THE PAST AND FUTURE OF THE CRUSADE AGAINST TUBERCULOSIS.*

BY

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WHEN invited to open a discussion on this subject I had little difficulty in consenting. Twenty years ago I had some slight responsibility for the initiation of a campaign against tuberculosis. One of its immediate results was the foundation of the National Association for the Prevention of Consumption and Other Forms of Tuberculosis, which at once set about stirring up the medical profession and the public to take effective action against a disease which claims more victims than any other to which the human race is liable. Among the measures which it vigorously advocated was the provision of sanatoriums, and in its second annual report, issued in 1901, it was able to point to the fact that the erection of a considerable number of such institutions was in progress. Another consequence of the crusade was the Congress on Tuberculosis held in 1901. Of that congress I have a vivid recollection, partly because it fell to my lot to act as secretary-general, but also because it was the occasion on which Koch startled the world with his heresy, long since exploded, that bovine tuberculosis is not transmissible to man.

Having these associations with a movement which has done not a little to stimulate and guide the modern methods of combating tuberculosis, it seemed to me that there might be some appropriateness in my undertaking to raise the question whether, after an experience of twenty years, we may consider that we are proceeding on the right lines.

Before that question can be profitably considered we shall do well to ask whether our theory of the conditions governing the dissemination of tuberculosis is sound and sufficient.

Until the *Bacillus tuberculosis* was isolated, in 1882, the main stress was laid upon the factor of heredity. Environment, in the narrow sense of climatic conditions, including dampness of soil, received recognition, but it was a recognition that largely took the form of protecting the patient as far as possible from the pernicious effects of fresh air. It was the era of the closed window and the respirator. With the demonstration of the microbic nature of the disease the stress was shifted to the factor of infection. Heredity was reduced to a diathesis, and at times even a diathesis was denied. For a time, too, environment fell into the background.

Of the three factors, the *environmental* has come to attain a much enlarged significance. Let us take it as connoting not merely a damp soil, atmospheric vicissitudes, insanitary dwellings, ill ventilated workshops, and unhealthy occupations, such as those in which the lungs are irritated by mineral or organic dust, but also under-nutrition, overstrain and exhaustion, alcoholism, and unhygienic habits generally—everything, in fact, which weakens the power of resistance to infection. It may be that even at the present time the predominance given to the element of infection is an obstacle to the full realization of the importance of environment. But if I read the signs of the time aright, the current is moving in the right direction. If average medical opinion has not yet implicitly accepted the recent dictum of Sir Douglas Powell, that if there were no dirty surroundings and bad habits of life, the infection of tuberculosis would almost cease to be operative, it is certainly travelling towards that point, and one of my objects on this occasion is to give an impetus to the movement. It is environment, in the comprehensive sense in which I use the word, that largely explains the rise in the phthisis death-rate in this country which has taken place during the war.¹ Compared with 1913, there was an increase of 1,582 deaths in 1914, of 4,621 in 1915, of 4,490 in 1916, and of 6,058 in 1917, due, in all probability, to the lowering of the nutritive standard, the severer strain of industrial life, and the depressing influences of widespread anxiety and grief.

With regard to the factor of *infection*, I have already suggested that it has received excessive emphasis. The statistics that have been published of healed tuberculous lesions found *post mortem* in those who have died from

other causes, and the enormous proportion of children who give a positive response to the tuberculin test, suggest at first sight that it is hardly possible to exaggerate the importance of infection. Of the former group, the most recent and most arresting figures are those published in 1917 by Reinhart of Berne, whose consecutive necropsies revealed evidence of tuberculosis in 96 per cent. In the latter group I need refer only to the figures of Hamburger and Monti, whose tuberculin tests, cutaneous and injectational, showed that 94 per cent. of Viennese children between the ages of 11 and 14 were tuberculous. In a sense, therefore, the infection of tuberculosis may be regarded as having a virtually universal prevalence. But we must distinguish between what I may perhaps term effective tuberculosis and a tuberculosis so slight as in many cases to escape clinical observation.

Metchnikoff's theory is that the cases of abortive tuberculosis are due, speaking generally, to attenuated strains of the micro-organism. The patient, usually in childhood, is infected by such bacilli, his powers of resistance enable him to repel the attack, and the antibodies evoked by the process confer upon him a measure of immunity against further attacks. Metchnikoff² cites his own experience in the following words:

At 23 years of age I married a young lady of the same age who was attacked by grave pulmonary tuberculosis. Her condition of feebleness was such that it was necessary to carry her in a chair in order to mount the few steps which led to the church where our marriage was to be celebrated. . . . My wife died of tuberculosis after four years of suffering. I passed the greater part of that time by her side in the greatest intimacy without taking any precaution against the contagion; nevertheless, in spite of these conditions, which were specially favourable for catching the disease, I have remained free from tuberculosis, and that during forty-four years since my marriage.

The inference Metchnikoff draws from his experience is not that tuberculosis is non-infective, but that, having suffered in childhood from scrofula—which has been observed to impart some degree of protection against phthisis—he had acquired an immunity that enabled him to resist the constant and massive infection to which his marriage exposed him. And while recognizing that "rational hygienic measures" have played their part in the reduction of the tuberculosis death-rate, he holds that much is due to "the unconscious immunization by the tuberculous vaccines scattered around us." I do not think we should be justified in accepting this theory without a much stricter scrutiny than it has yet received. It may not explain all the related facts; but it is at least suggestive, and if it encourages the search for a prophylactic, that will be all to the good. Whether or not it supplies us with the explanation of the difference between effective and abortive tuberculosis, it is obvious that infection in tuberculosis comes into quite a different category from infection in, say, small-pox or diphtheria. Owing to the ubiquitous diffusion of the contagium of this disease the community is constantly exposed to infection, and yet it is only a small proportion of the population that contracts effective tuberculosis.

We must be on our guard, therefore, against overstressing the factor of infection. Some have even gone so far as to demand the segregation of consumptives. When it was noised abroad that Chopin, during his residence in the Balearic Islands, was suffering from active phthisis he was turned out of the little house in which he was living; and in these days one hears from time to time of consumptives being made to suffer because of the exaggerated fears of those around them. If this tendency be not checked, tuberculous patients may come to be regarded with some measure of the repulsion which is felt towards lepers—a legacy from the days when leprosy was endemic in these islands. Some time ago the Royal College of Physicians deemed it expedient to issue a caution on this subject, and it behoves us to protest, whenever occasion arises, against the persecution to which tuberculous patients are liable. There is no cruelty so extreme as that which derives from fear.

I come now to the *prenatal* factor. In his brilliant little book on *Health and Disease*, in the Home University Library, Leslie Mackenzie expends a pretty wit upon the conception of a tuberculous diathesis. He asks whether the disposition to tuberculosis with which some people come into the world is an inherited variation of the germ plasm or a condition acquired from a tuberculous parent,

* Read at a meeting of the Tuberculosis Society, October 28th, 1918.

so that such children are born infected with the microbe or some of its toxins. That is a question which we are unable to answer, and it seems better, therefore, to speak of a prenatal rather than of an hereditary factor.

That tuberculosis "runs in families" has never been disputed, and the fact can only be explained by prenatal influence or by familial infection. The massive infection to which children living in tuberculous households are constantly exposed suggests at first sight that familial infection is a factor very seriously to be reckoned with. But this view appears to receive little support from statistics. Those of Goring, relating to all classes of the poor, indicate that the mate of a tuberculous person is no more likely to be tuberculous than any other person. Other statistics show that as the social scale rises the chances that a tuberculous person will have a tuberculous mate increase, but, as Professor Karl Pearson maintains,² to no marked extent, and only in about the same measure as in such obviously non-infective conditions as deaf-mutism and insanity. It is most unlikely that familial infection operates more freely among the well-to-do than in the crowded and less cleanly households of the poor, and it would seem therefore that the difference between the two groups may be largely accounted for, as the eugenists believe, by the principle of "assortative mating"—the attraction of like for like in both psychical and physical characters, a form of sexual selection that is mainly intellectual and is not met with among the poorest classes.

Turning now to the relation between tuberculous parents and their children, the statistics analysed by Professor Pearson suggest that a tuberculous father is twice as likely to have tuberculous children as to have a tuberculous wife, and that even at very early ages, when contact between mother and child is so close, the children of tuberculous mothers are only a very little more likely to be tuberculous than are the children of tuberculous fathers. As Professor Pearson asks, if in tuberculous families the main factor be infection, "why should the father and mother be equally influential with their children, and why should the father be twice as influential as the husband?" Now I do not assert that the statistics thus analysed are decisive. But they do suggest, I think, that pre-natal influence has more to do with the spread of consumption than we have of late allowed, and is a more potent factor in the dissemination of effective tuberculosis than is infection. If that apparent inference is to be negated it must be by statistics pointing to a different conclusion. Meanwhile, eugenists are certainly on the safe side in discouraging marriage among the tuberculous, and it is for the medical profession to consider whether a reversion to its older attitude towards this question is not required.

On the whole I do not see how it can be maintained that we have yet reached finality in determining the relative importance of the three factors under discussion. The older view, which made much of the so-called hereditary factor, may have had more truth in it than was too hastily assumed when the disease was proved to be microbic. The factor of infection has been overstressed, and environment probably accounts for a great deal more than the prominence given to infection has left us free to recognize.

Are Preventive and Remedial Activities on the Right Lines?

In attempting to answer this question a note of warning may in the first place be sounded against claiming too much for them. The success of the modern crusade against tuberculosis is sometimes said to be demonstrated by the steady fall in the tuberculosis death-rate during the five-and-twenty years preceding the outbreak of the war. But the fall began more than twice five-and-twenty years ago—long before our efforts took their present form. It began about the middle of the last century, and the rate of decrease among the white races generally appears to have been but slightly augmented since the initiation of the administrative measures directed specially against the disease.

Among those "rational hygienic measures" of which Metchnikoff speaks the first place must, I think, be given to sanatorium treatment. That it has fulfilled all the expectations cherished twenty years ago cannot indeed be maintained. Its striking effects in so large a proportion of

early cases, and even in cases somewhat more advanced, in arresting the progress of the disease, and leaving the patient in a state of apparent cure, led not unnaturally to its being hailed as an almost infallible agent in all but quite advanced cases. A more extended experience has shown only too clearly that the benefit derived from sanatorium treatment may not be maintained if the patient returns to an unsuitable occupation or an otherwise unhygienic mode of life. In an illuminating discussion on this subject organized by the Medical Society of London in November of last year, under the presidency of Sir StClair Thomson, while the value of this treatment was vigorously asserted, its limitations were freely admitted. No attempt was made to gloss over the fact that in many cases a return to urban industrial life is followed sooner or later by relapse. In the well-to-do, who return to an environment which is not unfavourable, and find it easy to conform to the prescribed regimen, relapse is much less frequent. Professor Pearson, who thinks very little of this treatment, concedes that where the upper and middle classes are concerned the sanatorium probably acts as a school of hygiene, and that is obviously a point of much importance. It is unfortunate that sanatorium statistics should be so incomplete. Their incompleteness arises partly from the great difficulty of following up the later history of cases for any considerable period, and partly from lack of control figures giving the results of extra-sanatorium treatment. Personally, having had some opportunities of seeing its effects, I can have no doubt of the value of this measure, subject to the qualification stated, and I rejoice to find that the number of beds in sanatoriums—public, voluntary, and private—has risen from 5,500 in 1911 to 11,893 in 1916, and this in spite of the check imposed by the war. But sanatorium treatment needs to be supplemented by a great extension of the farm colony system, in the interests of those for whom an outdoor life is a permanent need. And the crusade against an unhealthy environment must at the same time be energetically prosecuted.

With the farm colony may be bracketed the open-air school. The vicissitudes of our climate impose severe limitations upon this measure, but it also, like the farm colony, must be greatly expanded.

The dispensary system, of which Sir Robert Philip is the distinguished pioneer, is in the front line of our offensive, in the sense that by domiciliary visits of trained observers it seeks out cases in their earliest stages and brings them under treatment, at the same time seeing that patients observe the rules of treatment in the home, and correcting as far as possible environmental defects. Before tuberculosis was made universally notifiable it did good service in bringing cases to the knowledge of the medical officer of health. It does valuable work in assorting the tuberculous according as their cases are suitable for home treatment, or demand sanatorium or hospital treatment, or must be relegated to homes for the dying, as well as in designating children for attendance at open-air schools. Of late years dispensaries have been rapidly increasing in number—from about 30 in 1911 to 371 in 1917; but we must not rest satisfied until the country is covered with a network of these institutions, which, for the amount and value of the work they do, are probably the most economical of all antituberculous agencies.

A multiplication of homes for the dying is another of our needs. Quite rightly the statistician excludes sentiment from the working out of his problems, unless it be the very human sentiment of exulting over a defeated antagonist. To him tuberculous patients are but factors in a calculation, and one may admire the skill with which they are marshalled in serried ranks and manoeuvred across his pages. To medical men, whose office it is to alleviate their physical distress, they are stricken fellow creatures, and I am sure that a demand for more of these beneficent institutions where they may end their days in such comfort as their sufferings permit will evoke a sympathetic echo in any medical assembly.

Of treatment by tuberculin I need say little on this occasion. It had an unfortunate beginning. The inflated claims made in its behalf, and the rashness with which it was used, inevitably provoked a violent reaction against it. Gradually, however, it has been finding its true place. In diagnosis it is eminently useful, and as an adjunct of general treatment in carefully selected cases its value is in my judgement established.

I have not scrupled to admit that our knowledge of the conditions under which tuberculosis is disseminated is far from complete. But I hold that, in spite of the imperfection of our theory, the means by which we seek to control the disease are justifying themselves. We shall do well, therefore, to carry on the campaign with undiminished vigour upon the same general lines as at present, ready, however, to receive new light when it comes, and to adjust our measures accordingly.

If the proof that in the main our activities are well directed is less absolute than could be desired, it is chiefly because of that statistical insufficiency which so often applies an abrupt check to the exploration of public health questions. The need will never be met until Parliament sees fit to create a Ministry of Health, one of whose functions it will be to collect statistics bearing upon all the aspects of tuberculosis at which I have glanced, and to subject them to a skilled analysis that will elicit their true significance. Not until then shall we be within sight of a complete solution of the problems presented by tuberculosis.

REFERENCES.

¹ Supplement to the Forty-seventh Annual Report of the Local Government Board, 1917-18. ² *Bedrock*, January, 1913. ³ *Tuberculosis, Heredity, and Environment*, by Professor Karl Pearson, F.R.S. 1912.

TREATMENT OF ANTE-NATAL AND POST-NATAL SYPHILIS.*

By JOHN ADAMS, F.R.C.S.,

MEDICAL OFFICER IN CHARGE OF THE THAVIES INN VENEREAL CENTRE FOR PREGNANT WOMEN.

BEFORE proceeding with the practical part of my paper I desire to say a few words on the origin of what is the first and at present, I believe, the only hospital of its kind:

Following the issue of the Royal Commission Report on Venereal Diseases, the Guardians of the City of London Union were invited to consult informally with Sir Arthur Downes and Mr. Oxley of the Local Government Board upon the best ways and means of providing, staffing, and equipping a centrally situated institution for the reception and treatment of parturient women suffering from venereal disease. Several conferences and meetings were held, and suggestions were considered that a portion of the Thavies Inn establishment, the property of the guardians, might be adapted with advantage for these cases. On April 11th, 1916, the Chairman of the Thavies Inn Committee reported that the Local Government Board had decided to make an order to carry out the above suggestions, and that the Metropolitan Asylums Board should arrange with the City of London Guardians to receive and treat such cases at Thavies Inn, the actual cost to be made a charge on the metropolis generally. These proposals were agreed upon and a specially trained matron, sister, and nursing staff, with myself as medical officer in charge, were appointed, and the hospital was duly equipped ready to receive patients on September 1st, 1917.

The institution provides for 20 beds, and contains a lying-in room and an operating theatre; it is managed by the guardians of the City of London, who take a keen and progressive interest in its working and results.

Since the opening, thirty cases of pregnant syphilitic women have been admitted, and in this paper I wish to deal with these cases only and to reserve for a future date any remarks I may wish to make regarding patients suffering from gonorrhoea.

The most practical way of dealing with the subject will, I think, be to give an account of every case of syphilis which has been admitted to the hospital, including details of the treatment before and after delivery, and the treatment of the baby, and the results, as far as they can be ascertained, during the short time the centre has been opened.

On admission a Wassermann test is made by Dr. Stansfeld of St. Bartholomew's Hospital on the blood of every patient suspected of suffering from syphilis. More recently I have decided that the best safeguard against overlooking cases of syphilis is to have a Wassermann test made in every case admitted; for some patients, sent as suffering from gonorrhoea and without any symptoms or history which would suggest syphilis, have been confined of a child who has had the appearance of the latter disease, and on testing the mother's blood a positive reaction has been found.

* A communication to the Obstetrical Section of the Royal Society of Medicine on November 7th, 1918.

Immediately on the birth of the child a specimen of blood is taken from the vessels of the divided umbilical cord in a cubic centimetre glass tube, and a similar amount of the mother's blood is secured for the purpose of a Wassermann test. A small portion of the placenta is also obtained for examination for spirochaetes. If further specimens of the child's blood are required, a small quantity, from a quarter to half a cubic centimetre, is best obtained by pricking the heel with a medium size Hagedorn's needle in three or four places near one another, and allowing the blood to drip into the glass tube. This should be repeated, if necessary, at intervals of a month or six weeks for a further test.

As soon as syphilis is diagnosed in the mother treatment by one of the salvarsan substitutes is commenced, and weekly doses are administered by intravenous injections. At the same time intramuscular injections of grey oil, 40 per cent. *B.P.C.* emulsion, are given, and I find that little or no pain is caused by the latter injection. Pregnant women bear intravenous injections of salvarsan extremely well, and these can be given up to the time of confinement. The figures which I shall give later show that treatment of the mother has a decided influence on the child. The salvarsan substitutes have been galyol and novarsenobillon, galyol in glucose solution being used exclusively for the babies. In the case of mothers the weekly injections begin with a small dose, which is gradually increased until nearly the maximum is given. Intramuscular injections of mercury are given in 1-grain doses on the same day as the salvarsan is administered.

While yielding to none in my admiration for the treatment of syphilis by salvarsan—giving as it does, in the majority of cases and at all stages, results of a brilliance hitherto unattained—I believe at the same time that the administration of mercury is as important for the cure of syphilis as it ever was, and I am inclined to think that too little of the drug is given.

Of the many methods advocated for the administration of mercury, none is, in my opinion, wholly satisfactory.

Intramuscular injections are often painful; the preparation itself frequently varies, and some metallic mercury is usually deposited at the bottom of the bottle containing the cream, showing that the doses given are not uniform.

Intramuscular injection of mercurial compounds such as the benzoate, although practically painless, has to be repeated daily to get the best results; patients naturally object to these repeated injections, and it is often not possible for the patient to attend regularly.

In administration of mercury by inunction the results depend on several factors which often vary; there is the preparation itself, the time given to the rubbing, and the variations in the absorbing power of different skins. Moreover, it is necessary to get someone experienced in the art to obtain the full effects of the inunction.

Treatment by suppositories, advocated by Mr. Shillitoe and used by him with considerable success, has this disadvantage, that patients dislike the mode of treatment, and the amount of mercury absorbed must vary considerably from time to time, in accordance with the local conditions in the rectum itself.

Treatment by the mouth was advocated by the late Sir Jonathan Hutchinson. His method—namely, the administering of a pill of hyd. c. cret. with equal parts of pulv. ipecac. co.—has been used probably more than any other. Administration in this form requires about ten times as much mercury as is the case with mercurial injections. Patients can take mercury in this way without any necessity for the constant attention of their medical adviser, and the effects are generally excellent. Therefore, when it is not possible for patients to be under continual supervision, I am inclined to think this is, on the whole, the most generally convenient way in which to administer mercury.

With regard to treatment by novarsenobillon and galyol there does not appear to be any material difference between the effects, but the former has in my hands had a tendency to produce, in a few cases only, a more or less severe dermatitis; while in one patient, when galyol was used subsequently on several occasions, no such symptoms appeared, but on resuming a medium dose of novarsenobillon severe dermatitis was again set up.

In the Thavies Inn centre every dose given to mothers and babies is registered on a chart for future reference, and the weekly weight of the baby is noted.

It is found most convenient to give the intramuscular injections, both of salvarsan and mercury, with a special syringe graduated in fortieths of a cubic centimetre. Thus each division of the syringe corresponds to 1 cg. of mercury. For the purpose of sterilization the needles should be made of platino-iridium, which can be heated in a spirit flame without damaging the point. When galyol in glucose is used the needle must be carefully wiped and water passed through the needle two or three times before heating it in the spirit flame, as a high temperature