a nervous and vascular cutaneous reaction attributable to the irritation of the contained salts, modified to a certain extent by the temperature of the water. The baths produce a reduction of the mean arterial pressure, and an equally marked rise in the venous blood pressure. This explains the feeling of lassitude and drowsiness which is frequent after a warm sulphur bath, and is more marked than after an ordinary warm bath. The quickening or retarding of the pulse-rate seems to depend entirely on the temperature of the bath.

The Moffat sulphur water originally came into note for its reputed curative effects in cases of rheumatism and strumous affections of the glands and joints. I need not say we have discarded all belief in the latter claim. I find I get my best results in gouty and rheumatic patients. Rheumatic affections of joints and lumbago and sciatica of rheumatic origin seldom fail to derive great benefit from the waters and baths. Holding as I do that gout is a toxæmia caused by some toxin formed in the liver or intestine, or both, and due to a faulty chemistry of digestion, I take it that gouty patients are bound to derive benefit from a course of the sulphur water, and in my experience they do.

Certain cases of that puzzling affection, rheumatoid arthritis—with its obscure and elusive etiology—obtain a considerable amount of relief. Nervous disorders, such as neuritis, sciatica, lumbago, are also greatly benefited. And in some toxic forms of neurasthenia I have seen excellent results follow a course of treatment.

Certain renal and bladder affections show the most gratifying results. Here the diuretic action of the water is most manifest. Cases of abdominal plethora and engorged portal circulation do well. Especially good results are seen in tropical livers. In many cases of gastric derangement the waters tone the stomach and stimulate digestion.

The water must on no account be taken by patients suffering from tuberculous lung trouble. Haemoptysis is the almost invariable result.

The baths are followed by most beneficial results in rheumatic and gouty joint affections, in lumbago and sciatica, and in scaly eczematous affections, seborrhoeic eczema, and psoriasis. The warm sulphur bath gives great temporary relief in some cases of neuritis. Gouty patients who suffer from insomnia generally obtain a night's rest after a bath.

TUBERCULIN DISPENSARIES: A REPLY.

BY

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SIR CLIFFORD ALLBUTT, Sir Lauder Brunton, Sir William Osler, and Dr. Arthur Latham have made a report to the executive committee of the Welsh Memorial to King Edward VII upon the value of sanatorium treatment which confesses to the failure of the system and yet urges its continuance. "In many cases it must be useless," "in a few instances it is actually harmful," and "in many cases this method of treatment need not be carried out at an institution"—or, in other words, in many cases sanatorium treatment is unnecessary. Why, then, call it sanatorium treatment? Will these authorities give some definite estimate of the number of cases of consumption among the poor that may and can be treated in sanatoriums? It is casting dust in the eyes of the people to vaunt the sanatorium system in one breath and then speak of sanatoriums as an unnecessary luxury.

We learn from this report that "the cardinal factor in the treatment is the constant and skilled regulation of the amount of rest and exercise prescribed from day to day for each individual patient." This system is Brehmer's, as any one who has visited Goerbersdorf very well knows, but it is dignified nowadays by the term "auto-inoculation." Certainly if this cumbersome and complicated system of "auto-inoculation" is able to do all that is required for the sufferers from consumption, these authorities are right in recommending the system to their wealthy patients; but, so far, this old system under a new name has been applied chiefly to early and specially

selected cases which have already been through a probationary period, and sufficient time has not elapsed for us to be able to say whether even these results will last. It is, therefore, somewhat premature to speak of the "cardinal factor," when the results of this system in England are still *sub judice*. As yet there is no trustworthy evidence that this system of "auto-inoculation" by graduated exercise can do more than the sanatorium methods of Germany have already achieved. Certainly such a system of "auto-inoculation" carried out under the Insurance Bill requires sanatoriums, and therefore cannot help the poor.

As these authorities choose to furnish no evidence in favour of the system they advocate, and trust the public will place a high valuation upon their mere statements, I will venture to furnish evidence that proves the hollowness of these pretensions that sanatoriums, combined with graduated exercises, can help the poor suffering from consumption. Both rest and graduated exercise have long been employed in Germany in the treatment of consumption at sanatoriums, and the results of sanatorium treatment among the poor in Germany lend no encouragement to the view that sanatoriums can help the poor. Professor Moeller, of the famous Belzig sanatorium, near Berlin, tells us that sanatorium methods by themselves cure only 10.9 per cent. of the cases. Arranged according to stages the results were:

Stage I. Sanatorium methods alone cured 31.8 per cent.
" II. " " " " 1.9 "

According to Moeller's later experiences, sanatorium methods alone may cure 25.3 per cent. of the cases of pulmonary tuberculosis of Stage I (German Board of Health classification), while I may mention incidentally that tuberculin has secured the same results in his hands in 84.6 per cent. Weicker, the devoted pioneer of the Volks-sanatoriums of Germany, found that of every 100 cases treated in sanatoriums by rational methods alone, including exercises, at the end of 1 to 1½ years, 41; at the end of 2 to 2½ years, 51; at the end of 3 to 3½ years, 65.8; and at the end of 4 years 80 had lost their fitness for work or were dead. The death-rate was as follows:

In 1 to 1½ years	...	25 per cent.
In 2 to 2½ years	...	38.4 per cent.
In 3 to 3½ years	...	55 per cent.
In 4 years...	...	56.7 per cent.

Again, the aspect of sanatorium treatment is not encouraging when we read that 7.6 per cent. of cases in Stage I are unfit to work or are dead in 1 to 1½ years, 19 per cent. in 2 to 2½ years, 33.3 per cent. in 3 to 3½ years, and 55.6 per cent. in 4 years.

This tragic result of sanatorium treatment compelled both Moeller and Weicker to look about for some better system, and they are both among the most enthusiastic advocates of tuberculin treatment in Germany. Weicker's investigations are invaluable as evidence upon this national question, because he was dealing with the very class of people who would come within the scope of Mr. Lloyd George's Insurance Bill.

I therefore ask the authors of this report to furnish at least some positive evidence that may help to neutralize the otherwise inevitable verdict against sanatoriums as a means of helping the poor. Surely, the voluminous report compiled by the late Dr. Bulstrode upon sanatorium treatment justifies me in saying that there are no satisfactory statistics dealing with the results of the treatment of the poorer classes in sanatoriums which can help us in forming an opinion. We are compelled to look to Germany to guide us by its careful and laborious statistical analysis of sanatorium results. One may ask, too, why it is that in France there has been no effort to establish sanatoriums on any moderate scale for dealing with tuberculosis among the poor.

Further, those familiar with Weicker's careful reports know that special care was taken to try the system under the most favourable conditions. In Weicker's sanatoriums the presence of tubercle bacilli in the sputum was almost a disqualification. At any rate, in the majority of cases received into Weicker's sanatoriums tubercle bacilli were not found in the expectoration. Is it not, therefore, little less than folly to take our instructions from men like Sir Clifford Allbutt, Sir Lauder Brunton, Sir William Osler, and Dr. Arthur Latham, who so minimize the importance

of early diagnosis, that they even presume to condemn my system of tuberculin dispensaries because I make early diagnosis by means of tuberculin an essential and indispensable feature of these institutions? When I urge the supreme importance of employing tuberculin in diagnosis at these special dispensaries, I am following the lead of such men as Koch, Cornet, Petruschsky, Spengler, Moeller, Pfuhl, Krause, Turban, Behring, Mitulescu, Roepke, Bandler, and hosts of others. Surely, those of us who have fearlessly investigated this important phase of practical medicine are safer guides than those who presume to judge without such investigations. Until the medical profession seriously recognize the enormous value of tuberculin in the diagnosis of early tuberculosis, we shall be only too familiar with the catastrophes that must follow this disregard of the most valuable weapon we possess in detecting pulmonary tuberculosis in the stage when treatment is likely to be successful. There are few sanatoriums in Germany where this use of tuberculin is not fully recognized. There are, unfortunately, too few sanatoriums in England where tuberculin is thus employed.

THEORY OF INTOXICATION.

These authors, misled by their views of "auto-intoxication," assume that in the progressive stages of pulmonary tuberculosis there is progressive intoxication of the system by means of tuberculin. This theory begs the whole question and presents a one-sided and wholly inadequate idea of the tuberculous process. The element of infection and the presence of living, virulent bacilli are wholly ignored. Accordingly, those familiar with the complex character of the tuberculous process can only designate this description of these authors as a misinterpretation of scientific facts. One or two illustrations will best explain my meaning, and will prove also the artificial and misleading system of classification adopted in describing the forms and stages of pulmonary tuberculosis.

First, it is stated "cases of consumption may be roughly divided into four classes: Class I. Those patients who become infected and recover without knowing that they have been infected." In an earlier paragraph it is stated that "practically every man or woman over 35 bears evidence of having suffered from tuberculosis." I ask whether it is justifiable to describe cases in "Class I" as cases of consumption? Such a loose and unscientific definition cannot be too strongly condemned by those who distinguish between healthy individuals and those who are consumptive. Next, I have seen not a few cases in which to-day "the dose of poison absorbed is not beyond the capacity of the defensive forces," and to-morrow, as the result of some trifling accident or complication, "Class I" suddenly passes into "Class IV." This is not the result of a progressive intoxication, but due to an extension of infection. For example, I have seen several cases of latent pulmonary tuberculosis producing no symptoms to attract attention, and yet within three weeks the patients, adults too, have died of tuberculous meningitis. In a smaller degree, and by less severe extensions, "Class I" may pass into "Class II," and even into "Class III," not by virtue of the progressive intoxication, but because the infection has spread discontinuously by the lymphatics or blood vessels to near and distant parts. Thus, too, slowly and even without attracting attention, the third stage of the disease may be reached without any symptoms of poisoning such as the theory of these writers presupposes.

This loose and inaccurate classification of the forms of consumption arises from an attempt to prop up the cause of sanatoriums, which are tottering to their fall, while it may entirely mislead all except those who are intimately acquainted with the variable and uncertain nature of the tuberculous process. The writers go further, and, without offering a tittle of evidence, seek to induce their readers, medical and lay, to believe that those of us who use tuberculin for treatment at tuberculin dispensaries obtain our successes by treating only classes hypothetically designated as "Class I" and "Class II," which would "recover without treatment or by taking a holiday at the seaside." They themselves assume the very point—the result of treatment—which it is necessary to prove. I challenge any one who has studied pulmonary tuberculosis to tell us how long a particular case will belong to

"Class II." There may be no "unsanitary or degrading conditions, no lack of food," and yet the disease may rapidly hurry its victim into "Class III," because the virulence of infection is a factor which cannot be estimated, eliminated, or disregarded. Thus, according to this classification, one and the same case might to-day belong to "Class II" and would "recover if given a holiday at the seaside"; but to-morrow it would be "Class III" and "need careful treatment in a sanatorium"; and next week would belong to "Class IV" because "he is going to die, whatever may be done for him."

This is the sequence of events which too frequently follows upon a system of diagnosis and treatment which dispenses with tuberculin. The dominant error in this classification is that the issue of treatment determines the diagnosis. The wise physician desires rather to modify the prognosis by adopting treatment that will bring back the victims of the disease from "Class IV" to "Class III," and even to "Class II." If he can even occasionally succeed in doing this, he will frequently succeed in bringing cases in "Class III" to "Class II," and even "Class I"; while he rarely, if ever, fails to prevent cases in "Class II" passing into "Class III" or "Class IV."

I have urged in my Weber-Parkes essay that the worse the prognosis, the better the method that succeeds in saving the victims of the disease. Nothing has convinced me of the value of tuberculin treatment so much as the extraordinary successes I have obtained in cases in II-III and III stages of the disease even when complicated with tuberculous ulceration of the larynx. These results were published in the BRITISH MEDICAL JOURNAL of November 26th, 1910. I challenge any laryngologist to produce a similar series of successful results obtained by any other method.

If one can restore to health, by means of tuberculin, victims in these advanced stages of the disease, with the worst of all complications—tuberculous ulceration of the larynx—a *fortiori* it becomes a relatively easy task to obtain successful results in the earlier stages of the disease. I have obtained these successes in cases that would be rejected by any sanatorium, and I have obtained successes in Stage II of the disease which have not been approached in any records of sanatorium treatment. In Stage I of the disease my results have been such that I unhesitatingly endorse the dictum of Professor Koch that in Stage I tuberculin cures pulmonary tuberculosis with certainty. It is for this reason that I must deplore the *ex parte* statements of men who have not themselves consistently, persistently, and courageously employed tuberculin in treatment, and I earnestly demand that a searching investigation of actual facts and authentic observations should be instituted by unbiassed and competent authorities.

There are two other important points that need discussion. These authorities speak of the limitations of tuberculin. There is no remedy known which has not limitations. Injections of tuberculin cannot restore life to a dead man, and cannot always save a dying man. Tuberculin also has no effect except upon a tuberculous process. No one has more persistently pointed out that tuberculin may even do harm when other infectious organisms have found entrance to a tuberculous lesion. I insisted upon this point long before Sir William Osler paid any special attention to the part played by mixed infections in the later stages of pulmonary tuberculosis. Mixed infections generally appear late in the course of pulmonary tuberculosis, and one of the best ways of dealing with these mixed infections is to anticipate them, and by means of tuberculin produce that state of fibrosis in the tuberculous lesion which not only checks the extension of the tuberculous disease in the lungs, but also forms the best barrier against the invasion of the disease by these secondary organisms. Thus, the judicious use of tuberculin in the first and second stages of pulmonary tuberculosis is the best way of obviating this particular limitation of tuberculin treatment.

I am quite convinced that the routine use of tuberculin in the second stage of pulmonary tuberculosis is the best means of preventing mixed infections in all forms of open pulmonary tuberculosis. As for any other limitations which these authorities are careful enough not to define or describe they must tell me what they are before I can

admit their existence. Personally, I know no limitations to the use of tuberculin in pulmonary and other forms of tuberculosis provided the disease has not wrought so much destruction of tissue that recovery could only be brought about by a miracle.

I have already said, and I am quite earnest in my statement, that I know no contraindication to the use of tuberculin except despair. Within the last year I have treated at the tuberculin dispensary more than 100 cases of pulmonary tuberculosis in all stages, and apart from the cases of mixed infections, always in an advanced stage of the disease, I have been unable to find any limitation circumscribing the use and value of tuberculin. To be quite accurate, I am ready to admit that it is not wise, except with certain precautions, to use tuberculin in cases of well marked renal disease. Renal disease is in itself, sooner or later, fatal, and there is not much object in curing a tuberculous lesion when there already exists a disease which in itself is likely to be fatal.

The other point I wish to discuss is the need for "constant, skilled medical supervision." Again, these authorities do not define what they mean by "constant, skilled medical supervision," but I take it that, imbued with the idea that "auto-inoculation" by graduated exercises is the cardinal principle of treatment, they mean that the physician must constantly watch this empirical system of introducing into the circulation a sufficiency of poison from the diseased foci to stimulate the tissues to produce a sufficiency of antibodies to neutralize the effects of the disease. I am convinced that by the system of graduated doses, which can be measured with mathematical accuracy, by the subcutaneous injections of tuberculin, there is not the same need for "constant medical supervision." In our system experience has shown that it is enough to record the temperatures every three hours, and to weigh the patients at regular intervals, in order to work out the salvation of the victim. We teach even our youngest patients to take their own temperatures, and we instruct them or their parents to keep the patient quiet if the temperature rises. By working on this system for many years in Australia and for more than a year in England, where I have treated nearly 200 patients, we have found no difficulties which could not be surmounted.

It is too often forgotten that in dealing with tuberculosis among the poor it is necessary to reduce expense to a minimum; and if there is little risk in carrying out this system at a cost of at most £2 for every case treated, I see no reason for spending another £30 a case in order to secure this "constant, skilled medical supervision." If this money is given to us, we should spend it, not on this "skilled medical supervision," which does not greatly benefit the patient, but rather upon trying to introduce permanent improvements in the homes of the poor—not merely in bricks and mortar, but in supplying the ordinary necessities and comforts of life. It is only too clear to me that this "constant medical supervision" is much over-rated, because for at least ten years it has been my custom to treat well-to-do patients at a distance—even in the late stages of the disease—and I cannot remember an instance in which these patients were any the worse because I was not at their elbow every hour of the day to tell them to do this and not to do that. In fact, by this system of training one teaches the people themselves to understand the importance of carefully watching the course of the temperature and the value of improving their health and nutrition by a proper and regular system of dietetics, which can be controlled in a practical manner by the weighing machine.

Lastly, by a proper course of tuberculin treatment, it is almost the rule that cough and expectoration cease, so that the victims themselves cease to be a danger to their friends and relations. Bandelier and others, including myself, have proved beyond all doubt that tuberculin treatment is a much more powerful factor in converting infectious into non-infectious cases than the best sanatorium treatment. This transcendent advantage of tuberculin treatment, which is admitted by all the best authorities—Turban, Bandelier, Koch, Cornet, Petruschsky, Spengler, Moeller, Pfuhl, Krause, Behring, Mitulescu, Roepke, Rembold, and myself—seems to be given no weight, and yet it is perhaps the greatest advantage of all. Such a system benefits not merely the individual victim, but mankind.

THE FRENKEL SYSTEM OF EXERCISES FOR TABES.

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THE following case is of interest as illustrating the beneficial effects which result from the systematic practice of the exercises designed by Dr. Frenkel of Heiden for restoring the power of co-ordinate movements in persons affected by tabes dorsalis. It shows how a person who has been reduced to a state of almost complete invalidism may by this means regain the power of locomotion so as to be able to live a comfortable and useful life.

A. B., aged 39, was admitted on April 30th, 1908, suffering from tabes dorsalis in the ataxic stage. He had contracted syphilis fourteen years previously, from which he had suffered severely, and had treatment continuously for about three years. Neurasthenic symptoms occurred in 1905, which were soon afterwards followed by girdle pains, bladder symptoms, and difficulty in walking. Tabes dorsalis was definitely diagnosed by Dr. Risien Russell, by whom he was treated for a time. The ataxic symptoms had gradually increased in severity till he was able to walk only by aid of two sticks. When I first saw him he had a very pronounced ataxic gait and frequently fell, so that it was no longer safe for him to walk in the streets alone. The knee reflexes were entirely gone, Romberg's sign was very marked, and the Argyll Robertson pupil present. The girdle pains and bladder trouble continued, and varied in severity at different times. Ocular symptoms did not then trouble him, and he had fair control over the sphincter ani. The muscles of the lower limbs were in good condition, but slow of action. There was some increase in the range of movement in the joints and some degree of hypotonia, likewise some loss of sensibility of the skin, muscles, and joints, particularly the knee. The symptoms were rather more marked on the left than on the right side. Owing to the falls he had had he was very nervous in walking. He was utterly unfit to follow any pursuit, and the prospect in life before him was very unfavourable.

As the patient had been treated for some time for the disease, which appeared to have remained, for some months at least, *in statu quo*, the most pressing object was to alleviate the disablement in locomotion resulting from the destruction of nerve tissue which had already taken place. To this end Frenkel's exercises were employed. The first thing done was to teach the patient the various movements of the body required to enable him to rise from and sit down on a chair, as a sound person does instinctively and generally without knowing how he does it. The successive movements included in these acts had to be learnt one by one and repeated frequently with the attention concentrated upon them by the patient till he was able to regain the power of performing them in the ordinary manner. The patient was likewise set to do walking exercises daily along a track 21 cm. broad (8½ inches). At first little regard could be paid to the length or regularity of the steps taken. How to advance one foot before the other, to gain sufficient control over his limbs in order to be able to place his foot upon the track at each step, and to correct the outward rotation of the legs while doing so, occupied all the patient's attention at the beginning. Not only had he to be taught in their proper sequence the various physiological movements of the body required to perform the mechanical act of progression, but he had also to learn to forget the faulty methods of moving his limbs which he had developed during the course of the disease. Progress was necessarily slow at first, but little by little improvement took place as the movements were repeated day after day with the attention concentrated upon them. After a time it became possible for the patient to take steps of a given length (30.5 cm.), and later on he learned to take steps of shorter and of longer lengths, and various combinations of steps in the manner laid down by Frenkel. Finally, practice was conducted on Frenkel's narrow track, 11 cm. wide.

After four months' treatment in the sanatorium he went to a private residence in the country, where he continued to practise in the garden the exercises which he had been taught under my supervision. Several months later he wrote to me in 1909 saying:

Now I can assure you that the progress I have made has quite surpassed my most sanguine expectations. I have entirely discarded the use of a stick in the house; urinary troubles are vastly improved. My strength is increasing, especially in the legs; the calves have become firmer and the muscles under control. Outsiders have noticed the improvement even more than I have.