the earlier part of the century. Inoculation doubtless had its part in causing the small-pox mortality of the latter part of the eighteenth century to be greater than that of the earlier part; but I doubt if that will account for the whole difference. And now, towards the end of the nineteenth century, we witnessed lately an extraordinary and worldwide extension of the disease, exceeding in intensity anything known since vaccination was introduced. Why was this? We know not; the matter is not within our control. *But what is within our control is our defences.* On looking back at the history of that epidemic, to draw what lesson we can from it, we find that where these defences were perfect, according to the rules I have laid down, they stood us in perfect stead. The intensity of the epidemic, the disproportionate number of malignant cases, caused the death-rate, indeed, in proportion to cases, to rise beyond the average in all persons attacked, whether the unvaccinated, the badly vaccinated, or the well vaccinated, but the *relative proportion* was preserved. The deaths among the well vaccinated were very few indeed; and among the successfully revaccinated, as far as we have any opportunity of knowing, scarcely any at all. The serious mortality in that epidemic in the vaccinated, or so-called vaccinated, was the simple result of our vaccination having been left to take care of itself, and, therefore, of our defences not having been in proper working order. So, also, as far as I have been able to learn,

with regard to the vaccinated in the present epidemic in London, which has manifested the same malignant character as that of 1871, but which has been attended, however, with much smaller mortality, doubtless because the prior epidemic had caused so large a number of the susceptible to become secure against future infection, either in having then contracted small pox or obtained revaccination.

The gist of these observations has, you will perceive, been to induce you mainly to rely on a continuance of the system now in progress, with such improvements in administration as may be shown to be necessary, as our best security against future small-pox. The task we have before us is to build up a properly protected population. Epidemics of small-pox may be looked for, and perhaps for some time to come epidemics which may cause some considerable mortality; but severely fatal epidemics should by-and-bye be made to cease from amongst us. We are in possession of the means, if we rightly use them; not, perhaps, that we shall ever make such perfect use of them as to leave nothing to be specially done when an epidemic arises; but that special work will be brought within reasonable limits—limits such as will render its performance of easy attainment. Special provision with regard to vaccination, at times when small-pox is epidemic, is, I need not remind you, within the regulations issued under the Acts now in force.

ANIMAL VACCINATION.*

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By the courteous invitation of this the Metropolitan Counties Branch of the British Medical Association, I possess the valued privilege of expressing before you in a brief manner my opinions and views upon the subject of animal vaccination. My experience has not been very limited. I commenced the practice shortly after its introduction into this country by Dr. Blanc, and continued it more or less assiduously for eight years, during which time I either inoculated or experimented upon about four hundred animals chiefly with Belgian lymph.

I approach the matter to-night in the character of one having a profound conviction of the value to mankind of the great discovery of Jenner, and with an equally strong conviction that we have not yet reached perfection in its administrative application. I desire that a fierce light should shine on this new movement of animal vaccination that shall make manifest alike its weakness and its strength. Since the passing of the first Vaccination Act, it seems to me that the profession have ceased to exercise that high interest and activity in the matter which characterised the early years of vaccination, and have rested securely cradled in the thought of departmental infallibility; but, at the present time, a new desire has arisen, shared in by the present eminent adviser of Her Majesty's Government, to examine the subject afresh, to mark defect, and find a remedy. It may be hoped that such a spirit may lead to the capitulation of the anti-vaccinators by punishing them with a famine of reasons.

I hold the opinion that, if it can be found possible to improve a little further our present arrangements, we shall be enabled almost wholly to banish small-pox from the land. In the considerations which will here arise, the question of lymph-supply goes at once to the root.

If it be proposed by anyone that animals should be made to afford a large portion of this supply, and that a considerable percentage of the population should be protected by direct inoculation, I would immediately reply in the negative; it would be cumbersome, expensive, and, in fact, impracticable for many reasons. I feel sure this position does not require elucidating in this room; but, as used in a limited manner and for a special purpose, I desire to advocate the supply of lymph from animals. I allude to the advantages the method presents of an ever-flowing fountain of lymph of a relatively high standard of activity for the renewal of stocks at any time, when opinion or accident makes it requisite. Now, passing over for a moment certain important matters involved in this proposition, I think it possible that the detail could be so arranged that, whilst fulfilling the above splendid duty, it would at the same time discourage any wide tendency on the part of the public to have recourse to it in a too frequent or unnecessary manner, which would soon result in the destruction of the chief function warranting its existence. For instance, by limiting the production of cow-pox to one establishment for the whole kingdom, the undesirability of adopting that lymph for general vaccination would be proclaimed of itself; that a few sought and obtained vaccination in this manner would be merely a necessary incident, and careful restrictions might be trusted to prevent any excess in the number without impairing the liberty of those whose minds were set upon it, or

who entertained a fanciful or conscientious objection to hominal lymph. This is a matter of administrative detail not at present in discussion.

To proceed: the question of having occasional recourse to new stocks divides itself into two parts: 1. Whether science tells us as a fact that it is necessary for the preservation of power; 2. Whether, on any other grounds, it is expedient. To answer the first in the negative would not necessarily nullify the latter, whilst to answer it in the affirmative would involve it. To attempt to decide the leading question is to enter upon an endless struggle of argument and statistics out of which can proceed no definite issue which should stand spotless from doubt. Dogma is a poor refuge from this dilemma; the evidence thereon is, like the cow-pox itself, having an effect which is the mean between inoculability and receptivity, and so will perpetually vary with us individually.

It would be an uncongenial task for me to compile or tabulate the various facts I have read, or to quote opinions; all these are public property. I will not weary you with a twice-told tale; for the same reason, I will not again go over the ground taken by myself in the pamphlet I wrote in 1870, on *Good Vaccine Lymph*; still I must make a few remarks upon the point.

It is a fact that a number of authorities, each equally reliable, industrious, and trustworthy, have investigated the subject of lymph-degeneration, and have come to diametrically opposite conclusions. Now, many of these conclusions do not admit of an easy explanation in an adverse sense, or of a matter-of-fact explanation at all; so that we are bound to the logical inference that there are circumstances influencing the history of contagium (be it dead or living) of which we are ignorant—a truism you will say. Yes! But in argument we are apt to forget it, and build a house on sand. We have yet to learn the mysterious agency which decides the advent of an epidemic of small-pox, measles, or scarlet fever, or influences their disappearance or decline. Of the causes of their varying malignancy at different epochs, and eccentricity of incidence, we know little beyond certain subsidiary facts of local hygiene. It is not more certain that the amount of that peculiar material in the human organisation upon which variola thrives differs in individuals at all times than that it does in populations at diverse times, and, as the intensity of the effect of an inoculation of cow-pox must be the means of the exciting power of the contagium and the receptivity, it follows that, during periods when the latter is low, successive and frequent inoculations of the same lymph must result in an average reduction or degradation. Careful selection doubtless will diminish the rate of, but cannot extinguish, the process. This slow alteration may be going on in one district and not in another; or all over the kingdom imperceptibly at one time and not at another. Thus only is it possible to account for conflicting evidence where no other explanation is obvious. Thus will it seem easy to produce a vaccinoid affection bearing the same hastened relation to fresh Jennerian cow-pox as varioloid affections have to typical variola. Jenner himself has stated that a bad inoculation of variolous matter itself will not protect from variola. How much less, then, must a mere vaccinoid inoculation! In this way do I account for the large number of persons found badly protected at this late date in the history of the prophylactic.

But, if we remove the vexed question of renewal from the ground of personal conviction to that of balanced evidence, we reach the neutral zone of doubt; and here I venture to think that common sense may and will come to the rescue of perplexed science, and answer the second part of my proposition as to the expediency of renewal in the affirmative, assuming that we have the power to obtain the right article. This expediency is demonstrated by the fact that hundreds of medical men whose opinions have been formed by their own meditations and experience earnestly desire this renewal, and also thousands of the instructed part of the community at large. That there are no means available for doing so, is a plausible ground for complaint in very wide circles. It is not imperative to examine the varied reasons upon which the demand is founded; but it exists, and I affirm it can be met.

We will pass over the history of animal vaccination, from its origin in Naples and importation into France, to its development in Belgium and the United States of America. Suffice it to say that it is known that, with a sufficient capital and assiduous care, a continuous supply of animal vaccine may be afforded. It is in the character of a witness as to the qualities of this virus that I have the honour to be present to-night. In the first place, however marked are the differences between children vaccinated by the same lymph, the differences in calves are greater. Here lies the difficulty of lymph-cultivation upon the animal. It is the most care-compelling pursuit I can think of, requiring, in addition, capital and every material convenience. Looking, then, to the fact that its perfect cultivation is dependent upon human judgment and circumstance, and not upon a natural process, I cannot conceive how the assertion can be justified that cow-pox on calves, being on its own natural soil, can never change. As for the argument of "natural soil",

* Read before the Metropolitan Counties Branch.