clear that the great advances in the future of pathology must be looked for not so much in this direction as from researches into the essence and causes and processes of disease; and we may hope that through them will be founded more rational and scientific treatment, and the gradual substitution of it for the empirical methods which have so long ruled. Solidism and Humoralism have ceased to attract, and we are now between the two, in the borderland of minute, almost inappreciable, chemical and microscopical changes. Hitherto we have regarded pathology as advanced physiology, and morbid process as a modification of the processes of healthy nutrition; and so, in large measure, it doubtless is; but we are now advancing into a region beyond the actual processes of healthy and morbid nutrition, into the wide field of the causes of the morbid processes; and these, some of them at least, seem to lie outside physiology—that is to say, outside the range of the natural phenomena and the modifications of them, and to depend upon certain agencies foreign to, or external to, and superadded to the natural phenomena of nutrition. In such light must we view the micro-organisms and their chemical products; and it is with the phenomena of micro-organisms and their ptomaines, and the action of these in modifying the nutritive processes, as well as with those modifications and their results, that we are now largely concerned. Thus a new field has been added to pathological investigation—a field of profound importance, and of the extent of which we can form no guess.

Further, the property of certain diseases to give immunity against themselves, referred to by our late President in his interesting and philosophical address to the Pathological Section of the British Medical Association at Bournemouth, is replete with interest, and seems to have a wide range of influence. It has its illustration, in one way, in vaccination; and it always has appeared remarkable that this kind of illustration should so long have stood alone, though certainly that is less remarkable than that its protective power against small-pox should have been doubted by reasonable and observant persons, or that it should be supposed that so great a good should be conferred without any attendant evil. It is to a similar immunity, conferring influence, however wrought, that we must attribute not only the non-recurrence of certain maladies in the same person, but also the spontaneous subsidence of many diseases in the person or part affected by them. Even a common cold commencing in the nostrils does not abide there, but soon shifts its quarters to the throat, thence to the bronchi, then passes away, and leaves usually a temporary immunity from the like seizure. A spot of ringworm or of psoriasis ceases where it began, and spreads to pastures new, like the fairy rings upon the grass. Is it that in these and the like cases micro-organisms generate products which are poisonous to themselves? or is it that they exhaust the pabulum on which they thrive, and therefore quit the system or the locality? Is it in some such immunity-giving property that the secret of the influence of counter-irritants lies? Some effect of this kind, caused by the absorption of the altered proteids in a blister, is hinted at by Dr. Lauder Brunton in his masterly address at Bournemouth; and, forasmuch as observation respecting the effects of remedies is not a little dominated by theoretic view, will not the use of counter-irritants, which has notably diminished in my time, receive a new impulse if it is supported by fresh ideas as to their *modus operandi* based upon researches into the nature and spread of disease?

At the recent meeting of the British Association at Cardiff, the President, in his highly scientific and remarkable address, speaks of the improvements made in the spectroscope and the achievements of spectroscopic astronomy as worthy to be regarded as the scientific epic of the present century. May we not put in a strong claim for the achievements in bacteriological research, with the discovery of the various micro-organisms and their ptomaines as the sources of many diseases, together with that of the defensive proteids which seem capable of being derived from them, as being not only scientifically comparable with the results of spectroscopic astronomy, but as being of far greater importance, inasmuch as they have direct relation to the future well-being of man? May we not claim for pathology the highest place on the hill of physical science, inasmuch as it takes cognisance of all those subtle agencies, mechanical, chemical, electrical, and others, which influence for evil or for good the delicate workings of the most complex of existences, as well as the effects of those influences and the changes which result from them? Surely in no other branch of science has greater advance been made than in this during the last twenty years. Never before has so promising a light dawned upon medical science; and this Society is to be congratulated on the intention to endeavour to walk in it and to turn it to account.

In order to increase the brilliancy and make the most of this light, and throw its bright beams into practical directions, it is necessary that this Society should especially encourage and draw into it the younger members of the profession, by whom doubtless the work of pathology, especially in the wider sphere upon which we are now entering, must be chiefly carried on, more particularly in this country, where science is left so much to take care of itself, or, which is far worse, is sometimes impeded by misguided opinion and ill-founded sentimentalism, where income has greater demands upon it than elsewhere, and where the *res angusta* (for this especially affects the medical profession, into which not many men of wealth enter) compels most of its votaries, after the earlier years of life have passed, to follow the more lucrative and in some other respects more attractive path of ordinary practical work. It is in early life that the impulses in new directions are strongest and the mind is most accessible to new impressions, and the nerve-cell-looms of the brain most easily weave new thoughts. Many of the younger members of the profession are now occupied in investigations bearing upon this great subject; and this Society will welcome the results of their researches, which may here be laid upon the anvil of discussion and, while yet plastic, be hammered, if need be, into better form. This sort of ordeal in the present day, when the need of speedy publication is urgent, is the fitting substitute for that longer period of refining time and thought which was possible to our forefathers; and often does one see reason to regret that conclusions have not been subjected to it before being submitted to the wider bar of public opinion.

It is upon the other officers of the Society that I must in great measure rely for the assistance which I know will be kindly given; but I will do my best to attend the meetings, and fulfil the responsible and honourable duty which you have imposed upon me.

RECENT EXPERIENCES IN

THE TREATMENT OF TUBERCULOSIS (WITH SPECIAL REFERENCE TO PULMONARY CONSUMPTION) BY KOCH'S METHOD.

BY PROFESSOR P. EHRLICH, M.D., BERLIN.

A paper read before the International Congress of Hygiene and Demography, held in London. Abstracted by

THOMAS WHITESIDE HIME, B.A., M.D., Bradford.

[THAT the question of the merits of tuberculin was introduced at the Congress of Hygiene and Demography held in London last August must be regarded as an error of judgment, for therapeutics were properly excluded from the programme of such a congress, but that, having been introduced, it should be treated as it was, must be pronounced a gross blunder. This will not appear too severe a censure when it is explained that just twenty minutes were assigned to the consideration of this most important and interesting subject—one gentleman being allowed ten minutes to speak in the affirmative, and another ten minutes to speak against it! Professor Ehrlich could not attempt to read the whole of the important paper he had prepared in ten minutes, and as he spoke in German a good many of his hearers probably did not understand the short extemporised abstract of it which he gave. As he had been working with Koch, and must know his latest opinions and experiences with tuberculin, I thought it very undesirable that his paper should not see the light until the publication of the Proceedings of the Congress (perhaps months hence), and then only in a foreign language. The readers of THE LANCET have here a full abstract of the paper, which cannot fail to interest them and revive attention in those who have been inclined to neglect this wonderful discovery of Koch. The necessity for the

administration of small doses of tuberculin, and for its long-continued use, are points on which I expressed a strong opinion in THE LANCET at the beginning of this year, and Langenbuch's and Ehrlich's favourable results with that method quite correspond with my own.—T. W. HIME]

Up to the present time therapeutics, the most important branch of medicine, has grown from pure empiricism. Observation of the beneficial effect of certain substances on animals or men has been the origin of their employment for therapeutical purposes. This may be illustrated by the history of quinine, opium, and mercury. It is only in most recent times that a change has taken place, and since the great development of chemical science in recent years it has become possible to ascertain the connexion between the constitution of medicines and their medicinal properties, and such researches are being made with great energy and success. This line of research has been greatly influenced by the more accurate investigation of the nature and properties of the alkaloids. By this it has been established that to the greater number of these substances, though endowed with such different properties, one nucleus is common—viz., that of pyridin,—and that various collateral groups, to which the physiological effects are due, are correlated to this body. From this discovery sprang the artificial and designed synthesis of new drugs. A glance at the history of the more recently introduced antipyretics—chinolin, kairin, thallin, down to antipyrin and phenacetin—proves that it is possible by suitable combinations to exclude injurious effects without interfering with therapeutic activity.

However, though the symptomatic treatment of disease may be satisfactorily met by this method, it must always be the true end of scientific therapeutics to attack the cause of the disease directly and destroy it. Although the possibility of effecting this has been proved in the case of recurrent fever and syphilis, still we possess no specifics against the majority of infectious diseases. It was not pharmacology which opened up the path to the desired goal, but the great discoveries of Pasteur and Koch as to living causes of disease, which cannot be discussed in the present paper. After Koch had discovered the cause of tuberculosis, he devoted his whole energies to the discovery of the means of resisting it. He found little success with the great number of organic and inorganic agents. It was the study of the biology of bacilli and the analysis of the natural processes of healing which led Koch to find in the specific products of the vital activity of the bacilli the only means of contending successfully with tuberculosis. Thus we have realised for the first time the ideal of a rational mode of treating disease in accordance with strictly systematic scientific principles, and we have an example offered us which must serve us as a standard in the further development of the art and science of medicine.

The unwarranted enthusiasm and the no less unwarranted depression which followed on the announcement of the discovery of tuberculin are in the memory of all. The despondent view taken by so many has been mainly due to anatomo-pathological observations. And yet it must be self-evident that Virchow's demonstrations, which referred mostly to very advanced cases, in no way invalidated the *principle* of the method of treatment, but at the most could only be directed against its technique and against its employment in very advanced cases. Undeterred by those fluctuations of feeling which are but too common in the history of every great advance in science, a large number of medical men have persevered in their endeavours to utilise the benefits derivable from tuberculin, while getting rid of its disadvantages. Koch has established the fact that the essential point in the use of tuberculin is its local effect on all tuberculous tissues. Of the various hypotheses suggested for the explanation of this remarkable phenomenon, the one proposed by Koch himself is still the most probable. He suggests that at every place where there are active tubercle bacilli there exists a certain amount of toxin, and consequently the increased action following on the injection of tuberculin is due to a simple summation of the pre-existing and injected toxin. The new theory of Koehler and Westphal is not defensible; it assumes that the active principle in tuberculin is not identical with the products of the vital activity of the tubercle bacilli present in the tuberculous tissue; and their opinion, that a new substance, capable of exciting inflammatory action, is developed from the combination of the two is entirely unsupported by facts or by analogy.

In attempting to give any explanation of the nature and cause of the local action of tuberculin, it must be borne in mind that it attacks the tissues immediately around the tubercle, and not the tubercle itself. With reference to this point, Biedert seems to have been the first who stated that the essential difference between the action of the injected tuberculin and that produced by the bacilli *in loco* is that the former attacks the tubercle from the periphery, the latter from the centre. One might go a step further and assume that the cells forming any particular tubercle have acquired a certain increased degree of immunity in consequence of their being exposed to the constant action of the products of the tubercle bacilli, whilst the constituent cells of the diffusion area surrounding the tubercle are in the opposite condition. It is in these latter areas of increased susceptibility, such as the cutaneous system of the guinea-pig, that tuberculin exercises its activity. It is here that the inflammatory symptoms first occur, the transudation of serum &c. Under these circumstances there takes place, in many cases, an escape, towards the outside, of the metamorphic products which were deposited within the tubercle, and in this way the action of the injected tuberculin is reinforced from within. By the aid of this explanation most of the phenomena of reaction, frequently so paradoxical, may be satisfactorily accounted for, especially the remarkable fact that very minute doses of tuberculin frequently produce strong reaction, out of all proportion to the quantity of tuberculin injected. It is evident that in such cases there must coexist a number of favourable conditions—e.g., suitable anatomical structure, the possibility of free diffusion into and from the surrounding tissues &c., which result in a small quantity of injected tuberculin setting free a disproportionately large quantity of metamorphic products from the tuberculous mass. In the same way can be explained the fact so often observed in the early cases treated by tuberculin, when large injections were given at the end of the treatment, that the first decigramme dose after the pause in the treatment, caused a strong reaction, while the second, administered on the next or next but one day following, produced no noticeable effect.

One of the greatest triumphs we owe to tuberculin is that which has been gained with reference to the diagnosis of tubercle, more especially of pulmonary tuberculosis, a matter of such paramount importance for practical purposes. There exist now almost numberless instances of individuals with regard to whom, with the previous means of diagnosis, one could only *suspect* the existence of pulmonary tuberculosis, but who even after the first injection of tuberculin were proved beyond doubt to be so affected, either through the occurrence of a characteristic reaction or by the demonstration (for the first time made possible after tuberculin had been injected) of tubercle bacilli in the sputum, set free by the local action of the tuberculin. In another way too the tuberculin has proved itself of great clinical importance by demonstrating that in many cases there existed numerous latent tubercular deposits, although it was supposed that only one strictly localised deposit was present. It may be well to refer here to the frequency with which affections of the apices of the lungs are accompanied by secondary processes in the superficial lymphatics of the axillary and supraclavicular regions, and of complications affecting the synovial membrane, bones, and other parts, which were first recognised after injections of tuberculin.

In considering the diagnostic importance of tuberculin, it is practically uncontested that the occurrence of local reaction is proof of the existence of tubercle. Among the numerous diseases in which the reactive properties of tuberculin have been tested there are only two, besides tuberculosis, in which in a few cases a local reaction has been observed, accompanied by beneficial results—viz., actino-mycosis and leprosy. In the case of leprosy the morphological and tinctorial properties of the specific organism had, even before the introduction of tuberculin, suggested a close relationship to tuberculosis. The exceptional phenomena of local reaction occurring in the case of these two diseases does not really diminish the diagnostic value of tuberculin for practical purposes in tuberculosis, as both the diseases in question are easily distinguishable.[1]

[1] Professor Ponfick mentioned a very instructive case in point at the recent Congress of Hygiene in London. In a case under his care he had diagnosed pulmonary tuberculosis, and after an injection of tuberculin had been given a distinct reaction was produced. The patient subsequently died, and on making a post-mortem examination a considerable extent of one side of the chest wall was found affected by actino-mycosis and not tubercle. Determined to go to the root of the matter, Dr. Ponfick very carefully examined the various organs, and in the apex of one lung discovered a small, quite unsuspected deposit of tubercle.—T. W. HIME.

The question of the value to be attached to general febrile reaction has been still more contested, and more particularly has discussion been raised over the fact that in many apparently healthy persons even doses of 1 mgr. produce strong febrile reaction. There is not sufficient evidence available to decide this question at the present time, but there are very strong grounds for believing that where doses—e.g., below 5 mgr.—produce such reaction there is tubercle present. Fifteen experiments made in the Moabit Hospital, Berlin, on healthy attendants, with injections of 0·001, resulted in a rise of temperature of a trifling character being observed (to about 38° C. = 100·4° F.) in only a single case.

Whoever has had the opportunity of proving in the post-mortem room what a small mass of tubercle, hardly the size of a pea, has led to severe general reaction, will involuntarily be disposed to regard these cases of apparently healthy persons giving marked reactions to tuberculin as being those of persons in whom there exist small or concealed tuberculous deposits, whose situation (bronchial glands &c.) has helped to prevent their discovery. Besides this it must be borne in mind that, according to some persons, one-third of all bodies examined post mortem, according to others, even one-half, show evidence of having suffered from tuberculosis. Considering the unsettled state of the question, it is all the more desirable that it should be energetically investigated by veterinarians, who are more fortunately situated than medical men for ascertaining the facts. It can be stated as a definite fact that in the case of apparently healthy cattle, whenever a reaction occurs after an injection of small quantities of tuberculin (0·1 to 0·3), after they have been slaughtered they have been found without exception to be tuberculous.

The healing properties of tuberculin are generally recognised as exclusively dependent on its local specific influence on the tuberculous tissues. Prolonged experience with the employment of tuberculin has shown that, in order to secure the desired therapeutic effect, it is neither necessary nor desirable to produce severe local reaction. To get the best results smaller and more frequent doses are preferable. The essential principle of the healing process is to effect the encapsulation of the tuberculous tissue after the manner of cicatrisation. This can be best attained by maintaining the specific irritability of the diseased tissues as long as possible, and not (as in the early method) by destroying it by large and rapidly increased injections.

The history of the treatment of lupus by tuberculin affords a proof that the astonishingly good results attained at the outset of the treatment, when strong reactions were invariably thought necessary, were purchased at too dear a price—viz., the rapid decline of the reactive power of the tissues. The successful continuation of the treatment and the prevention of relapse were thus rendered impossible. It is no mere accident that has led to agreement on this point by all those who have recently written on the subject, including Biedert, Lichtheim, Langenbuch, Moritz Schmidt, Merkel and Rosenfeld, Wall, Guttman, Ehrlich, and others.

The essential principles common to the practice of all these authorities are the avoidance of strong general and local reaction, the employment of small doses, and a slow and gradual increase in their amount. The fact that small doses produce, as a rule, but little irritation is an argument in their favour, for by their employment all the disadvantages which may result from a very marked reaction can be completely avoided. There will thus be no grounds for fearing that the zone of tissue which, according to Biedert, may be regarded as a "bulwark," on the maintenance and strengthening of which by connective tissue depends the cure of the tubercle, will be prematurely destroyed. Undesirable complications can also be avoided, such as the long-continued elevation of temperature, as well as the general weakening of the system indicated by the loss of weight commonly observed where there is high fever. But the chief advantage of the administration of small doses is that the organism does not become so easily habituated to tuberculin. Under the old system of large and rapidly increasing doses the patient, sometimes within a week, usually within a month, arrived at that stage when he showed no more reaction after doses of 1 decigramme; but with the small doses, even after months of treatment, a febrile reaction may occur if the doses should be temporarily increased too much. Another means of maintaining the irritability of the tissues for as long as possible is the administration of the injections, not daily, but at longer intervals. A further advantage of this method is that the injurious influence of a superposition, the so-called cumulative effect, is completely avoided.

The following procedure, founded on the foregoing considerations, is recommended by Koch as the best. The dose should be large enough to induce without fail a reaction of the diseased parts. As it is not usually possible, in the case of pulmonary phthisis, to detect the occurrence of local reaction, small elevations of temperature should be taken as an indication of the sufficiency of the doses; but these elevations should not be allowed to reach actual febrile temperatures—38° C. (100·4° F.) and upwards. In the majority of cases the initial dose should be less than 1 mgr.[2] In the case of patients who are still vigorous and do not exhibit any symptoms of advanced disease, the first injection may experimentally be ½ mgr. But in the case of debilitated patients, or those suffering from more extensive disease—in a word, whenever there are grounds to suspect greater susceptibility to the action of tuberculin—it is better to begin with not more than $\frac{1}{10}$ mgr. The injection is to be repeated, according to the individuality of the patient, at intervals of from two to three or even more days. The quantity is not to be increased until the slight reactive wave produced in the temperature-curve has disappeared. In this way the treatment is to be carefully and tentatively continued, and in accordance with the phenomena induced by the administration of the tuberculin. This method should only be departed from in cases where there is hectic fever, as the fever already existing in these cases masks the occurrence of the desired minimal reaction. In such cases it has been found advantageous to administer smaller doses *several times* a day—e.g., 3 to 5 decimilligrammes, and ultimately to increase the quantity only very cautiously. By this means in the Moabit Hospital (Berlin) and elsewhere very decided improvement has been obtained in a relatively short time, often within the first eight to fourteen days the hectic more especially being completely brought to an end.

Attention must also be directed to the efforts which have quite recently been made to increase the curative action of tuberculin by combining its administration with suitable drugs. The specific tubercular nodule represents what may be regarded as an almost isolated non-vascular portion of tissue, which, as one might say, protects the tubercle bacilli from the influence of the tuberculin introduced into the blood. It seems a very natural and plausible thing to attempt to utilise the transudation into the affected parts induced by the local reaction, as a means of exposing the tubercle bacilli to the action of suitable destructive agents. Many attempts in this direction have been made by various persons, and such good results have been obtained in the treatment of lupus in Professor Sonnenburg's wards at the Moabit Hospital by a combination of tuberculin injections with the local application of emplas mercuriale,[3] that they deserve particular mention. Of course it is essential to a good result that the affected parts be kept constantly in close contact with the plaster.

It will be the duty of the clinician to endeavour to bring into action against the tubercle bacillus, by the help of tuberculin, such substances as are known to exercise an unfavourable influence on it. That the great problem will be successfully solved by this means is rendered highly probable by the results already published by Maragliano and Langenbusch as to their success in the treatment of pulmonary phthisis. The splendid results obtained by Langenbusch in the treatment of phthisis by the combination of tuberculin and other suitable substance, especially picric acid and sublimate, are established facts which can be vouched for. When it is, further, borne in mind that he did not select his cases, but treated a rather unfavourable average class of case, and that still of ninety-nine cases 40 per cent. improved and 33 per cent. were cured, it must be admitted that these are facts which must excite the wonder and admiration of everyone.

In combating so obstinate a disease as tuberculosis it is obvious that no auxiliary means of treatment should be neglected, and the general principles laid down by Brehmer and Dettweiler should be carried out in the most thorough manner. Koch himself, in his original paper, laid it down as essential in surgical practice to combine suitable surgical methods with the administration of tuberculin. It will always be a task of special importance to decide whether in any particular case the use of tuberculin is

[2] Of tuberculin.—T. W. HIME.

[3] V. Deutsche Med. Wochenschrift, No. 30, July 23rd, 1891.—T. W. HIME.

to be recommended or not. There is certainly no reason for limiting its employment to cases in the initial stage, and excellent results have been obtained in advanced and even hectic cases, when the treatment has been carried out in the manner here indicated and for a sufficient time. Unfortunately hospital patients are often compelled by their circumstances to break off their treatment when they have hardly begun to derive benefit from it. Under such circumstances it is not surprising if any benefit derived should speedily vanish. Hence it must appear desirable, so far as the interests of the method are concerned, that the treatment of advanced cases should only be undertaken when there is the certainty that it can be carried out regularly and for months. It is much to be wished that the necessary conditions for such treatment will be attained by the provision of suitable special hospitals and convalescent homes.

As to the therapeutic results so far obtained by the use of tuberculin, friends and foes are still engaged in active dispute. It is obvious that too much value must not be laid on statistical reports, especially those published at the commencement of the method, which only give the experience of a few weeks. The mere consideration of the difference in the class of patients which came under treatment immediately after the publication of Koch's method must prove suggestive. Patients in extremely advanced states of the disease, to whom the new method appeared as a ray of hope, thronged to those who were using the tuberculin method, and almost forced them to attempt dangerous experiments with it. It must further be borne in mind that this was in every sense the experimental period; the properties of tuberculin had to be studied, it was a perfectly novel substance, without analogue in the armamentarium of the medical man, and neither his professional education nor his experience provided him with any indications as to its use. The whole field on which tuberculin might be utilised had to be explored, and—last, not least—the best method of utilising it had to be ascertained.

The deep despondency as to the efficacy of tuberculin which prevails in many places is essentially due to the attacks of pathologists. It may be admitted that Koch's original mode of employing tuberculin against tuberculosis in man might in some cases prove hazardous. Still none the less is it a source of the greatest regret that, under the influence of erroneous views as to the significance of appearances noted in the post-mortem room, the estimation of the value of tuberculin should be made entirely from a wrong direction. It has been the common practice to attribute to the influence of tuberculin every unfavourable circumstance[4] which may occur in a case treated with it, even though the very same are observed in the course of ordinary cases not so treated. On the other hand, it may be stated that out of the very large number of cases treated in the Moabit Hospital (Berlin) not a single case of miliary tuberculosis has been observed, and complications, such as pneumothorax, intestinal perforation, and hæmoptysis, only rarely, and certainly, if anything, less frequently than with any other kind of treatment.

It cannot be too frequently repeated that the pathological anatomy of the recorded necropsies which are so constantly referred to as condemnatory of tuberculin refer exclusively to cases treated according to the old method, and hence have at present no actual practical value. Further, the conclusions on this very subject have been drawn from a relatively limited number of cases, very small as compared with those available for clinical purposes. It may be accepted as an established fact that the secondary pneumonic processes, which it is so important to avoid, are no longer to be anticipated with the method of small doses. It may further be regarded as highly probable that the risk of dissemination of the disease is energetically resisted by this method, the object of which is to secure the encapsulating of the tuberculous masses in a systematic manner.

In conclusion, it is desirable to refer briefly to the therapeutic results so far obtained. The majority of authorities are agreed that under tuberculin-treatment remarkable improvement is obtainable. It shows itself in the favourable turn observed in all the physical conditions, especially in the diminution or disappearance of the râles, the changes in the sputum, and the ultimate disappearance of bacilli from it, the cessation of the cough, hectic and night-sweats, the improvement in the general condition, and a considerable increase in weight. An equal degree of improvement in respect of these is quite unknown with other kinds of treatment. There are persons who do not set so high a value on these results as others; and yet from the practical point of view it must be regarded as no small triumph when, after a relatively brief treatment, a patient broken-down with disease is in so short a time restored to his family and enabled to go back to his work. It is only to be expected that complete cures, as evidenced by the total disappearance of all objective and subjective symptoms, have not been attained. But some attention should be paid to the observation of Koch, Stricker, Furbringer, Guthrie-Leigh, Cantani, Langenbuch, and myself (five cures). As to the permanence of the cures no definitive decision can be given for years to come. But in all probability, and judging from an experience of three-quarters of a year, there is good reason to believe the cures are permanent. And there is certainly no reason why the cases regarded as cured by the tuberculin-treatment should not be considered so as much as those which have been treated by other methods—e.g., the hygienic-dietetic as at Görbersdorff, Falkenstein, &c. The published statistics of such institutions offer very encouraging standards of success in numerous cases.

Most remarkably gratifying success has been obtained in the treatment of laryngeal tuberculosis, the relatively greater success in this form of the disease being no doubt due to the anatomical relations, which admit of a relatively easy removal of infected material. Even if the brilliant successes reported in individual cases—as those of Renvers, Lenzmann, Michelson, &c.—be entirely disregarded, there remain the reports of such men as Moritz Schmidt, who obtained twenty cures among thirty-nine cases, and those of Grabower, who of forty cases states that eight have remained perfectly cured during several months, and that fifteen are considerably improved. Such results must be regarded as highly gratifying. These splendid results obtained by laryngologists, even in hopeless cases, are of great value, as they prove incontestably that tuberculin can effect complete cures, not only in animals experimented on, but also in men. It is the most important duty of medicine at the present time to investigate the processes by which these results are obtained, and to discover the means by which these rare cases may become the rule. Owing to the extraordinary complexity of the tuberculous process, it has been extremely difficult to ascertain the conditions of success. But when we reflect that the majority of the questions of general therapeutics are still waiting for an answer, when we consider that the important question—which has already been under discussion for centuries—as to the utility of antipyresis is still being debated, and is still far from being solved, if we bear these and similar facts in mind there will appear no grounds for discontent with the theoretical and practical results obtained in a few months by the tuberculin treatment. The very peculiarity of Koch's discovery will enable the desired goal to be reached all the more quickly; for experimental research is the soil whence it has sprung, and it will be possible to test by experiment the various problems which present themselves, and often in so perplexing a manner, to the clinician. Koch has been fully alive to the fact that the isolation of tuberculin in a perfectly pure state, free from all unnecessary by-products, for clinical use, is an essential adjunct to extensive experiments on animals. For some time past he has been employing exclusively this pure substance at the Moabit Hospital in Berlin. This substance has been found to possess several advantages over the original lymph, which are especially observable in the effects produced on the general condition of the patients and in the absence of unpleasant secondary effects. Local reaction is produced in a typical manner by this pure tuberculin. With relatively larger doses or more rapid increase in their quantity, the febrile reaction occurs, almost invariably showing the type of a rapidly decreasing fever-wave. The results, so far obtained, have been such as to justify the hope that the favourable anticipations entertained as to Koch's great discovery will be fully realised.

Bradford.

[4] Most especially the danger of dissemination of the disease, as if it were not the very nature of tubercle to spread, and from being a strictly local disease to become widely disseminated.—T. W. HIME.

MILK IN OUR HOSPITALS.—The members of the Lambeth Board of Guardians have passed a resolution requesting their representatives at the Metropolitan Asylums Board to introduce and support a resolution advocating the substitution of milk for intoxicants at the various hospitals.