SECTION OF STATE MEDICINE.

COMPULSORY RE-VACCINATION: A SOLUTION OF VEXED QUESTIONS RELATING TO SMALL-POX.

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So long as a community remains susceptible to small-pox the supposed aërial convection of the virus or poison of that dread disease and the isolation of small-pox patients are questions which must have a very lively interest for the public as well as for the medical profession.

The conflicting evidence given by medical experts on the question of the aërial convection of the *materies morbi* of small-pox has seriously influenced important legal decisions within the past few years.

In February, 1904, a case bearing on the subject of the danger of a small-pox hospital to the surrounding community came before the Chancery Division of the High Court of Justice in England, Mr. Justice Farwell presiding (*The Attorney-General v. The Mayor and Corporation of Nottingham*).^a This was a "Quia timet" action to prevent the defendant Corporation from using as a small-pox hospital a building which they had recently erected in the parish of Bulwell, within the borough of Nottingham, on

^a The Law Reports of the Incorporated Council of Law Reporting 1904. Vol. I. Page 673, *et seq.*

the ground that the hospital was both a public and a private nuisance. The hospital premises were within half a mile of Bestwood collieries and within a quarter of a mile of certain iron-works. The hospital itself was within seventeen yards of a public road. In addition, a considerable number of people either lived or worked within a short distance of the hospital premises. The plaintiffs were the Attorney General at the relation of several owners and occupiers of land and collieries in the parish of Bestwood. They alleged that the maintenance and use of the hospital caused grave danger of the spread of infection, and they claimed an injunction accordingly. The hospital accommodated from 30 to 40 patients. Expert evidence was given on both sides. The principal witnesses for the plaintiffs were Dr. Thresh, Medical Officer of Health to the Essex County Council; Dr. Chalmers, Medical Officer of Health for Glasgow; and Dr. M'Vail. For the defendants were Dr. Boobyer, Medical Officer of Health for Nottingham; Dr. Hope, Medical Officer of Health for Liverpool; and Dr. Reid, Medical Officer of Health to the Staffordshire County Council.

The judge found, as the result of the evidence, that the site of the defendants' hospital was carefully chosen, was in a proper situation, and constituted no appreciable danger to the public health and no nuisance to the relator plaintiffs' property. On the question of the aërial dissemination of small-pox, the expert evidence was equally balanced for and against, and Judge Farwell agreed with Lord Justice Bowen's opinion in another small-pox hospital case that it is no part of the functions of the Court to qualify itself as an expert in science. The Court acts on the opinion of experts whose qualifications can be tested by cross-examination, and weighs the evidence so given and tested. The result was that the action failed and was

dismissed with costs, the question of the actual danger of a small-pox hospital remaining legally undecided.

To quote one other case nearer home, the action of the Attorney-General for Ireland *v.* The Urban District Councils of Rathmines and Pembroke was tried in the Dublin High Court in 1904 before the Right Hon. Hedges Eyre Chatterton, the then Vice-Chancellor.^a The Urban District Councils in question had established in February, 1902, a Joint Isolation Hospital for small-pox and other infectious fevers at Vergemount, Clonskeagh, Co. Dublin. The site selected was in a populous neighbourhood, and abutted on public and private roads and on an electric tramway. There was a population of 750 persons within a quarter of a mile, and a population of 2,682 within half a mile, of the proposed site. An injunction was granted.

Against this decision the District Councils appealed, and, on hearing the case, the Court of Appeal reversed the Vice-Chancellor's judgment, and quashed the injunction. This was largely due to the conflicting medical evidence which was given. Dr. E. W. Hope, Medical Officer of Health for Liverpool, in particular testified that there was no evidence to show that the isolation small-pox hospitals in that city had in any way disseminated the disease.

In giving judgment in the appeal case, Lord Justice FitzGibbon said that "to sustain the injunction, the law requires proof by the plaintiff of a well-founded apprehension of injury—proof of actual and real danger—a strong probability, almost amounting to moral certainty, that if the hospital be established it will be an actionable nuisance. . . . The decision depends upon the facts proved in the particular case, with due regard to the opinions of experts so far as they are founded upon facts; but with

^a The Irish Reports, published under the control of the Incorporated Council of Law Reporting for Ireland. 1904. Vol. I. Chancery Division Page 161, *et seq.*

due regard, also, to the decisions of other Courts pronounced upon similar evidence in other cases.”

The Lord Justice went on to say:—

“It seems probable that the dread of small-pox is to a great extent the result of tradition; that scourge of the eighteenth century retains its terrors for those who do not realise that it has been deprived of most of its terrors. Vaccination is not only a preventive—it also modifies the disease. The evidence even of Dr. Thresh is that vaccination and re-vaccination at proper intervals confer ‘practical immunity.’ In applying the maxim *sic utere tuo ut alienum non lædas*, the duty of reasonable precaution for one’s own protection is not to be ignored. An Isolation Hospital reduces the risk for every inhabitant of the district—it is, in fact, a necessity; and though the individual must be protected, the public advantage should not be forbidden unless the danger and injury to the individual are clearly proved.”

In conclusion, the Lord Justice held that the action must be dismissed on the ground that no real danger had been proved. The other members of the Court concurred. They were Lord Justice Walker (now Lord Chancellor of Ireland) and Lord Justice Holmes.

Notwithstanding Dr. Hope’s opinion and the judgments I have quoted, there can be no doubt that the doctrine of the aërial convection of small-pox is widely accepted by the medical profession both at home and abroad. Writing in “Nothnagel’s Encyclopædia of Practical Medicine,” in 1902, Dr. H. Immermann, of Basle, observes:—“Of the greatest importance for the epidemic spread of the disease is the fact that the contagion existing in the pock-contents is volatile (*contagium volatile*). This signifies that the specific agent possesses the power, by means of effluvia from the patient, of mingling mechanically

with the surrounding atmosphere and of infecting the air to a distance. This volatility is not only a property of the contagium of small-pox but it is so to a very high degree, and on this peculiarity rests the great danger of infection. This danger is naturally greater where many patients are crowded together and where the eruption is extensive. For a susceptible person, the danger is greatest if he comes often to, or stays long in, a small-pox locality or in the neighbourhood of a small-pox patient, while with increasing distance the 'chance of acquisition' rapidly lessens. But the vitality of the volatile variola poison is so great that pathogenic transmission of it for great distances (100 metres and over) through the open air is by no means unheard of."

This is not the place to discuss at length the question of the aërial convection of small-pox. Suffice it to say that a doctrine which was held by such a master as the late Sir Richard Thorne Thorne, and which has received support from the investigations of Mr. W. H. Power, the very able Medical Officer of the English Local Government Board, Dr. G. S. Buchanan, one of the Medical Inspectors of the same Board, Dr. John Thresh, Medical Officer of the Essex County Council, and many others, is deserving of full consideration.

During the last epidemic of small-pox in London, which began in August, 1901, and continued through a large part of 1902, practically all the cases of the disease were brought by the River Thames Ambulance Service to three hospital ships of the Metropolitan Asylums Board, which were moored off the South Bank of the Thames in Long Reach, opposite the districts of Orsett and Grays, in South Essex. Between September, 1901, and June, 1902, these districts sustained a severe outbreak of small-pox. Throughout the period of the epidemic a large number (usually

between 100 and 300) of acute cases of small-pox were under treatment on board the hospital ships. Dr. Thresh has given an account of the behaviour of small-pox in past years in the Orsett Union, and has shown that the disease has been introduced into the district at Purfleet on many occasions when the hospital ships contained notable numbers of cases of London small-pox.

Here is Mr. Power's opinion of the evidence furnished by the Orsett outbreak:—

“The operation of these ships in this way—certainly in 1901-02, if not always on previous occasions—can only be thought of as a matter of aërial transmission of infection. There was no traffic or communication whatever between the hospital ships and the northern shore. The account of this outbreak, when considered along with the data accumulated with regard to various small-pox hospitals in different parts of the country, affords an interesting illustration of the conditions which I have shown, in reports to the Board in 1886, to have occurred around London hospitals of the Metropolitan Asylums Board in former years, when these hospitals were used for the isolation of acute small-pox cases.”

An important leading article on the spread of small-pox from hospitals appeared in the *Lancet* for January 12, 1906. The writer considers that the facts regarding the outbreaks of small-pox in the Orsett Union in Essex in 1901-02, and in Felling in 1903-04, are hardly capable of any other explanation than that afforded by the doctrine of aërial convection. The story of the latter outbreak, as told by Dr. George S. Buchanan, of the Local Government Board, is very striking. The urban district of Felling adjoins Gateshead, and the Gateshead Hospital is situated near the boundary line. Traffic to and from the hospital is all from Gateshead. Felling cases go to a hospital of

their own, and no convenient route from the affected part of Felling passes the Gateshead Hospital, which is situated on out-of-the-way rising ground. Yet the Feiling small-pox epidemic mainly attacked not its most populous part near the Tyne, but the higher and comparatively open country to the south, particularly a village less than half a mile from the Gateshead Hospital—a village lying in the path of light south and south-west winds blowing across the hospital towards the village. The small-pox incidence on dwellings within half a mile of the hospital was about three and a half times that on the dwellings farther away, and no one of the wards in any part of Gateshead or Felling had so high a rate of small-pox as the half-mile area, the nearest approach to that rate being experienced by a Gateshead ward, which had many dwellings within a mile of the hospital.

In answer to a query addressed by me to him for the purpose of this communication, Dr. John Marshall Day, the Registrar and Resident Medical Officer of the Fever Hospital and House of Recovery, Cork Street, Dublin, writes as follows, under date February 2, 1906. It will be seen from his letter that Dr. Day is of opinion that the facts observed in Dublin in recent outbreaks of small-pox point to the dissemination of the disease by “contacts” and fomites (or infection carriers) rather than through the atmosphere (aërial convection):—

“The reason we ceased to admit cases of small-pox was that the Irish Local Government Board, impressed by the aërial convection theory, came to the conclusion that Cork Street, being in the city, was not a suitable place for the treatment of that disease, and urged this view on the Corporation. The latter body finally settled on the Pigeon House site as the best and most suitable they could obtain. I believe the Local Government Board based their opinion

on the admirable report of the late Sir Richard Thorne Thorne.

“In 1887-8 we treated and stamped out an outbreak of small-pox, which, fortunately, was limited to twenty persons. In 1892 there were two cases. In 1893 one case. In 1894-95 there were 796 cases. In 1895-96 there were 216 cases. In 1896-97 two outbreaks occurred, embracing three or four cases respectively. Since 1897 we have had isolated cases of small-pox in the hospital and at Beneavin, the Convalescent Home of the Hospital at Glasnevin, Co. Dublin, but no considerable outbreak.

“In the years 1894-96, although the numbers were so high, we did not find any difficulty in preventing the spread of the disease to the other patients, although in many cases we did not re-vaccinate them—a practice which was put in force only during the latter part of the epidemic.

“Some of the non-variola cases developed the disease after admission, but in all such cases we were able to trace the source of infection to outside causes—for example, coming from infected houses, contact, &c. In one case—that of a scarlatina convalescent—there was direct contact through disobedience of the patient. This patient was sent back to us a fortnight after leaving with small-pox. During the last epidemic we traced all the cases to direct contact with the infected area or with infected clothes. In the 1887-88 outbreak we also traced all cases to direct contact, although several of the cases were admitted from localities that were free from infection.

“There is no doubt that the last epidemic was stopped by the vigorous action of the sanitary authorities, who isolated the sick, segregated the ‘contacts,’ re-vaccinated wholesale, and paid frequent house-to-house visits in the infected areas.

“We shall not in future admit any case of small-pox,

as the Isolation Hospital at the Pigeon House will admit all cases occurring in the city as well as in the districts of the North and South Dublin Rural Councils."

The English and Irish Local Government Boards have, not without reason, practically accepted the doctrine of the aërial convection of small-pox as proved. For some years the English Board, at all events, have framed their regulations for the hospital treatment of the disease accordingly. The following is an extract from the memorandum of the Local Government Board for England "On the Provision of Isolation Hospital Accommodation by Local Authorities (1902)":—

"Hospitals for Small-pox.—In view of the frequently-demonstrated liability of small-pox hospitals to disseminate that disease to neighbouring communities, and in order to lessen the risk of such occurrence the Board require the following conditions to be complied with in the case of small-pox hospitals provided by means of loans sanctioned by them:—1. The site must not have within a quarter of a mile of it either a hospital, whether for infectious diseases or not, or a workhouse, asylum, or any similar establishment, or a population of as many as 200 persons. 2. The site must not have within half a mile of it a population of as many as 600 persons, whether in one or more institutions or in dwellinghouses. 3. Even where the above conditions are fulfilled, a hospital must not be used at one and the same time for the reception of cases of small-pox and of any other class of disease."

These regulations—everyone of which, by the way, is violated in the case of the Clonskeagh Isolation Hospital, above alluded to—have caused great difficulty in providing hospital accommodation for small-pox in England. This difficulty does not exist in Germany. Hear Mr. W. H. Power on this point:—

“Disappearance from Germany of epidemic small-pox is a fact altogether without question. For more than a generation—ever since Germany adopted compulsory vaccination and re-vaccination—sanitary administration in that country has been practically untroubled by this disease. This freedom of Germany from small-pox has, it is asserted by objectors to vaccination, been due less to universality of acceptance of primary, succeeded by secondary, vaccination than to prompt systematic and vigorous isolation of each small-pox case as it arose.”^a

In the circumstances the Right Hon. Walter H. Long, who was at the time (1903) President of the Local Government Board for England, determined, partly in the interests of science, but mainly in reference to administrative and financial considerations, to ascertain through the Medical Department of the Board what in the present is the German method of dealing with small-pox outbreaks. Accordingly, Dr. R. Bruce Low, one of the Board's Assistant Medical Officers, having been furnished by the Foreign Office with necessary credentials to the German Government, visited Germany in the autumn of 1903 and made inquiry in certain representative towns of the chief States of that country as to current methods of suppressing small-pox.

In his report on the arrangements in Germany for the isolation of small-pox patients, Dr. Low gives, for purposes of comparison, the number of recorded deaths from small-pox in that country and in England and Wales during the twelve years 1891 to 1902 inclusive. In Germany, with a population of 56,367,178 in 1900, 607 deaths from small-pox were recorded in the twelve years. In England and Wales, with a population of 32,526,075 in

^a Report of the Medical Officer for 1903-04. Thirty-third Annual Report of the Local Government Board. Page xxxv.

1901, the deaths from small-pox in the same twelve years numbered 6,761. Had the mortality from small-pox been as low in England and Wales as it was in Germany, only 352 deaths would have happened in the twelve years—in other words, 20 people died in England and Wales of an absolutely preventable disease for every one victim of the same disease in the German Empire.

As a result of his investigations, Dr. Low ascertained that the machinery, preventive and other, for dealing with small-pox in Germany comprises:—

(1.) Compulsory vaccination of all infants before the end of the calendar year next succeeding that of their birth; and *compulsory re-vaccination* of all children in their twelfth year; compliance of parents with the above requirements as to vaccination and re-vaccination being enforced by fine or imprisonment.

(2.) Notification of all cases of small-pox.

(3.) Powers to isolate in hospitals cases of small-pox or of suspected small-pox.

(4.) Vaccination or re-vaccination of the “contacts” in small-pox-invaded houses, and, in some towns, isolation of such contracts.

With reference to measures of isolation Mr. W. H. Power informs us that, as Dr. Low ascertained, no specially provided small-pox hospitals exist in Germany, save in rare instances. In fact, owing to the system of vaccination and re-vaccination there in force, the demand made by small-pox upon isolation accommodation is so trivial that in the majority of places one of the pavilions of the “General Diseases Hospital” within the town has sufficed in all ways for dealing with small-pox emergencies.

Now and again, it is true, Dr. Low found a single pavilion nominally allotted for small-pox; but almost invariably such pavilion was, in the absence of small-pox,

used for the other and general purposes of the hospital establishment. Further, it appeared that such small-pox pavilion, even when in use for small-pox, was in most instances allowed to remain, administratively as well as structurally, one with the hospital establishment of which, in ordinary circumstances, is constituted a part. Similarly, it is not deemed needful in Germany, when small-pox is being accommodated in a section of a local hospital, to require re-vaccination of the hospital staff or of the "general" patients in the establishment, reliance against spread of the small-pox being placed on the routine statutory primary vaccination and re-vaccination that these persons have already undergone. Persons, however, who are of necessity brought into near and sustained relations with the small-pox patient, or patients in the hospital, have to submit to a further vaccination.

An excellent illustration of the trifling expense and trouble to which Germany is put in the matter of isolation of small-pox is afforded by Berlin, with a population of near upon two million persons. For this city the sole provision for small-pox is a pavilion, containing twelve beds, at the Royal Charité Hospital, which can accommodate at one and the same time some 1,500 patients suffering from a variety of maladies, medical, surgical, and other.

So far as Dr. Low was able to find out, and he was careful to make special and detailed inquiries on the subject, no serious inconvenience has at any time attended the method of small-pox isolation now adopted by Germany. Furthermore, it appears that all the officers and physicians with whom Dr. Low conferred on the matter were unanimous in attributing the immunity from small-pox enjoyed by the population in the neighbourhood of small-pox pavilions in Germany to the systematic enforcement of statutory vaccination and re-vaccination. But for this

antecedent precaution, all those persons agreed it would be necessary to establish, outside the town limits in each instance, a small-pox hospital, distinct and separate from the local hospital provided for "general" disease.

Some five-and-twenty years after the introduction of vaccination, the increasing occurrence of small-pox and varioloid among vaccinated individuals shook to its foundation the doctrine, held by Jenner and the pioneers of vaccination, that the vaccine disease conferred a life-long immunity against small-pox. Immermann shows that the re-vaccination movement had its beginning in the year 1824, and received decided impetus from the severe epidemics of small-pox which raged throughout the greater part of Europe in the following years up to 1833. To the States of the German Confederation belongs the credit of making re-vaccination compulsory in the army. The Würtemberg Government gave orders in 1829 that all recruits, without exception, must be re-vaccinated. This obligation was enforced by law four years later. Prussia followed only one year afterwards with a similar law (1834); then came Hanover (1837), Baden (1840), Bavaria (1844), and in succession the other smaller States.

Shortly after the terrible Franco-Prussian War broke out in the summer of 1870 small-pox appeared and soon spread over the greater part of Europe as a virulent and persistent pandemic. A notable exception to the widespread diffusion of the outbreak was afforded by the troops of the German Army, in which the number of individuals attacked and the mortality of the disease were markedly less than among the remaining population of the Continent. The French Army, on the other hand, suffered frightfully from small-pox, and, in fact, contributed largely to the dissemination of the disease among the nations of Europe. The absolute mortality from small-

pox in the French Army was nearly fifty times greater than that of the Germany Army, and the ratio of deaths to all the cases was at least twice as great.

A very marked, though less striking, difference was observed in the mortality from small-pox as it effected the army and the civil population of Germany.

On the favourable results of systematic compulsory re-vaccination in the German Army, the medical profession based a demand for a general Vaccination Law to be enforced throughout the newly-constituted German Empire. And so the "Imperial Vaccination Law" of Germany was approved by the Reichstag, April 8, 1874, and took effect April 1, 1875. Since the latter date there has been no great epidemic of variola in Germany, although cases of small-pox have occasionally been observed upon the exposed frontiers of the Empire. As regards re-vaccination, this great Statute requires that every pupil in public or private schools shall be re-vaccinated when twelve years of age if he or she has not had small-pox within the previous five years. If the re-vaccination is unsuccessful, it is to be repeated in the following year.

The law originally allowed the use of human vaccine lymph, lymph from an original case of vaccine disease, and bovine lymph from an artificially-transmitted vaccinia. When serious objection was urged to human lymph and retro-vaccine lymph on the ground of a possible transmission of syphilis, it was enacted in 1885 that the use of pure animal lymph should be gradually adopted. Now that the State Institutions for the production of vaccine lymph are able to supply the necessary quantity of pure bovine lymph the legitimate and regular form of vaccination and re-vaccination in the German Empire to-day is by pure animal virus. Immerman says^a:—"It might have been supposed

^a Loc. cit. Page 186.

that European countries generally would either have followed the good example of Germany, or have been stimulated to the production of still better legislation. Nothing of the kind has occurred, however, and at the present time Germany alone enjoys comparative immunity from variola."

THE PRESIDENT did not think that anybody who studied the question from a scientific standpoint could possibly have any doubt as to the efficacy of vaccination in the prevention of small-pox, and further expressed himself as agreeing entirely with the opinions held by Sir John Moore.

DR. DELAHAYDE held that it would be very difficult to enforce compulsory vaccination and re-vaccination in these countries, though he thought it would be easier to have such laws carried out in Ireland than in England and Scotland, as the people of Ireland were more inclined to take the advice of medical men on such subjects, and he further said that previous to attempting to obtain legislation we ought to endeavour to educate the public.

DR. T. P. KIRKPATRICK said that it was, in his opinion, a matter of complete indifference how small-pox was disseminated, because if the community was protected by vaccination and re-vaccination the disease could not spread.

DR. H. U. BYRNE spoke as a public vaccinator, and, while completely agreeing with the paper, he instanced the difficulty he had experienced in getting the workingmen to consent to be re-vaccinated, though they were quite willing that their families should be done. This difficulty was caused by their natural objection to be unable to go to work. He further held that there was no real objection on the part of the public in Ireland to vaccination, but went on to express his doubts as to whether the number and depth of the scars of primary vaccination were any guide as to the amount of protection enjoyed by the person.

SIR JOHN MOORE then shortly replied, and expressed the opinion that it would not be wise at present to advocate the bringing in of a Bill in favour of compulsory re-vaccination, although no opportunity should be lost of impressing on the public the value of re-vaccination as a preventive of small-pox, and the necessity for it at or about the age of 12 years.