ON THE VALUE OF TUBERCULIN

IN THE

TREATMENT OF SURGICAL TUBERCULAR DISEASES.

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IN considering the subject under discussion to-night it will, perhaps in some ways be most convenient, if I commence by referring to the modes in which the remedy has been employed in my cases, and to those which I believe to be most likely to yield good results. For experience has convinced me that the ultimate result depends to a great extent on the mode in which the fluid is used, and that the method of administration must vary to some extent with the aim which one has in view. I will only refer in detail to two methods. The first, which may be spoken of as the "intermittent" method, is that which was recommended by Dr. Koch, and which has been followed by most of those who have used this treatment: the great majority of the cases in my list have been treated in this way. The guiding point in this plan is the occurrence of febrile reactions. The recommendation is to begin with a certain dose, and if febrile reaction

occurs, repeat the dose when the fever has subsided ; if after the second dose there is still febrile reaction repeat it again, and go on in this way till reaction is slight or absent. Then raise the dose, and continue to do so every day till reaction is again obtained, when that dose is adhered to again till there is no further elevation of temperature, and so on till one decigramme is reached. A few doses of one decigramme are then given, and if no reaction occurs the treatment is considered to be practically at an end, but a decigramme is given every week or ten days for a few weeks. There are several objections to this line of treatment. In the first place, by making the occurrence of febrile reactions the guiding point in the treatment the patient is subjected for several weeks to a recurring fever with all its disadvantages, and without any corresponding advantage. Another objection is that, as the later injections only produce very little local reaction, if they are only given every day or two the effect is spasmodic instead of being constant. A third point to which I take exception is that the treatment was said to be practically at an end when the dose of one decigramme is reached. This view was no doubt based on the idea that the cessation of reaction implied complete destruction of the tubercular tissue and absence of tubercle bacilli from living tissues, and not the establishment of tolerance ; but this view is, as will presently be evident, quite erroneous.

The occurrence of fever is not at all essential to the treatment ; it is an unfortunate complication, at any rate in the early stage ; and if it could be got rid of or modified without interference with the local effect a great advantage would be gained. The fever can be very much diminished by the administration of antipyrin in ten or fifteen grain doses two and three hours after the injection, as was first pointed out by Rosenbach, and I have found that under these circumstances the local reaction occurs and is well marked, even though the temperature remains low. Fever can also be avoided to a great extent by the second or "con-

tinuous" method of treatment which I am now using, and which I shall now describe. Careful clinical investigation shows that tolerance is much sooner established as regards febrile than as regards local reaction; in lupus, for example, it can be seen that after doses which produce no fever increased scaling occurs. This being so, it occurred to me very shortly after I commenced the treatment that it would be a good plan to try to establish tolerance as regards the febrile reaction as quickly as possible, and at the same time to try to make the local effect as continuous as we could. To do this I adhere to the original dose till no further reaction occurs with it, and then increase its frequency up to twice or thrice daily. After a few days the dose is raised, and if no reaction occurs this second amount is continued twice or thrice daily for several days, when a further increase is made, and so on (see Case No. 8). For example, in external tuberculoses I now usually commence with two milligrammes. In most cases this produces a febrile reaction which seldom passes off completely in less than thirty-six or forty-eight hours. After forty-eight hours, if the fever has subsided, I repeat the dose; again fever occurs, and again it may be necessary to wait forty-eight hours. At the end of that time the same dose is injected, and now in many cases the fever will be less, and will subside within twenty-four hours; if that is the case the dose is repeated at the end of that time. Usually after two or three daily doses the rise of temperature and the general symptoms are insignificant or absent, and in that case I give it twice, and later thrice daily. After a few days the dose is increased, and in this way the amount may be carried up to several decigrammes thrice daily without the patient experiencing any bad effects. Further, the treatment should be continued for a long time. Proceeding in this way, the febrile or disadvantageous part of the treatment is got over in a week or ten days, while for a long period the local action is kept up, as evidenced in lupus for example, by continued redness and scaling and steady

improvement. And not only have cases treated in this way from the first improved markedly, but cases which had come to a standstill under the ordinary method are now improving under this plan. At first sight this method may appear to be an heroic one, but it is not really so. The patients treated in this way have suffered much less than those treated by the earlier plan. The initial dose and the rapidity of increase must of course vary in each case; the former may be small or large, the latter slow or rapid, according to circumstances and the results aimed at. I lay more stress on the frequency than on the amount, and from what I have seen I am inclined to think that treatment in this way will do more good and less harm than by Koch's original method.

There are various other plans which might be tried, such as large doses at long intervals, so as to avoid the establishment of tolerance, very small doses every few days, and so on, but they do not seem to promise any advantage; indeed, the last plan seems to me distinctly bad.

With regard to the phenomena which occur after the early injections, so much has already been written that it is needless for me to go over the ground again, and I shall therefore pass on to the points raised in this paper. These points are three in number, viz. the dangers of the treatment, its capabilities, and its place in surgery.

DANGERS OF TUBERCULIN.

Taking first the dangers of the treatment, we may consider them under two headings, viz., 1, dangers due to the action of the remedy on the body generally—poisonous effects; and 2, dangers in connection with the action of the remedy on the affected parts.

As regards the dangers due to the action of the remedy on the body generally, I have in two instances, where the doses employed were large, observed poisonous effects following immediately after the injection. In the one

case (No. 2) I had gradually raised the dose up to $4\frac{1}{2}$ decigrammes, and the occurrence to which I refer took place after the second injection of this dose. About ten minutes after I had left the house Dr. Thin was sent for, the patient stating that a few minutes after the injection she had felt very ill, and a rash had come out. Dr. Thin found the patient considerably collapsed, with a weak intermitting pulse, and covered with urticaria. These symptoms soon passed off, and when I saw her about six hours after the injection she had quite recovered. In the other case I happened to come into the ward at Paddington Green Children's Hospital at the time that the house surgeon was giving the injections, and I found him at the bedside of a little child (No. 22) to whom he had just given a dose of $3\frac{1}{2}$ decigrammes. He told me that about half a minute after the injection the child began to cry loudly, and then rapidly became cyanosed. When I saw her the skin all over the body was deeply cyanosed, and the pulse was very feeble, but the child was crying strongly. Warm bottles were applied, and within five minutes the cyanosis had disappeared, and the pulse had much improved. In these two cases it seems to me that the fluid must have been injected directly into the circulation, for in both as large doses had been administered before without any such result; and besides, the immediate onset of the symptoms implies immediate entrance of the fluid into the circulation. These cases teach us that great care must be employed in using large doses if it seems necessary to do so, and I believe the risk can be avoided by moving about the point of the needle in the subcutaneous tissues so as to form a pocket, and by injecting the fluid very slowly.

A much more common period at which danger may arise is during the early febrile reactions, and the most alarming general symptom is the cardiac depression which is frequently present to a slight extent, but sometimes, especially where the first dose is large, to such a degree as to cause anxiety: this depression is often most marked

during the fall of the temperature. In only one of our cases was this depression so great as to cause alarm, viz. in the leper (No. 56). About six hours after the third injection the patient passed for a short time into a more or less collapsed condition, with a very slow and weak pulse. I have not been able to find any recorded case in which death occurred as the result of this cardiac depression, although several patients have evidently been in a very critical condition. Indeed, I can only find a record of two cases which died during the early stage of the treatment. One of these was the Innsbruck case which has been mentioned in the journals. The case was that of a female æt. 17, with extensive lupus about the face, nose, mouth, &c., but, so far as was discovered on clinical examination, with no internal tuberculosis. On December 3rd, at 9.30 a.m. two milligrammes were injected for the first time. This was followed by marked local and general reaction, the temperature fifteen hours after the injection reaching 106° F. Next morning the patient was very drowsy, the pulse intermittent, weak, and very rapid (from 150 upwards), respirations 40; the somnolence continued, and fæces were passed in bed. During the afternoon there were twitchings and convulsions, and the patient became quite unconscious and died thirty-six hours after the injection. On post-mortem examination there was marked œdema of both lungs, and numerous patches of pneumonia scattered through them; extreme œdema of the brain and spinal cord; capillary hæmorrhages under the pleura and pericardium, and into the thymus and spinal cord; inflammatory changes in connection with the tubercular lesions on the skin, in the glands, and in various parts of the intestine. The second case is reported by Schmid ('D. M. W.,' 1891, No. 1), and was that of a boy æt. 5, whose knee-joint had been excised six months previously, and whose general and local condition was bad. He did not react after 2 and 4 milligrammes; on the sixth day 6 milligrammes were injected; two hours later there was a slight rigor, and the tempe-

perature had risen to 102° F. Severe cerebral symptoms commenced about the same time; there was twitching of both sides of the face, Cheyne-Stokes respiration, and death fifteen hours after the injection. On post-mortem examination there was great hyperæmia of the brain, with about twelve hæmorrhages the size of sixpence scattered over it and penetrating for half an inch or more into its substance; there was also thrombosis of one of the sinuses, which, however, was of older date. Schmid leaves it an open question whether the hæmorrhages were due to the drug or to the previously existing thrombosis.

When we take into account the very large number of patients who have now been subjected to this treatment, and the fact that the cases where death has occurred during the febrile period are so extremely few, we must, I think, conclude that the risk of death as the immediate result of the injections is not one which need deter us from employing the treatment. The risk is not nearly so great as that of many surgical operations for tuberculous disease.

In connection with the immediate risks of the treatment regard must be had to the possible cumulative action of the remedy. We not unfrequently observe that if the second dose is followed quickly on the first the temperature is higher, and sometimes also the constitutional symptoms are more severe. This is especially the case when the second injection is given before the temperature has completely fallen after the first. This happened in the first case which I injected (No. 1), where the first reaction was severe and the temperature was slow in falling. On the fifth day after the first injection, while the temperature was still 100° F., I repeated the dose, and the result was a much more severe reaction than at first, and indeed for a day her condition was such as to cause us considerable anxiety. (I may say that this case and the leper were the only two which gave us any anxiety during the reactions.) These cumulative effects are only, as a rule, seen during the very early injections.

At a later period of the treatment tolerance is being established, and this cumulative effect is not apparent. In only one instance have I observed it to any appreciable extent at a late period in the treatment, and in that case tolerance had not yet been established (No. 52). In the continuous method of administration which I advocate, and where we would expect this effect to be most marked, we usually see nothing of it, though in some cases there may be a slight rise of temperature after a few doses have been given; this, however, is generally where we begin to repeat the dose frequently before reaction at that dose has quite ceased.

The other general effects, such as anæmia, loss of weight, &c., need not be considered here, and I may pass on to the second group of dangers, viz. those due to the action of the remedy on the tubercular tissues.

In the first place great stress is now being laid by some on a supposed risk of dissemination of the disease, and that in two situations, viz. either generally throughout the body, or locally in the immediate vicinity of the original deposit. In reference to the occurrence of acute general tuberculosis, we know that this only takes place when a quantity of tubercular material is poured into the circulation more or less suddenly, generally from involvement of the wall of a vessel in the tubercular growth, subsequent destruction of the wall, and communication of the tubercular material with the still patent lumen of the vessel. A few bacilli passing into the blood will not suffice to produce general tuberculosis, or indeed of themselves to set up a secondary deposit; and in my recent lectures at the College of Surgeons I referred to evidence which shows that bacilli are frequently present in the blood in cases of tuberculous disease without giving rise to any local lesions. Indeed, if the bacilli floating in the blood are only few in number, they will, in all probability, be quickly destroyed, more quickly than in the tissues. Now there is no evidence whatever that after the injection of tuberculin the bacilli get into the blood in un-

usual numbers in any other way than by the ordinary modes of communication of a tubercular deposit with the circulation. Nauwerck alone has put forward the view that after the injection of tuberculin the bacilli grow more rapidly, and that the larger numbers of bacilli found in the sputum during the early period of the treatment are to be explained by increased growth, and not, as appears at first sight more probable, by more rapid passage of the organisms into the sputum. This view is not supported by evidence so far as surgical tubercular diseases are concerned, for in lupus, tubercular glands, and the synovial membrane of joints I have found it just as difficult to find bacilli after Koch's treatment as is usually the case: there is no sign in these instances of more rapid multiplication of the organisms. Liebmman's statement that he has found numerous tubercle bacilli in the blood of phthisical patients undergoing Koch's treatment is absurd on the face of it, for even in the most virulent infective disease the micro-organisms in the blood are seldom so numerous as they appear to have been according to his statement and in the most acute general tuberculosis it is practically impossible to demonstrate tubercle bacilli in the blood by means of the microscope. Several trustworthy observers have since examined the blood of patients under this treatment, and have invariably failed to find bacilli; while Ehrlich, Guttmann, Kitasato, and Kossel examined Liebmman's original specimens, and found that they had been contaminated with phthisical sputum, and that it was in the sputum and not in the blood that the bacilli were present.

Where a tubercular deposit is present which involves the wall of a blood-vessel it is not at all improbable that the effect of the tuberculin may be to establish a communication with the interior of the vessel more quickly than would otherwise have occurred; but where this condition is present the patient is already in imminent risk of acute tuberculosis quite apart from Koch's remedy, and it is most difficult to estimate whether there is any or

how much increased risk of this occurrence after the use of this material. Indeed, it is equally probable that under the above circumstances the effect of the tuberculin may be to save the patient from the impending general disease, in that it may arrest further growth of the tubercle, or in that the inflammation around the deposit set up by the remedy may lead to thrombosis of the vessel, and thus shut off the deposit from the general circulation. We can only arrive at any sort of conclusion on this matter by the careful comparison of extensive statistics of cases treated by tuberculin, and of similar cases treated in other ways, and this has not yet been done. So far as I can see from what has been published on this subject, the increased risk of general tuberculosis from the use of this remedy must be very small. To put down every, or indeed any case of acute tuberculosis which occurs during this treatment to the effect of the remedy is at present utterly illogical, and is only to fall into the *post hoc ergo propter hoc* fallacy, that great bugbear of scientific medicine. I may illustrate how this fallacy would tell in the opposite direction from my own experience. When I commenced the treatment at the end of November, I made up my mind that in order to ascertain the capabilities of the remedy, I would not attempt to select cases at first, but would admit and treat any patient who applied till my wards were full. This resolution I carried out with two exceptions; one of these cases was a man who was already in the ward before I went to Berlin, and who had consented, and indeed was anxious to undergo the treatment immediately on my return. It was a case of spinal disease and early tubercular disease of the kidneys. When I came from Berlin I found that the patient had developed some obscure lung trouble with high temperature, and I therefore sent him up to the medical wards, intending to carry out the treatment at a later period. The other was a patient with extensive disease of the sacrum, and of one hip-joint with septic sinuses, who was admitted at the end of December.

I had already by that time become chary of employing the treatment where there was a septic complication, and I therefore did not use it in this case. Both of these patients died of acute general tuberculosis during January, the lungs in the first case especially being completely infiltrated with miliary tubercles. Now of fifty-five cases of tubercular disease in which I have employed this treatment none have developed acute general tuberculosis, while the only two cases in which I declined to use it died of that disease. Allowing the *post hoc ergo propter hoc* fallacy to come into play, we should conclude that the tuberculin prevented the occurrence of general tuberculosis in the cases treated—a conclusion as unwarranted as the opposite one, that where acute tuberculosis occurs in the course of the treatment it is therefore due to it.

More important because more probable is the question of the risk of dissemination of the disease in the immediate vicinity of the original tubercular deposit. This is, I suspect, much more likely to occur in internal than in external tuberculosis, and the possibilities are undoubtedly greatest in disease of the lungs. In the first place, if the local reaction is considerable, and a large amount of fluid is poured out, carrying with it the bacilli and débris from the surface of a cavity, there is the risk that this increased quantity of material may not be properly expectorated, and that portions may be inhaled into other parts of the same lung or into the other lung, and there set up further disease. This is a danger which must be guarded against by taking care that the reaction shall not be excessive.

A second way in which dissemination may occur in the case of the lungs is where the disease is situated close to or involving the pleura, and where adhesion of the two layers of the pleura has not taken place. Under these circumstances it may quite well happen that after the injection, ulceration or destruction of the thin tissue separating the tubercular deposit from the serous cavity may take place, and the tubercular virus be poured into the cavity, caus-

ing infection and growth of the endothelial lining of the pleura, which being at first non-vascular would go on growing quite unaffected by the remedy, and so produce the masses of tubercles which have been described. A similar occurrence may also take place in connection with other cavities, such as the peritoneum and the joints. In the case of joints it is quite possible, and has indeed apparently happened, that where an osseous deposit has not yet burst into a joint, but is on the verge of doing so, the occurrence may be precipitated by the use of tuberculin.

A third way in which it is conceivable that local dissemination might occur is, that the tubercular area being distended during the early reactions by a large quantity of effused fluid, bacilli may be floated away by this fluid and deposited in neighbouring parts, and there set up new growth of tubercular tissue. That a dissemination of the disease can occur in this way in the immediate vicinity of a tubercular patch under the ordinary method of treatment seems not impossible from what has been found in some post-mortem examinations, and from what has been observed clinically, especially in the larynx. At the same time I cannot think that this will be other than an exceptional occurrence, seeing that the tubercle bacilli are usually present in the fixed cells, and would not, therefore, be easily carried away; while, as a matter of fact, bacilli have not been found beyond the tubercular areas. The idea arose at a time when Koch's view that the treatment caused caseation, and thus might free the bacilli, was accepted; but this view is incorrect. If dissemination can take place in this way, clearly the best way of meeting it is the continuous method of administration, by which the new tubercular tissue cannot increase to any extent before it is attacked by a fresh dose. Under the intermittent method, more especially when small doses are given at considerable intervals, the new tubercular tissue could develop practically without interruption.

So far as my own experience goes, I have had no

example of general dissemination of tubercle under the treatment, and case No. 46 is the only one which lends any support to the view of local spread.

Apart from the poisonous action of the substance, and the possibility of dissemination of the tubercular virus, there are other dangers to which I must allude. The first is from the inflammation which is set up around the tubercles. As is shown both by clinical and microscopical observation, the effect of the early injections is to cause distinct and, according to circumstances, even violent inflammation around the tubercular area. This inflammation is not, however, of a spreading character, and is quite transient, passing off within a few hours, and consequently in external tuberculosis it is not associated with any special danger. It is, however, evident that this inflammation, if severe, may be attended with serious consequences, especially in extensive internal disease, as in the lungs and kidneys. The remedy for this is to begin with small doses.

What in my opinion constitutes the greatest danger in connection with the treatment, and one of far more importance than any to which I have as yet alluded, is the conjunction of sepsis¹ with the tubercular process; this danger is, of course, common to medicine and surgery. Where this combination exists, whatever may be the effect of the tuberculin on the tubercular tissue itself, it certainly seems to aid the extension of the septic process, and that in various ways. In the first place, during the early injections, a quantity of serous fluid is poured out into the sinus or cavity in which the pyogenic organisms are present, and thus provides them with pabulum for their growth; this is readily seen in the increased suppuration which follows the use of the injections in these cases. In the second place, the transient inflammations of the wall of the cavity weaken the tissue, and thus favour the penetration of the pyogenic organisms into it,

¹ Under the term sepsis I refer only to those forms of disease due to the pyogenic organisms and their allies.

and the consequent extension of the suppurative process. And, thirdly, I cannot but think that not only does tuberculin produce conditions favorable to the local extension of the septic process, but that the body as a whole becomes more prone to septic infection.¹ Several instances have now been published in which erysipelas has followed injections in cases of lupus; and as regards sepsis in other parts of the body, I have seen several things which have made me chary of employing this treatment in septic cases. Take, for example, No. 32. This patient had two septic sinuses, one in the lumbar region connected with the spine, and one in connection with disease of the left elbow-joint; and she also had tubercular disease of the occipital bone, with a semi-fluctuating swelling over it, which had not yet been opened. After a few injections this swelling over the occipital bone became so much smaller that it was only found with difficulty, and the tenderness became less. On the other hand, the sinus in the back did not improve, the elbow became much more painful and swollen, and her general condition became worse. In this case, in the part where no sepsis was present, there was improvement as regards the tubercular process, and the bad result as regards the elbow was evidently due to the septic condition rather than to any unfavorable action of the remedy on the tubercular disease. Take again No. 42, a child with hectic temperature and with septic sinuses in the groin in connection with tubercular glands. After a few injections the temperature became continuously high, there was burrowing of pus in the left iliac fossa and groin, and marked increase in the amount of discharge; a communication also formed with the left hip-joint, leading to an acute septic arthritis of that joint.

I believe that the danger where sepsis is present, due to extension of the septic rather than of the tubercular

¹ With regard to this point I have made some experiments on animals by injecting tuberculin and inoculating pyogenic organisms, but have obtained no evidence confirmatory of this view (July).

process, is a very real one, and much greater than that of dissemination of the tubercular disease, which is, after all, only problematical. In most of the published cases in which continuous fever has supervened on the injections the patients have had suppurating sinuses or cavities, and here the extension of the septic process is, I believe, the true explanation of the phenomena. So real, in my opinion, is the danger in these cases that I should be inclined to exclude from the treatment most of the cases, whether of external or internal tuberculosis, in which this complication is present, or at any rate not to treat them till a very free exit had been provided for the escape of the pus, and an attempt had been made to get rid of the septic element.

To sum up what I have to say with regard to the dangers of the treatment, I believe that the great danger is the combination of sepsis with the tuberculosis; the other dangers can, I think, be for the most part avoided by care, and are not such as to deter us from using the treatment in cases where otherwise it is likely to be of value.¹ Whatever the dangers and disadvantages be, they must be weighed against the advantages in any given case, just as in deciding on operative interference in tuberculous disease we have to weigh the dangers of dissemination of the disease, of shock, of possible sepsis, the disadvantages as regards the growth of the limb in joint disease, &c., against the probable advantages. We must therefore now inquire what this substance can do in the way of cure or arrest of the disease; and it is on the answer to this question rather than on the possible dangers that the future of the treatment depends.

¹ Another danger of the treatment which has attracted my attention lately is that tuberculin seems to render the body more susceptible to tubercular infection, instead of producing immunity, and therefore, if a cure is not obtained before leaving off the treatment, very rapid recurrence will probably take place, and the condition of the patient become worse than before (July).

THE CAPABILITIES OF THE TREATMENT.

The question as to the capabilities of the treatment must be decided on evidence obtained from clinical observation and from pathological investigation, and it will perhaps be most convenient if we begin with the latter evidence.

When we examine microscopical sections of tubercular tissues which have been subjected to the action of tuberculin, we see that very considerable changes have occurred in connection with the cellular elements. The first effect of the remedy is to cause a transient but acute inflammation in the tissues immediately surrounding the tubercles; and thus in sections made a few hours, or, better, a day or two after the first injection we find a great increase in the number of the leucocytes, which are in parts commencing to penetrate into the tubercles, and we also see evidences that the tissues have been more or less distended with exuded fluid. These acute inflammatory changes recur in a lessening degree after the earlier injections, and at a later period the appearances observed indicate an absorptive and healing process.

If we examine tubercular tissue from patients who have been under treatment for six or eight weeks we can note the following points. In the first place, looking at the essential cellular elements of tubercle, the epithelioid and giant cells, we see that they have undergone grave changes as regards their nutrition, and many of them are evidently dead, and simply appear as clumps of degenerating protoplasm in which the nuclei are not at all visible or only very faintly stained. The epithelioid cells almost always suffer before the giant-cells, and it is not uncommon to find in a tubercle that the epithelioid cells are more or less shapeless masses, while the giant-cells are fairly well preserved. At this time the tubercles are becoming infiltrated with small cells, and the remains of the epithelioid cells are disappearing before them, so that

in several of the photographs exhibited the place of the tubercle is taken by a mass of round-cells, scattered throughout which we find the remains of the epithelioid and giant cells. In addition to the small cells which apparently spread in in the first instance we not unfrequently find larger cells following them, and thus obtain appearances recalling very strongly Ballance and Sherrington's description of the changes which occur in the organisation of lymph. The next step is the development of fibrous tissue from these cells (not, so far as I can see, from the epithelioid cells, as some German writers have asserted), and the ultimate result is the disappearance of the tubercle and its replacement by fibrous tissue.

In some cases the giant-cell persists for a long time, and may be found lying in this newly formed fibrous tissue. The changes thus consist in transient inflammation around the tubercles at an early stage, accompanied by serious damage to the tubercular cellular elements, ending in many cases in their death. This is followed by absorption of these degenerated cells, and their replacement by young fibrous tissue. These changes are in all probability similar to those which occur in the natural cure of tubercle.

I have placed a number of specimens showing the various changes under the microscopes, and although the matter does not lend itself very well to photography, as the staining effects are of great assistance, nevertheless I think that I can illustrate my meaning by a few photographs which have been made for me by Mr. Pringle, of specimens illustrating the later changes.¹ (See Plates III, IV, and V.)

It will have been observed that the specimens which I have shown are all taken from isolated tubercles embedded in vascular connective tissue. It is in these that the changes which I have been describing are most manifest,

¹ Here several photographs were shown, from some of which the plates have been prepared.

and this would naturally be the case, seeing that the blood-stream is in close relation to them. Where there are closely aggregated masses of tubercles the changes are not as a rule nearly so marked ; indeed, some, especially of the more centrally placed ones, may appear quite unaffected after six or eight weeks' treatment. It thus seems that outlying and isolated tubercles may be completely destroyed by the treatment, but that where the tubercles are collected in masses portions are very likely to remain and act as foci of new growth when the treatment is left off, or when local tolerance has been so completely established that the remedy has lost its action. It is also not improbable that in some cases the increased infiltration of these masses of tubercle with round-cells may not lead to retrogressive changes, but to the formation of a chronic abscess. The recognition of these histological facts is very important in regard to the questions of relapse and of combination with surgical measures.

As regards the bacilli, the material apparently does not act on them directly, but only indirectly by getting rid of their surroundings and bringing them into contact with healthy, living, vigorous tissues, in which they will succumb more or less quickly. Where there are masses of tubercular tissue the bacilli will also remain and grow on the cessation of the treatment. I have tested all the tissues which I have removed from patients who have been subjected to this treatment by inoculating two guinea-pigs with the tissues from each case. Of eleven experiments of this kind, ten have yielded positive results, the animals becoming tubercular after the usual period of time. The length of time for which these patients had been under treatment varied from thirty-four to sixty-eight days. The case where a negative result was obtained had been under treatment for thirty-four days, and numerous tubercles in various stages of decay were seen under the microscope.

As regards experiments on animals, I have, in conjunction with Mr. G. L. Cheatle, been treating the animals

just spoken of with tuberculin, but our experiments are not yet in a fit state to publish. I may, however, say that in all cases the ulcers at the site of inoculation have healed under treatment, and the enlarged glands in the vicinity have diminished markedly in size, this diminution only lasting, however, so long as the treatment is continued. Further, in the animals which have died, the disease in the internal organs has been slight as compared with the usual amount found in animals which have lived for the same length of time after inoculation. In some, indeed, as in the case exhibited, there was no internal tuberculosis, although the treatment was begun at a period (after fifty-three days) when internal tuberculosis is usually evident, and although the companion animal killed when the injections in the other were commenced showed signs of commencing tuberculosis in the lungs and spleen. In this animal, on the other hand, tubercles are present in the lungs, and have no doubt enlarged somewhat during treatment, but there is no sign of fresh tubercle formation. In other two cases, again, there must have been fresh development of tubercles going on slowly during treatment, but in these the dose was small and was not increased. I cannot go further into this matter, but will merely show the organs of the rabbit, which was killed this evening.

This rabbit was inoculated from the case of iris tuberculosis (No. 44) on January 7th, the inoculation being made into the anterior chambers of both eyes. Twenty-six days later, there being well-marked signs of tubercular iritis in both eyes, the right being much more advanced than the left, the treatment was commenced. The first dose was 1 centigramme, and the amount was gradually increased to 3 decigrammes, at which it has remained for some weeks: sixty doses have now been given. In spite of the treatment the right eye has got steadily worse, and is now a caseous mass; the left eye remained fairly stationary for some weeks, but of late the disease seems to have progressed to some extent. We here see that the

right eye has become converted into a caseous mass. In the left eye the cornea is still clear, but there is distinct wrinkling of the iris and some nodules in it. There are several small tubercles in the lungs, but not what one would call an extensive infiltration. These tubercles are rather larger than usual, and may have been there originally, and perhaps have grown somewhat of late. No visible disease in the other organs.

To contrast with this I may quote the post-mortem appearances of one of the animals which lived longest after inoculation into both eyes, from my paper on tuberculosis published eight years ago. This animal (Exp. xiv, No. 1) lived sixty-six days (the present rabbit has lived 111 days). Eyes tubercular, cheesy glands below jaw, very extensive tuberculosis of the lungs, tubercles in liver, kidneys, spleen, large intestine, and omentum. Enlarged and caseous mesenteric and lumbar glands, &c.

On the whole the tendency of our experiments is to confirm Koch's statements as to arrest of the disease in animals by the use of this material, this arrest, however, only continuing so long as the treatment is carried on (experience of two months); and not only is there arrest in the growth of tubercles, but arrest in their dissemination.

Turning now to the clinical evidence, we find that the effect of the first injections is to cause increased swelling and pain at the seat of disease, due, as we have seen, to the inflammatory changes in the tissues immediately surrounding the tubercles. This effect is less after the subsequent injections and is soon hardly evident, and the increased swelling and pain give place as a rule to diminution of the pre-existing swelling and tenderness. In all my joint cases with unbroken skin (except No. 16, where operation was resorted to early) this improvement went on to a greater or less degree for three or four weeks, and joints which were previously rigid and tender became moveable, and in some cases quite free from pain, while they also diminished considerably in size. The meaning of this

early improvement is a point of very considerable importance, and the following is my interpretation of it. As microscopical examination shows, the thickening of the synovial membrane in cases of tubercular disease is not so much due to actual new formation of a mass of tubercular tissue as to chronic inflammation in the parts surrounding the tubercles; and the pain and tenderness of the part is connected with these chronically inflamed tissues, and not with the actual tubercular deposit. The persistence of this chronic inflammation implies the persistence of some cause of irritation, and without doubt the chief irritating cause lies in the tubercular tissue itself. The mere collections of cells forming the tubercles can of themselves hardly be irritating; it must be the chemical substances in the tubercle, the products either of the bacilli or of the cells themselves which keep up the process. Now there are many objections to Koch's view that the remedy acts by simple addition of substances to those already in the tissues, and it seems to me, for a variety of reasons which I cannot enter into now, that the material acts rather as a ferment, and for a time at least lessens or puts a stop to the production of these irritating chemical products by the bacilli or the cells. By this action the chief cause of the surrounding chronic inflammation is at once removed, and hence we have the rapid subsidence of this process. The microscopical evidence shows quite clearly that within three or four weeks there is very little disappearance of the actual tubercular tissue, that must evidently be a longer matter; while the clinical evidence shows diminution of swelling and pain, and in the case of matted glands, for example, subsidence of the periadenitis. I therefore believe that this diminished swelling and pain is in the first instance practically entirely due to cessation of the chronic inflammation around the tubercular area, and not to disappearance of tubercular tissue.

When this stage has been reached (and I am here speaking of cases treated by the intermittent method) matters seem in the majority of cases to come more or less to a

standstill, and the remaining swelling persists or only disappears very slowly ; indeed, in some cases the swelling again increases, but this early increase depends to a great extent on the manner in which the treatment is carried out. In only extremely few cases has the improvement gone on to apparently complete disappearance of the disease ; but it is not improbable, so far as I can judge from the cases I have had, that by means of the continuous method of administration the number of cases in which further improvement is obtained will be considerably greater. While the rapid improvement corresponds to the cessation of the chronic inflammation, the slow improvement corresponds to the removal of the tubercular tissue. Even where this is thoroughly carried out it must be a slow process, and the defect of the remedy seems to be that it somewhat rapidly loses its power, in the great majority of cases before the removal of the tubercular tissue has been completed.

In a few joint cases, after the preliminary improvement, progress has not only come to a standstill, but matters have got worse, in that suppuration has occurred. This took place in four cases, and I am under the impression with regard to two of them that the suppuration was possibly brought about by the treatment, by increasing the dose too rapidly, and thus keeping up too great local action.

We may therefore, I think, take it as a fact that in the great majority of suitable cases the early effect of the treatment will be to produce improvement, varying in amount according to the individual case and the mode of application of the remedy, and that subsequently this improvement will go on slowly or come more or less to a standstill. Further, it seems that the chances of complete cure by the remedy alone, within a few months at any rate, are slight, especially in cases where, as in unopened joints, the tubercular focus is buried in the tissues, and where, therefore, it cannot be got rid of except by the slow process of absorption.

In accordance with the various facts which have been mentioned we find that if the treatment is left off at the stage of improvement and cessation of reaction, or even within three and a half months (the limit of my experience on this point), recurrence will almost certainly take place. I have left off the treatment in ten cases which had more or less improved, after from two to nearly four months' treatment; and of these six have definitely relapsed, and in only one (No. 39) is there certainly no relapse. These cases are Nos. 15, 17, 22, 23, 24, 26, 32, 35, 38, and 39. The treatment has also been left off in a few other cases, but either there was no preliminary improvement or I do not know the result.

Such being the state of matters, there remains the question whether we can keep the disease at a standstill by going on with the treatment. (It may be noted in Koch's papers that he speaks almost entirely of a "standstill," and seldom of "cure.") This is an extremely important question, especially in cases where we cannot shorten matters by surgical measures. In a case of phthisis, for example, if we can bring the disease to a standstill and keep it so we have made a great stride in advance, and most patients would, I think, be willing and eager to go on with injections, even for an indefinite period, just as they winter in various health resorts with the same object in view, or as epileptics take bromide. Besides, an existing disease cannot really be at a standstill. If it is making absolutely no progress it is only a matter of time for it to be eradicated, or for the morbid tissue to become encapsuled; and if the bacilli are brought in contact with healthy tissues by removal of the tubercular elements, as histological examination shows to be the case where the tubercles lie in vascular tissue, they must die out in at most a few months, provided that they are not allowed to grow.

If now we examine the cases in my list which bear on this point (and my experience extends in a number of them over a period of nearly five months) we find that

the facts vary a good deal, due, no doubt, partly to the original distribution of the tubercular tissue, and partly to individual predisposition, more especially to the age of the patient; the result is apparently better in the young than in the old. In one case of lupus (No. 4), after two months' treatment the disease, which had not been entirely eradicated, was kept at a standstill for another two months by means of a decigramme once a week. Quite lately (since the abstract of cases was drawn up) this has seemed to be hardly sufficient, but a decigramme twice a week has checked it again. In one case (No. 11) a decigramme twice a week still keeps the disease in check, and in No. 12 improvement has steadily gone on up to the present time under decigramme doses given almost daily. In Nos. 16, 27, 28, 36, &c., similar doses given two and three times a week have also kept the disease from relapsing. In other cases, however, 2 (No. 6) and 3 (No. 3) decigrammes a week have failed to keep the disease in check, though the recurrences have been slow, and in No. 3 increase in frequency of the dose has again produced improvement. (The cases where scars have broken down after operations on joints do not come into the same category.)

On the whole I think we are warranted in saying that in a good many cases by keeping up and manipulating the injections with the view of maintaining the condition of standstill the disease can be kept in abeyance for five months, but that the frequency and strength of the injections necessary for this purpose vary in different cases. If the disease can be kept in abeyance for five months I see no reason why this condition should not be maintained for a longer time, and of course the longer the time the greater the chance that the tissues will destroy or encapsulate the remains of the disease. This action of the remedy is naturally of much greater importance in internal than in external tuberculosis. Physicians may be very thankful indeed, if they can do this, but surgeons cannot be satisfied in many cases with merely keeping the disease

at a standstill for an indefinite period ; we have other means at hand by which we may hope to expedite the cure. Hence I have come to the conclusion that tuberculin as a main agent in treatment has more to do with the domain of the physician than with that of the surgeon.

It is clear from the above facts that the treatment does not come to an end, as was originally supposed, when the dose of one decigramme has been reached without causing reactions, but that if once the treatment is commenced it must be continued steadily and carefully ; and so far as I can see we cannot as yet make any precise statement as to the period at which it may come to an end. This last fact is a very serious obstacle to its employment in many cases, but more especially in hospital practice, because, apart from the fact that patients soon become very irregular in their attendance, the expense of keeping up the treatment in anything like a considerable number of cases is very great ; for example, the cost in tuberculin alone of keeping up my hospital cases just now is at least £1 a day.

Before going on to the last point I must say a few words as to the diagnostic property of the drug. A list of twelve cases will be found at the end of the abstract where injections have been made in doubtful and non-tubercular cases. The case of leprosy (No. 56) is a very interesting one, both as regards the local effects during the reactions and the statement of the patient that improvement has been obtained. Of the other cases the last three are important as showing fever without any definite local reaction. No. 57 is very interesting as showing the way in which the remedy reveals the existence of tubercular deposits. In this case I wanted to demonstrate the opinion which I had expressed that the knee trouble was not tubercular, and I therefore injected one centigramme. Next day I found that there had been fever. On inquiring further it was found that there had been no reaction in the knee, but the patient showed us two strumous scars on the arm which had reacted markedly. The facts as regards the diagnostic property of the fluid

seem to be that most non-tuberculous individuals do not show any symptoms with doses up to a centigramme, while, on the other hand, some suffer from fever without any local effect. On the contrary, the great majority of tubercular individuals react more or less violently, both generally and locally, with the same dose. Fever without local reaction does not necessarily imply tubercle; fever with local reaction almost always implies tubercle, with the exception of some cases of leprosy. Absence of reaction with a *first* dose of one centigramme almost absolutely excludes tubercle, but absence of reaction with a first dose of one or two milligrammes, or even after a dose of one centigramme, provided that it has been preceded by smaller doses, does not necessarily imply the non-tuberculous nature of the lesion.

ITS PLACE IN SURGERY.

We now come to the last question which we have to consider, viz. what place should tuberculin occupy in the treatment of those forms of tubercular disease which come under the care of the surgeon?

Let us take first that form of tuberculosis in which the action of Koch's treatment is most manifest, viz. *lupus*. The experience of all who have treated cases of lupus by tuberculin alone has been that it is only very rarely indeed that it will produce a cure, and that we must go back to Koch's original statement that, in order to get a cure, operative measures must be combined with the treatment. Of my cases there is only one treated by tuberculin alone which seems to approach a cure, and it is of course too early as yet to speak positively. This is case No. 8, which is being treated by the continuous plan. On the other hand, the cases in which additional surgical measures are being employed promise exceedingly well. If we examine large sections of lupus we find that the tubercles are in parts aggregated together at the surface

of the skin, forming the visible nodules, and in other parts are scattered throughout the dense fibrous tissue of the skin or scar. By the ordinary methods of treatment, such as scraping and subsequent application of caustics—for example, strong nitric acid—the greater part of the visible disease is removed; but these isolated tubercles are left in places, and it is chiefly they which give rise to the recurrence. By Unna's salicylic plaster treatment, which yields fair results, the visible nodules are broken down more or less completely, and portions are removed which might very probably, be overlooked by scraping, but the isolated nodules are still for the most part untouched. By the combination of scraping and cauterisation, with subsequent use of these plasters after the wound has healed, a great deal is gained, but there is no security against recurrence on account of the isolated tubercles having escaped. Tuberculin, as we have seen from the histological facts, attacks and destroys these isolated tubercles pretty thoroughly, but is much less satisfactory in its action on the nodules. By combining the methods, however, we attack all parts, and everything seems to point to our being nearer a cure by this combination than by either plan separately. What I am now doing is this: first I give one, or better two, injections, fairly large so as to produce considerable local reaction. This brings into view all the nodules, and thus we are less likely to overlook them, while at the same time the tubercular tissue becomes softer and is more easily scraped away. I now scrape thoroughly and apply strong nitric acid, and then go on with the injections by the continuous plan, raising the dose quickly, and aiming at cure by destruction of the tubercle rather than at standstill. In a few days the wound heals under the treatment, and then I go over the whole surface bit by bit with Unna's salicylic plaster method. In these cases I do not think that the injection treatment ought to be stopped in less than six months.

With regard to tubercular glands I must say that I have not seen any marked change in the glands themselves

as the result of this treatment. Some have somewhat diminished in size, but the great majority have remained stationary. No doubt this is often due to the fact that the glands are partly or wholly caseous, when of course no marked diminution can be observed. In one case (No. 38), where the glands were not only almost completely caseous, but where they were much matted together, and where their thorough removal would have been a matter of considerable difficulty, the periadenitis cleared up very markedly; and I think it is quite likely that in cases where there is much matting of the glands and tissues a short preliminary course of this treatment (about three weeks) would much facilitate their subsequent excision. Except for this purpose I do not think that it would be worth while carrying out the treatment in the case of tubercular glands.

In considering *tubercular diseases of bones and joints* I shall divide them into the two classes of aseptic and septic; including under "aseptic" those where the skin is unbroken or where chronic abscesses have been opened or operations performed and the wounds treated aseptically, and under "septic" cases those where there are suppurating sinuses.

Speaking first of those with unbroken skin and without chronic suppuration, we had twelve cases of disease of the larger joints, in two of which (Nos. 11 and 12) the signs of disease have, as far as I can see, completely disappeared; while in a third (No. 13) the result would, I believe, have been very similar but for the accident that the ligamentum teres was the main seat of disease, and had been destroyed by it. Whether this result is really cure, or only improvement with standstill of the disease, I cannot, of course, at present say, because the treatment is still being continued. In any case we have at present 16 per cent. with restoration of function, and possibly we might have had 25 per cent.; and the question is whether we should in the early stages of joint disease subject patients to this treatment on the chance that a result of

this kind may be obtained. Now, in the first place my cases are too few in number to justify us in drawing any conclusions as to the probable frequency of such a result. I feel no confidence that if I had had twenty-four instead of twelve cases I should have had any more in which this remarkable disappearance of the disease occurred ; while, on the other hand, I cannot say that under the continuous method of administration the results might not have been better. Besides, we must bear in mind that occasionally, though it is true very rarely, quite as complete restoration of the joint occurs under expectant treatment carefully carried out. I have had two or three such cases, though only after years of treatment, and usually in the best cases there is more or less limitation of movement. Again, suppuration has occurred since the treatment began in four of the cases, and in two of these I cannot but think that it was induced by the treatment, and it is not improbable that in some cases, if the treatment is pushed too fast, the increased local action may precipitate the impending suppuration. On the whole I think the probabilities are decidedly against cure by this treatment alone, although it is quite possible that if we could get a case in the very early stage, while only a few tubercles are present, and while they are still discrete, a cure might be accomplished. So far as I can see at present, the advice which I would give in cases which would previously have been treated by the expectant method is to treat them by that method, and not to employ the Koch treatment at this stage. I think, however, that this question is still open.

The next question is whether the treatment comes into play at a later stage, and, if so, when. For a time I thought that the place for this treatment would be in cases where expectant treatment had failed to arrest the disease, and before performing any operation. Employed at that period in the case I hoped, firstly, that a certain number of the cases might behave like Nos. 11 and 12, and that thus in these an operation might be avoided ;

and secondly, that by the previous employment of the treatment the tubercular tissue might be so broken up that it could be easily removed by means of a comparatively trifling operation. This question I would still leave an open one, but my own inclination now is against the employment of the remedy at this stage for the following reasons. As regards the last point, we now know that it is not the tendency of this fluid to cause breaking down and softening of the tubercular tissue to any marked extent, and the hope that operations on joints would be more limited and more easily and thoroughly performed after this treatment has not been realised. As regards the first point, I think that the chance of avoiding operation at this stage is very slight, and certainly does not compensate for the drawbacks attaching to this course. The great objection to employing the treatment first is that tolerance has been established before operation, and that if recurrence takes place afterwards, and the scar breaks down, as happened in several of my cases, we no longer have this treatment to fall back upon ; and it is not at all remarkable that recurrence should take place in cases where only portions of the diseased tissues have been removed, for after the operation the joint contains lymph and blood-clot, which is some time in becoming vascularised ; and before vascularisation is complete tubercles may form in it, especially if any loose tubercular tissue has been left in the joint. For these reasons my own inclination is not to employ the remedy either in the early stage or before operation in joint diseases. It is possible, however, that one or two injections just before an operation might be of service in indicating the chief seats of the tubercular deposits, and in rendering them more easily removable.

It is at this period of the case, viz. after operation, that in my opinion the question of using tuberculin comes into play. Most of those who have employed the treatment have found that aseptic wounds or sinuses, or sinuses in which there is not much suppuration, heal as a rule very rapidly under it. In my list there are six cases of aseptic

sinuses, of which four have healed and the other two have improved, and one septic sinus in the soft parts, which was, however, only suppurating very little (No. 23), healed in twelve days. The position which I would at present assign to tuberculin in the treatment of disease of bones and joints is therefore as a means of obtaining healing of the wounds after operations have been performed. Where a complete arthrectomy or excision has been performed I would stitch up the wound, and wait till I saw whether healing occurred or not; if healing did not occur, and the appearance of the sinuses indicated recurrence of the tubercle, as indeed they usually do, and if they remained aseptic, I would employ tuberculin to get them to heal. Where the arthrectomy or excision was incomplete so far as the total removal of the tubercular disease is concerned, I would leave the wound open or provide very free drainage, and after about three weeks, when all the lymph on the surface had become vascularised, I would commence the treatment. Case No. 31 illustrates what I mean. It must always be remembered that unless the treatment is persevered in these sinuses will in all probability break down again, and I do not think it would be safe to leave it off in these cases either till the scar is well drawn in, or till at least six months have elapsed.

I think there is another possible advantage in tuberculin with regard to joints in that, by employing it after operation, it may not be necessary to do so much in the way of operation as might otherwise be required. I have always had a hankering after partial arthrectomies, but I have gradually been giving them up in favour of the complete operation; I think, however, that by the aid of tuberculin in getting the wounds to heal we may now in some cases be able to return to the less extensive operations, which in many ways present advantages over the other.

Where *septic sinuses* are present the treatment is for the most part contra-indicated, unless we can by operation render them aseptic previously. Under these circumstances I would follow the present lines of treatment in

these cases, and if the attempt to render the sinuses aseptic were successful, I would then take into consideration the question of Koch's treatment. In my list of six septic sinuses two cannot be said to have derived any benefit, and two were decidedly the worse for the treatment.

As to *genito-urinary tuberculosis* I cannot speak from my own experience, as I did not happen to have a case at the time I began the treatment, but I do not think that it will be applicable in most cases, for it is seldom that tuberculosis exists in the urinary tract for any length of time without becoming complicated with sepsis. At the same time, at the early stage before there is any marked septic complication, it seems to me that, considering the extremely serious nature of this form of tuberculosis, it would be quite right to give the treatment a trial. In that case one would not use the method so as to try to get a rapid cure, but rather with the view of getting and keeping up the condition of standstill. I have only tried it in one case of tuberculosis in this region, and that was in a patient of Mr. Rose's with tubercle in both testes, prostate, and various other parts of the body, to whom I gave a few injections. In this case there was no noticeable reaction in the testicles, but the amount of pus from the prostate diminished considerably.

I have had four cases of *tubercular laryngitis*, two of which healed and remained healed, and in one the treatment was given up as useless after a few injections (No. 48). In the fourth (No. 46) we committed the very grave error of giving up the treatment after a few injections because after the first there were no febrile reactions. When it was decided to resume the treatment we began at the dose we left off at, viz. 1 centigramme, and had a severe reaction, and subsequent extension of the ulceration. The treatment was given up again after ten injections, which had been administered at somewhat irregular intervals (latterly twice a week). I have since had serious doubts as to the wisdom of this second abandonment of the treatment, and I question whether the proper thing

would not have been to reduce the dose and pursue the continuous method.

As to *phthisis*, my opinion is not of course worth much, and I can only say that improvement has been the rule in the cases which I have had under treatment, as can be seen in the abstract of the cases. My own feeling is that if I had *phthisis* in a reasonably early stage I would have the treatment without any hesitation or delay. I would employ the continuous method with small but frequent doses, very slowly increased in amount, and aiming not at rapid cure, but at obtaining and maintaining a condition of arrest. With this object in view, I would not push the doses much above a decigramme, and I would from time to time diminish their frequency, the object being to have a certain reserve, so to speak, in hand, both as regards dose and frequency, so as to be able to combat any sign of recurrence by increasing the frequency and dose if necessary. Further, I should not look forward to leaving it off under from one to two years. In fact, I would try to make tuberculin occupy much the same position to *phthisis* that mercury does to secondary syphilis.

I have tried to bring forward as fairly and briefly as possible the facts which I have observed, and the conclusions which I would draw from them. These conclusions are, of course, only provisional, as the time has not yet come for dogmatizing. That better results might have been shown I do not doubt, and with my present experience I believe that if I were going over the matter again I could show better cases. For in the first place we now know more about what cases are suitable and what are not, and we also understand more about the manipulation of the remedy, and can employ it with more success and less risk than formerly. Further, we must remember that this matter is still in its infancy, and I do not doubt that as time goes on improvements will be made. The great failing of the material in its present form is the rapidity with which the tissues become tolerant of it; and it is to be hoped that when the question of

tolerance has been more studied, some way will be devised of preventing it. Besides, the fluid as we obtain it contains not only the active principle, but also other substances, which, as has been found in the case of other drugs, may more or less hamper its action ; and thus, when the attempts to separate the active agent in a pure state have proved successful, we may find that some of its present disadvantages have been got rid of. Even in its present form it must take its place among our means of combating tuberculous disease, although without doubt, in surgery, that place must be a secondary one.

Fig. 1.

Fig. 2.

DESCRIPTION OF PLATE III.

These illustrations are from photographs taken by Mr. Andrew Pringle from sections (chiefly of synovial membrane), from cases which had been treated by tuberculin. The method of reproduction is not a suitable one, and does not in any way do justice to the photographs; if, however, the plates are looked at from a distance they show in a general way the appearances which were present.

FIG. 1.—Section of synovial membrane showing small-celled infiltration of a tubercle: towards the centre some remains of epithelioid cells can still be found.

FIG. 2.—A similar appearance. In addition, larger cells are seen outside the small-celled infiltration.

DESCRIPTION OF PLATE IV.

FIG. 3.—Two tubercles with commencing fibrous formation around the giant-cells.

FIG. 4—Formation of young fibrous tissue in a tubercle ; a few epithelioid cells were still present at each side.

Fig. 8.

Fig. 4.

Fig. 5.

Fig. 6.

DESCRIPTION OF PLATE V.

FIG. 5.—Section from a case of lupus after two and a half months' "continuous" treatment, showing a giant-cell still present among the young fibrous tissue.

FIG. 6.—Section of synovial membrane under a low power. Two tubercles still present with marked small-cell infiltration. Much infiltration also towards the free surface, but no distinct remains of tubercles.

ABSTRACT
OF ALL
CASES OF TUBERCULAR DISEASE
WHICH HAVE BEEN TREATED
BY MR. WATSON CHEYNE
WITH TUBERCULIN
UP TO THE BEGINNING OF APRIL, 1891.

THE amount administered at each injection is stated, and an attempt has been made to indicate the occurrence and intensity of the general reactions, and the frequency with which the injections were given. The strength of the reactions is indicated by dashes placed above the dose. Where there is no dash there was no reaction. Where there is one dash (*e.g.* '002') there was only slight reaction, the temperature perhaps reaching 100° or a little higher, but without the patient suffering to any noticeable extent, and often not at all. Where there are two dashes (*e.g.* '002'') there was moderate reaction, the temperature being usually above 101°, between that and 104°, and the various symptoms being moderate in intensity. Where there are three dashes (*e.g.* '002''') there was a severe reaction, that is to say, the temperature was usually at or above 104°, though sometimes it was only 103°, and the general symptoms were correspondingly severe. Where

there are four dashes (*e.g.* ·002''') the condition of the patient was such as to make us anxious; only two reactions of this kind will be found in the list. No attempt has been made to indicate the local reaction.

This method, of course, only roughly indicates the state of matters. In some cases, even where the temperature was up to 102°, the patients did not suffer at all, but these I must mark as moderate reactions. In other cases patients with a temperature of 102° or 103° (within my "moderate" area) have suffered more than those with a temperature of 104°. Where this has been the case I have indicated them as severe. Those with slight reaction, *i.e.* with elevation of temperature above 99°, but seldom with any other symptoms, are probably correct. Those marked severe are, no doubt, all correct. But among those marked "moderate" are some where the symptoms were very slight, and which, were it not for the temperature, ought to have been so indicated, and others which were on the border-line as regards symptoms between moderate and severe, but where the temperature was not particularly high. The idea of indicating reaction and frequency in this way was taken from a paper by Leichtenstern, but his plan has been somewhat modified.

The frequency of the reactions is also indicated in the following manner:—Where more than one injection was administered on the same day the doses are bracketed together with a comma between them, thus: (·002, ·002). Where the injections were given on succeeding days there is a hyphen between each dose, thus: ·002-·002. Where there was one clear day's interval between the injections it is written thus: ·002; ₁·002; where there was two days' interval thus: ·002; ₂002, and so on.

As the ultimate result depends to a great degree on the way in which the material is used, it is absolutely essential in publishing the records of cases that the above facts should be clearly indicated, otherwise it is impossible to judge of the value of the results.

It is, of course, difficult in an abstract to convey a

thorough idea of any particular case, and I have attempted to add to the value of the record by stating, in the first place, what I would have done in the case in question before the Koch period, and in the second place, what I would now do in a similar case.

K. C. H.=King's College Hospital.

P. G. C. H.=Paddington Green Children's Hospital.

[illegible]

OF LUPUS.

Total number, amount, &c., of injections.	Additional treatment.	Condition when last seen.	Notes.
Commenced Nov. 26th, 1890; 3rd injection on Dec. 17th, 1890; discharged at her own request on Dec. 30th, 1890	None	When discharged on Dec. 30th the lupus patches had entirely disappeared, the sinus on the finger had healed and the swelling and tenderness of the bone had gone	The first reaction was a severe one but there were no dangerous symptoms; much local reaction. The temperature reached 104.4°, 16 hours after the injection fell a little, and again 31 hours after the injection was 104.8°. It then fell slowly, but was still about 100° when the second injection was given on Dec. 1st. There was an erythematous rash over the chest. The reaction after the second injection was much more severe, and for a few hours I was rather anxious about her. The temperature reached its highest point (105.2°) 9 hours after the injection, and during the next 24 hours she was retching a good deal, coughing, had a very weak and rapid pulse (148) and rapid respiration (60). She was also partially unconscious. Stimulants were administered and the symptoms gradually passed off, but the temperature did not reach normal till 7 days after the injection. There was violent local reaction and the lupus nodules for the most part sloughed out. There was a slight trace of albumen on Dec. 4th, but this disappeared next day. After the 3rd injection, though the temperature reached 104.4°, the general effects were comparatively slight.
Injections recommenced on Jan. 28th. Total number of injections up to April 8th = 100. Total amount of fluid used = about 5.816 grms.	On March 15th Unna's strong salicylic and creosote plasters were applied over the remains of the lupus on the right side of the neck	Note on April 6th.—"Some spots of lupus can still be recognised on the neck, but the condition is steadily improving. The arms are very much better. The sinuses on the hand are still unhealed, but the swelling is less and free from pain or tenderness. On the right side of the neck are some sores due to the salicylic plasters"	The patient did not suffer during this course of treatment. The parts around the lupus patches were kept constantly red and scaling, and these patches have gradually become less visible. The hand also steadily improved, and the swelling and tenderness disappeared. On March 15th remains of the lupus nodules were still visible in places in the neck and salicylic plasters were ordered for these places; the patches on the arm were very much improved and the finger was painless, but the most recent sores had no yet quite healed. She complained a good deal of her hair falling out during the course of the treatment. Treatment stopped in the middle of May. Slight recurrence in July.
Commenced Nov. 27th, 1890. Total number of injections up to April 8th = 51. Total amount of fluid used up to that time = 8.095 grms.	From time to time remnants of lupus tissue were picked out with a fine spoon, and on Feb. 16th the use of Unna's salicylic plasters was begun	Note on April 8th.—"The cheek is still in parts ulcerated as the result of the plasters, but the part looks quite healthy. Till this heals one cannot of course say how much has been gained"	The patient suffered a good deal after the early injections, there being sickness, headache, weak pulse, and pains, at first in the back, and subsequently in the limbs. After the first 3 or 4 injections she complained that at the height of reaction her limbs were powerless, and the pain in them so great that she could not move. As it seemed not improbable that there was some hysteria present, we gave an injection of the carbolic lotion without tuberculin, but no symptoms followed. By persevering steadily and cautiously these troubles were gradually overcome, and we were enabled to raise the dose. She also had several skin eruptions, mainly erythematous. On one or two occasions several subcutaneous hemorrhages occurred on the thighs after the injections. On March 2nd, after the injection of 4 decigrammes, she complained in about 10 minutes of great depression and of the sudden appearance of urticaria over the whole body. These symptoms very soon passed off. She had a second attack of urticaria a few minutes after the injection of .38 grm. on March 22nd, but without any marked depression. The lupus steadily improved, though at first more slowly than usual, owing no doubt to the intervals between the injections and the small dose. As there were evidently still some superficial remnants of lupus tissue the treatment by salicylic plasters was begun on Feb. 16th, a treatment which she had gone through several times before without any permanent benefit.

No.	Name, age, sex, &c.	History.	Condition before injection.	Frequency and amount of injections.
3	<p>M. C., æet. 26, female, admitted Dec. 1st, 1890, K. C. H.</p> <p><i>Diagnosis.</i>— Lupus of face and palate; enlarged glands in neck</p>	<p>Mother died of phthisis. Disease began 15 years ago. The nose was first attacked, and from thence it spread on to both cheeks. Hard palate and upper gums became affected about 5 years ago and the upper lip 2 years ago. Has undergone all sorts of treatment. Scraped last on Nov. 21st, 1890</p>	<p>Internal organs healthy. Very extensive lupus. A considerable part of the cartilaginous part of the nose has been eaten away as well as the columna. It extends up over the root of the nose, and for a short distance on to the forehead. From the nose it extends on to both cheeks, on the right side covering the whole of the cheek down to the lower border of the inferior maxilla, and as far outwards as the level of the anterior border of the masseter. On the left side the disease does not extend so low, hardly reaching below the level of the angle of the mouth. The upper lip is much affected and swollen, and the disease spreads to the inner side of the lip, from thence to the front of the gums; there was also a small patch at the anterior part of the hard palate on the right side. Much of the surface is raw as the result of the recent operation. There was some discharge from the nose. There are some enlarged glands in the submaxillary region and at the angle of the jaw on the right side</p>	<p>·006"; 2·006"; 1·006"; 1·008"; 1·008"; 1·008"; 2·01"; 1·01"; 1·018"; 1·02"; 4·03"; 2·06"; 1·06"; 1·08"; 2·1"; 3·1"; 1·1"; 1·1"; 1·1"; 2·12"; 1·12"; 1·12"; 2·12"; 1·12"; 1·15"; 2·12"; 1·12"; 1·12"; 1·12"; 2·12"; 2·1"; 1·1"; 2·1"; 1·1"; 1·1"; 2·1"; 1·09"; 1·1"; 2·1"; 1·1"; 1·1"; 2·1"; 1·1"; (1·1, 1·1)–(1·1, 1·1)–1·1– 1·1–(1·1, 1·1)–(1·1, 1·1)–(1·1, 1·1)– (1·1, 1·1)–(1·1, 1·1)– (1·1, 1·1)–(1·1, 1·1)– (1·1, 1·1)–(1·1, 1·1)–12– (12, 12)–(12, 12, 12)– (12, 12, 12)–(12, 12, 12). Treatment being continued</p>
4	<p>R. S., æet. 25, female, admitted Nov. 29th, 1890, K. C. H.; discharged Feb. 2nd, 1891, to attend as out-patient</p> <p><i>Diagnosis.</i>— Lupus of nose and cheek</p>	<p>Father and mother consumptive. Began on upper lip, immediately below septum of nose, 5 years ago. Has steadily extended in spite of all sorts of treatment. Has had 24 operations, the last about 6 weeks before admission</p>	<p>Various organs healthy. About $\frac{1}{3}$rd of the cartilages at the tip of the nose have been destroyed, especially on the left side; the orifices of both nostrils are considerably contracted. The centre of the upper lip is drawn up. The greater part of the nose is covered with scar tissue, in which are numerous lupus nodules and small ulcers. On the left side there is a separate patch of lupus close to the inner canthus of the eye. There is also a patch about the middle of the right cheek, which is ulcerated, and below the symphysis of the jaw is a thickened scar about $1\frac{1}{2}$ in. long, probably from a suppurating gland. There was evidently some disease inside the nose, but the orifice on the left side was so small that nothing could be seen</p>	<p>·008"; 2·01"; 3·01"; 1·01"; 1·01"; 2·01"; 1·01"; 1·018"; 1·02"; 2·08"; 2·04"; 1·08"; 1·08"; 2·1"; 2·12"; 2·12"; 2·15"; 2·2"; 2·23"; 2·1"; 4·1"; and once a week ·1</p>
5	<p>H. F., æet. 15, male, admitted Dec. 1st, 1890, K. C. H.; discharged Jan. 25th, 1891.</p> <p><i>Diagnosis.</i>— Lupus of thigh and axilla</p>	<p>No phthisical family history. Disease began 6 years ago</p>	<p>Internal organs healthy. At the back of the right thigh, rather below the middle, is a patch of lupus $3\frac{1}{4}$ in. from above downwards and $3\frac{1}{4}$ in. transversely. The patch is much thickened and covered with scales; there is no ulceration, and no signs of cicatrisation. Towards the outer part of the left axilla there is a similar patch, $3\frac{1}{4}$ in. from above downwards, and $2\frac{1}{4}$ in. from side to side</p>	<p>·01"; 2·01"–01"; 2·013"; 1·013"; 1·015"; 2·02"; 1·022"; 1·024"; 1·08"; 4·04"; 2·05"; 1·06"; 1·08"; 2·1"; 2·12"; 2·1"; 2·12"; 2·12"; 2·1"; 2·1". Sub- sequently attended twice a week and received ·1. Not been seen since the begin- ning of March</p>

Total number, amount, &c., of injections.	Additional treatment.	Condition when last seen.	Notes.
<p>Commenced Dec. 2nd, 1890. Number of injections up to April 8th, 1891 = 95. Total amount of fluid used up to April 8th, 1891 = 8705 grms.</p>	<p>Sent to convalescent home on Feb. 15th for a month. Readmitted on March 16th. On March 20th a number of nodules on the left cheek were scraped out and cauterised with nitrate of silver. On April 3rd the right side of the cheek was treated in a similar manner. In portions excised on March 20th there was still a good deal of tubercular tissue present</p>	<p>On April 8th the left cheek is still scaling in places, but there is no fresh recurrence; the parts scraped have healed. On the right side there are several sores, the result of the previous scraping</p> <p><i>Result.</i>—Great improvement in the lupus for a time; relapse. Subsequent improvement. Glands in <i>statu quo</i></p>	<p>Nothing abnormal about the reactions. The patient complained chiefly of headache, slight cough, sore throat, and the discomfort of the local reaction over this wide area. There was a good deal of local reaction, and after the first week the part steadily improved (though more slowly latterly) till she was sent to the convalescent home on Feb. 15th. On the morning of the previous day it was noticed that there were several small quite superficial bodies, almost like vesicles, on the skin just outside the lower angle of the lupus patch on the right side (on microscopical examination these were found to be really vesicles). Since the beginning of March a number of nodules have appeared at several parts of the scar, more especially towards the edge, and when readmitted on March 16th there was a considerable number of nodules over the surface, and ulceration was occurring at the nose. The left cheek was operated on as above, and the frequency of the injections was increased. Considerable improvement followed the increased frequency, and a large number of the nodules faded away. As there was still some tendency to ulceration on the nose and at one part of the cheek, these points were scraped and touched with nitrate of silver on April 3rd. Treatment stopped at the end of May, then much improved.</p>
<p>Commenced Dec. 3rd, 1890. Total number of injections up to April 3rd, 1891, = 30. Total amount of fluid used up to April 3rd, 1891, = 2331 grms.</p>	<p>None</p>	<p>Note on April 3rd.—“The parts remain healed, and there is no tendency to relapse. There are still several yellow spots in the scar, and the lupus patches below the eye and at the angle of the nose are not quite level.”</p> <p><i>Result.</i>—Great improvement. As yet no relapse</p>	<p>Before the temperature rose, after the first injection, patient had a rigor. She also complained of sore throat, nausea, and headache. There was a trace of albumen 2 days later, but this did not recur. The sore throat recurred after the first 9 injections; there was redness of the fauces, but no ulceration. No other noteworthy symptoms. The lupus improved rapidly and very markedly.</p> <p>Treatment stopped in the middle of May. Lupus nodules still present.</p>
<p>Commenced Dec. 3rd, 1890. Total number of injections=about 30. Total amount of fluid used=about 2067 grms.</p>	<p>None</p>	<p>“When last seen, about the beginning of March, there were still remnants of lupus in both places, but most on the leg. The disease seemed to be quite stationary.” Patient has not been seen since, and cannot be found.</p> <p><i>Result.</i>—Considerable improvement, and then standstill</p>	<p>After the first injection patient had a papular rash in patches over his back and sides, and slightly over the chest and thighs, in position and general appearance not unlike a herpes zoster. This faded away and disappeared about Dec. 14th. On Dec. 22nd a small abscess was found, and opened at anterior fold of axilla, and rapidly healed. The local reaction was fairly severe, but the patient was not very ill. Tubercles were still present in tissue removed from the thigh in the middle of January, though evidently much atrophied and destroyed.</p>

[illegible]

Total number, amount, &c., of injections.	Additional treatment.	Condition when last seen	Notes.
<p>Commenced Dec. 8th, 1890. Total number of injections up to April 6th, 1891, = 41. Total amount of fluid used up to that date = 3·818 grms.</p>	<p>On March 20th the strong salicylic plasters were applied to the left cheek</p>	<p>Note on April 6th.—“The condition of the face is better than when the patient was admitted, but shows a distinct tendency to relapse. On the left cheek the lupus nodules are breaking down under the plaster”</p> <p><i>Result.</i>—Improvement for a time, but tendency to relapse. Treatment stopped in May. Recurrence</p>	<p>The general constitutional disturbance after the reactions was not marked. There was a slight erythematous rash on the chest after the first injection. The local reaction was not so marked as in other cases, but was quite distinct. When she was sent home there were very few nodules remaining, but these have somewhat increased in number. On March 20th the strong salicylic plasters were applied to the left cheek.</p>
<p>Commenced Dec. 10th, 1890. No. of injections up to April 8th, 1891 = 35. Total amount of fluid used up to April 8th, 1891 = 2·780 grms.</p>	<p>Patient was advised to apply Unna's salicylic plasters to one side, but she did not get the proper material</p>	<p>Note on April 5th, 1891.—“The condition of the lupus is markedly better than before the treatment was commenced, but there is still lupus tissue round the greater part of the margin and at one or two places in the scar. The appearance is not so good as it was some weeks ago”</p> <p><i>Result.</i>—Considerably improved, but tendency to relapse</p>	<p>After the first injections patient had a scarlatini-form rash over the trunk. The lupus steadily improved for some weeks till considerable intervals were left between the injections, when it began to show signs of going back. Lately the injections have been given more regularly and frequently, and the condition has remained pretty stationary. Patient was ordered to apply Unna's salicylic plasters to the margin of the scar about the middle of March, but did not carry out her instructions properly.</p>
<p>Commenced Jan. 16th, 1891. Total number of injections up to April 8th, 1891 = 147. Total amount of fluid used up to that date = 13·246 grms.</p>	<p>Boracic ointment to prevent scabbing</p>	<p>Note on April 8th.—“There is everywhere a smooth depressed cicatrix which is gradually becoming paler. No trace of lupus tissue. Glands in neck rather smaller”</p> <p><i>Result.</i>—Very remarkable improvement. Disappearance of lupus tissue. Glands smaller</p>	<p>There was no serious general disturbance, but the local reaction was marked, and for several weeks the seat of the disease was red and scaling. The last places to cease scaling were the upper eyelid, the tip of the nose, and the left ear, and these had ceased to scale at the end of March. In a piece excised from the margin at the middle of March there were only a few traces of tubercular tissue. In a piece removed at the beginning of April no lupus tissue was found. Treatment stopped in the middle of May. No recurrence in July. Some strumous glands in neck suppurated at the end of May and were excised.</p>

No.	Name, age, sex, &c.	History.	Condition before injection.	Frequency and amount of injections.
9	<p>Miss C., set. 43, came under treatment on Feb. 28th, 1891.</p> <p><i>Diagnosis.</i>— Lupus of face, enlarged glands in neck</p>	<p>Tubercular family history. The disease began 20 years ago in the middle of left cheek, and has only attacked the nose during the last 2 years. Has undergone a variety of methods of treatment</p>	<p>Internal organs healthy. A number of enlarged glands in neck, some of which have suppurated. The whole of the left cheek is the seat of lupus, which extends on to the left ear, part of which is destroyed, and down into the neck and under the chin to the right side. The left upper eyelid is also extensively affected, and there is marked ectropion of the lower lid. It also extends on to and affects the whole of the nose, the part over the cartilage being one mass of lupus tissue. The corresponding part of the interior of the nose is affected, and there are several spots on the upper lip. There is also an extensive patch of ulcerating lupus over the right cheek. On Feb. 20th I scraped the lupus as thoroughly as possible, applying nitric acid to the raw surfaces. There were, however, numerous nodules which I could not remove, as they were embedded in dense scar tissue, and I only scraped the nose superficially, for if I had attempted to do it thoroughly the whole of the cartilaginous portion must have come away</p>	<p>·002"/, 2·004"/, 1·007"/, 1·01"/, 1·01'—01'—01'—01'—01'—01'— (01, 01''); 1·01'—01'— (01', 01)—012"—012'— (012, 012)—015'—(015', 015)— (015', 015)—02'—(01', 01)— (01', 01)—(01', 01)— (013', 01)—(01', 01)— (012', 015)—(015, 015)—02— (02', 015)—(02, 02)— (02', 025)—(025', 03)— (03, 035)—(035, 04)— (04, 05). To continue</p>
10	<p>W. H., set. 21, male, K. C. H.; admitted Feb. 23rd, 1891.</p> <p><i>Diagnosis.</i>— Lupus of face, hands, and leg, enlarged glands in neck</p>	<p>No tubercular family history. The lupus on the face began 11 years ago, commencing on the left cheek, and has been spreading steadily ever since, in spite of various operations and other treatment. When 6 years of age had tubercular disease of one toe; this was followed 2 years later by disease of right elbow and of upper part of right tibia</p>	<p>Internal organs healthy. Enlarged glands in neck. Extensive lupus of the face, involving both cheeks, upper lip, and the whole of the nose, a portion of which has been destroyed, and extending on both sides below the jaw, meeting at the chin. There is a large patch of lupus on the back of the left hand, and a smaller one on the back of the left forearm at the lower part. Sore on left leg, which he states was the result of an injury a month before admission. On Feb. 25th, before commencing the Koch treatment, the left side of the face was well scraped, but the nose and the right side were left untouched</p>	<p>·002"/, 1·002"/, 1·002"/; 2·032"/, 1·002"/, 1·001"/; 1·001'—001"/, 1·001'—002'— 002'—002'; 1·003'—004'— 005'—005'—(005, 005)—006'— (006, 006)—006—(006, 006)— (006, 006)—(006, 006)— (008, 008)—(01', 01, 01)— (01, 01, 01)—(02, 02, 02)— (02, 02, 02)—(03, 03, 03)</p>

Total number, amount, &c., of injections.	Additional treatment.	Condition when last seen.	Notes.
<p>Commenced Feb. 25th, 1891. Total number of injections up to April 8th = 53. Total amount of fluid used up to that date = 881 grms.</p> <p>Injections commenced on March 2nd, 1891. Total number of injections up to April 8th = 45. Total amount of fluid used up to that date = 393 grms.</p>	<p>Boracic ointment. Unna's strong salicylic plasters were commenced on March 12th</p> <p>On March 11th the creosote and salicylic plasters were begun on the right cheek</p>	<p>Note on April 8th, 1891.—“The condition of the face is very greatly improved. Parts are broken down under the influence of the salicylic plasters: portions where these have been applied are now soundly healed, and at present show no trace of disease. The parts to which the plasters have not yet been applied are still rapidly improving. Glands smaller”</p> <p><i>Result.</i>—Improving steadily</p> <p>Note on April 8th.—“The left cheek is still much swollen, red, and scaling, and is improving rapidly as regards the lupus. On the right side the scar is still broken down as the result of the plaster, but is healing at the lower part. The patches on the arm and hand are already much improved. Glands unaltered”</p> <p><i>Result.</i>—Improving</p>	<p>The patient did not suffer much from the early febrile reactions and the later reactions, which are marked slight, did not affect her at all, the temperature running up towards evening to about 100°, or sometimes a little higher. The wounds left after scraping healed in a few days. On April 2nd the places where the plasters were first applied were allowed to heal, and in the other parts, where the plaster had not been applied, the usual improvement noted in the early part of this treatment was observed. July 6th.—Still under treatment. Improving.</p> <p>The first five injections were followed by marked general and local reaction, and by a scarlatiniform eruption followed by desquamation. The sore on the leg also reacted, but the old scars in leg and arm did not react. The left cheek healed rapidly, and the right broke down well under the salicylic plasters. Sections of skin taken before the treatment was commenced show an unusual amount of tubercular tissue. Treatment stopped in the beginning of June. Face apparently well. Still remained well in July.</p>

There were thus ten cases of lupus under treatment, of which two have been going on for too short a time to be of value ; both are steadily improving. I may say that in all the remaining eight cases improvement occurred at first, and in some it was very considerable ; in one indeed (No. 8) there is now hardly any disease to be detected. In four of the eight cases (Nos. 1, 2, 4, and 8) the improvement is maintained or increasing. In one (No. 5) when the patient was last seen the improvement had come to a standstill, although there was still a good deal of lupus tissue present. In three, after the improvement had gone on to a considerable extent, it came to a standstill, and now shows a distinct tendency to relapse, but in none is the disease nearly so bad as before the treatment was commenced. My present view as to the position which this treatment ought to occupy in the treatment of cases of inveterate lupus, is that which it occupies in the treatment of case No. 9. The greatest improvement was obtained in a case (No. 8) treated by the "continuous" plan. Case 1 is very interesting as showing the very remarkable improvement after two severe reactions, but recurrence after leaving off the treatment ; this improvement affecting not only the lupus, but also the disease of the metacarpal bone.

DISEASES OF BONES AND JOINTS.

A.—CASES WITH UNBROKEN SKIN.

A. Cases with Unbroken Skin.

Total number, amount, &c., of injections.	Additional treatment.	Condition when last seen.	Notes.
<p>Injections commenced on Dec. 10th, 1890. Total number of injections up to April 6th, 1891 = 32.</p> <p>Total amount of fluid used up to the same date = 1'438 grms.</p>	<p>Extension till Jan. 13th. Massage afterwards</p>	<p>Note on April 5th.—“Child runs about, and is apparently in good health. Knee normal in size and appearance; no pain. Glands in neck in <i>statu quo</i>”</p> <p><i>Result.</i>—Very remarkable improvement. Complete disappearance of thickening and complete restoration of movement. Glands in <i>statu quo</i></p> <p>(In such a case I am afraid I would now recommend the expectant method and not Koch's treatment, for I can see nothing in this case to indicate that it would behave as it did under the Koch treatment and not as the other cases did. While one does occasionally get complete restoration of tubercular joints with expectant treatment, it is very rare where there is such marked thickening as in this instance, and certainly not in the course of 5 weeks)</p>	<p>The patient did not suffer from the injections, and the first reactions were quite slight; in fact, the temperature usually fell to between 96° and 97° a few hours after the injections instead of rising. After the first injection there was a little pain in the knee, but there was none subsequently. The swelling of the knee steadily went down, and when discharged it was only 1/4 of an inch larger in circumference than the other; the pain also quickly disappeared, and the movements became free. Massage was begun on Jan. 13th, and the patient was allowed to get up on Jan. 20th, when she could stand and walk without pain. She has since been allowed to run about without any local treatment.</p> <p>Treatment stopped in the middle of May. Remains well in July.</p>
<p>Commenced Dec. 12th, 1890. Total number of injections up to April 8th = 46.</p> <p>Total amount of fluid used up to that date = 2'7346 grms.</p>	<p>Extension and sandbags: left off on March 20th, and child allowed to move about</p>	<p>Note on April 5th.—“There is now hardly any perceptible difference between the two knees. The movement is perfect, and the child is standing and kicking in bed all day long. The glands in the neck seem to be in very much the same condition as they were originally”</p> <p><i>Result.</i>—Very remarkable improvement in the condition of the knee. Disappearance of fluid, thickening, and pain; movements perfect. Glands in <i>statu quo</i></p> <p>(I would now treat such a case as I would have done before the Koch period, for as in No. 11 I can as yet find nothing to indicate that it would improve so remarkably as it did under the Koch treatment)</p>	<p>The patient suffered very little after the injections, the chief symptoms being cough. The slight rise of temperature usually occurred on the day after the injections. The interval of 18 days was on account of an acute abscess in the scalp and a secondary one in right parotid region. These were opened and quickly healed. During the first injections the knee increased in size half an inch. On Dec. 27th it was found that the fluctuating swelling on the outer side of the joint had disappeared, and fluid was present in the joint. A drop or two was drawn off for examination, and was found to be of a glairy character with white flakes in it. After this the fluid became absorbed and had disappeared on Jan. 5th, and the synovial thickening steadily disappeared, and the movements of the joint became free and painless. The increase in size transversely was slower in disappearing. Treatment stopped in beginning of May. Have not seen patient since.</p>

No.	Name, age, sex, &c.	History.	Condition before injection.	Frequency and amount of injections.
13	<p>J. H., æet. 6½, female, K. C. H.; admitted Nov. 26th, 1890.</p> <p><i>Diagnosis.</i>— Hip-joint disease</p>	<p>No tubercular family history. The first symptoms of hip-joint disease were noticed last August, but they became much more marked after a fall 4 weeks ago</p>	<p>Internal organs healthy. Right limb slightly flexed and adducted. Limb can be flexed with care to a right angle, but not beyond. Cannot be quite extended. No rotation or adduction, and attempts at these movements cause great pain. No shortening. Some thickening in front of the joint. Antero-posterior measurements by callipers over the head of the femur give on right side 2½ in., and on left 2½ in. Nothing noticed wrong with the eyes.</p> <p>(Before the Koch period I would have employed the expectant treatment in this case)</p>	<p>'003''; 2'003''; 1'003''; 2'002''; 1'002''; 2'002''; 1'002'; 1'002'; 2'002'; 2'003''; 2'003'; 1'004'; 1'005-006; 1'008; 1'01'; 2'01; 1'015'; 1'02; 2'025'; 1'03'; 1'04; 4'05'; 1'06 (operation, interval of 13 days): 1'01; 2'02; 1'03; 1'04'; 1'05; 1'06'; 2'07'; 2'08'; 1'09; 1'1; 2'1; 1'1; 1'1; 2'1; 1'1; 1'1-1; 1'1; 1'1; 1'1-1-(1, 1)-1-1-1-1-1-1-1. Treatment continued</p>

Total number, amount, &c., of injections.	Additional treatment.	Condition when last seen.	Notes.
<p>Commenced Dec. 3rd, 1890. Total number of injections up to April 8th, 1891 = 53. Total amount of fluid used up to the same date = 2.76 grms.</p>	<p>Before the occurrence of the dislocation no retentive apparatus was employed. On Feb. 3rd the ordinary anterior incision was made into the hip-joint. Remarkably little disease was found, the synovial membrane being only very moderately thickened. The ligamentum teres had, however, been completely destroyed, and hence partial dislocation of the head of the femur was readily produced. The cartilages were intact, and there was no evidence of bone disease. As much of the softened synovial membrane as possible was removed, the joint thoroughly washed out, and the head of the bone replaced in the acetabulum. Wound stitched up; no drain. Extension and sandbags.</p> <p><i>Partial arthrectomy after 2½ injections.</i></p> <p>Abscess opened on April 1st (see notes).</p> <p>On microscopical examination of the synovial membrane removed on Feb. 3rd, tubercles were found for the most part much atrophied. Two guinea-pigs were inoculated on Feb. 3rd with portions of synovial membrane and became tubercular</p>	<p>Note on April 5th.—“Patient much more comfortable since abscess was washed out. The dressing has not yet been changed. Anæmic, but otherwise apparently well.”</p> <p><i>Result.</i>—Marked improvement at first; dislocation; partial arthrectomy; abscess formation.</p> <p>(In such a case I would now employ expectant treatment without using Koch's method. At the same time it cannot be denied that marked improvement followed the use of this method at first, and that the subsequent dislocation, which led to all the trouble, was only due to the fact that the ligamentum teres had suffered from the disease more than any other part of the joint)</p>	<p>As regards the general effect of the injections, the first four caused high temperature, headache, sickness, and coughing. Seven days after the treatment was commenced the child was markedly jaundiced, the stools were white and offensive, and there was bile in the urine. The jaundice passed off in about a week. After the first injection the patient complained of pain in the right eye, and some vesicular keratitis was found. This recurred after the next three injections and then ceased, and the eye remained well. There was a great deal of pain in the hip after the first two injections, and the hip was more swollen, but this did not recur with the later injections. From the end of the third week very remarkable improvement was observed in the hip, the thickening entirely disappeared, and the movements became free and painless. On Jan. 7th the hip-joint seemed normal in all respects, and remained so till Jan. 25th, when the patient was allowed to get up. After being up a short time she complained of severe pain in the joint, and next day it was found that partial dislocation of the head of the femur had occurred; this was reduced under chloroform. On Feb. 3rd the joint was opened as before described. The wound healed by first intention. On April 1st it was noticed that the scar was bulging about the middle. An incision was made into this, and about an ounce of thin pus was evacuated. It did not seem to communicate with the joint. The cavity was scraped out, iodoform and glycerine injected, and the wound stitched.</p> <p>Treatment stopped in beginning of May. Not healed at end of June, but improving under other treatment.</p>

No.	Name, age, sex, &c.	History.	Condition before injection.	Frequency and amount of injections.
14	E. S., set. 5, female, K. C. H., admitted Dec. 1st, 1890. <i>Diagnosis.</i> — Disease of hip-joint	Tubercular family history. The disease began last April after a fall. Has been wearing a Thomas's splint for some months	Internal organs healthy. The right limb is somewhat flexed (35°), adducted, and markedly rotated outwards; $\frac{3}{4}$ in. shortening. There has evidently been a true dislocation of the head of the bone upwards and forwards. A good deal of thickening about the joint, but no sign of abscess. Tenderness on pressure. No movement possible (Before the Koch period I would have excised the head of the bone)	.002"; .003"; .003"; 1'003" 1'004"; 2'005"; 1'005'; 1'008'; 1'007"; 4'008'; 3'009'; 2'01'; 1'012"; 2'015'; 3'02"; 2'02'; 2'015"; 3'015'; 2'02"; 1'02"; 1'03"; 2'04'; 1'05 (operation, interval of 11 days); 1'01"; 1'01"; 1'02'; 4'02'; 1'03'; 2'04'; 1'05'; 1'06'; 2'07'; 1'08"; 1'09'—08—08—09—1—1; 1'1— 1—1—1—1—1—(1, 1)—(1, 1)— (1, 1)—(1, 1)—(1, 1)— (1, 1)—(1, 1)—(1, 1)— (1, 1)—(1, 1)—(1, 1)— (1, 1). To be continued
15	J. F., set. 8, female, P. G. H.; admitted Dec. 29th, 1890; discharged March 18th, 1891 <i>Diagnosis.</i> — Hip-joint disease; enlarged glands	Phthisical family history. Losing flesh since last summer; limping for 2 months; starting at night for 2 weeks. No known cause; no previous treatment	Internal organs healthy. A few enlarged glands in neck and both groins. Pain in right hip and knee when walking. Leg fully extended and slightly adducted. No movement at hip-joint and pain on attempting it. No shortening. Fulness in front of joints. Thickening about trochanter. No thickening felt per rectum. (Before the Koch period I would have performed a partial arthrectomy of the hip in this case with the view of removing the sequestrum, the presence of which I was sure of. That a sinus might have formed after this treatment is not improbable from the results obtained in Nos. 27 and 29)	.002"; 1'002"; 1'004"; 1'004'; 1'006'; 1'008"; .008"; 1'01'; 2'015'; 1'02'; 1'03"; 2'035'; 1'04'; 1'05; operation, interval of 14 days; 1'015'—02'—02—02'—025'— 03'; 1'04'—04'—05'—05'—06— 07'; 1'09—1'; 1'12'; 1'15"; 1'15—15'—2'—25; 1'3"; 2'3. Stopped by mistake; resumed on April 7th

Total number, amount, &c., of injections.	Additional treatment.	Condition when last seen.	Notes.
<p>Commenced Dec. 4th, 1890. Total number of injections up to April 8th, 1891 = 68. Total amount of fluid used up to that date = 4·252 grms.</p> <p>Injections commenced on Jan. 5th, 1891. Total number of injections up to March 17th = 36. Total amount up to same date = 2·482 grms.</p>	<p>On Feb. 10th, 1891, the abscess was opened and thoroughly cleared out and the head of the bone removed. The articular cartilage was partially destroyed. The acetabulum was filled up with soft material which was removed. Wound stitched up; drainage-tube inserted at the upper part of the wound. Extension. Drainage-tube left out 3 days later.</p> <p><i>Excision of the hip-joint after 23 injections.</i></p> <p>Two guinea pigs were inoculated with material removed, and became tubercular</p> <p>On Feb. 5th the hip-joint was opened by the anterior incision and a large sequestrum was found and removed from the usual seat in the neck of the femur. Some curdy matter in joint, cartilages intact, synovial membrane not much thickened. As much of the tubercular material was removed as possible. Wound stitched up, no drain. Sand-bags on each side of limb. No extension</p> <p><i>Partial arthrectomy after 14 injections</i></p> <p>Numerous tubercles were present in the synovial membrane. Sent to convalescent home on March 18th</p>	<p>Note on April 5th, 1891.—“There is a sore where the drainage tube was with tubercular granulations. The middle of the scar is also breaking down. General condition good.”</p> <p><i>Result.</i>—Abscess formation; excision; breaking down of the wound.</p> <p>(In a similar case I would now excise the head of the bone and only employ the Koch treatment if the wound would not heal or if it broke down)</p> <p>Note on April 7th, 1891.—“Small sinus in middle of scar; leads to bare bone in the neck of the femur; hardly any discharge. Condition of patient good. Glands in <i>statu quo</i>”</p> <p><i>Result.</i>—Slight improvement at first; partial arthrectomy; healing of the wound; formation of a sinus after the treatment had been stopped</p> <p>(In such a case I would now perform partial arthrectomy at once and then use the Koch treatment)</p>	<p>Did not suffer much after the injections, and there was very little local reaction. After the first injections there was a slight papular rash on the face and back, and a good deal of cough. For a time the thickening around the hip diminished, but on Jan. 1st the tenderness returned, and an abscess soon showed itself in front. (This renewal of tenderness was coincident with an injection made directly over the joint instead of into the back.) Excision was performed on Feb. 10th and the wound healed by first intention except where the drainage-tube was. This sore has remained unhealed, and at first extended somewhat, but has not done so lately. On changing the dressing on April 5th it was, however, found that a point in the centre of the scar had broken down.</p> <p>Not healed at end of June, but improving under other treatment.</p> <p>After the first injection temperature was highest (104°). After 19 hours there was a good deal of pain in the joint. After the second injection there was no further pain. On 19th Jan. it is noted that there was no pain in the joint, and that slight movement was possible. This mobility increased up to the time of the operation, and the thickening in front of the joint steadily diminished. Operation wound healed by first intention. When sent to the convalescent home on March 18th the injections were stopped by mistake. About the 1st of April a small sinus formed in the middle of the scar. Injections recommenced on April 7th.</p> <p>Treatment stopped in the middle of May. Not healed at end of June.</p>

No.	Name, age, sex, &c.	History.	Condition before injection.	Frequency and amount of injections.
16	H. F. C., et. 5, male, K. C. H., admitted Jan. 20th, 1891. <i>Diagnosis.</i> — Disease of hip-joint with abscess	Tubercular family history. Disease began after a fall at the end of 1889. Patient was admitted to hospital in Feb., 1890, and sent out in July wearing a Thomas's splint. In Dec. last a swelling was observed about the trochanter	No disease of internal organs. Right limb slightly adducted; no flexion; no shortening. Slight movements of abduction and adduction and rotation causing pain; no flexion possible. Just above and behind the trochanter is a small abscess. There is a good deal of thickening in front of the joint (Before the Koch period I would in this case have excised the abscess, but not have opened the hip-joint)	.002''; .001''; .002''; 1'003'; .005''; 1'006 (operation, interval of 11 days); 1'002; 1'004; 1'006; 1'008; 2'01; 1'015; 2'015'; 1'02; 1'03; 2'04; 1'05; 1'06; 2'07; 1'08; 1'09; 2'1-1-1- (1, 1); 1'1; 1'1; 1'1; 1'1
17	W. R., et. 32, male, K. C. H.; admitted Nov. 29th, 1890; discharged Feb. 18th, 1891 <i>Diagnosis.</i> — Disease of knee-joint and tibia	No phthisical family history. Disease began about 3 years ago after an injury to his knee (combination of twist and blow). The knee has improved from time to time when he lay up; on resuming work it always became painful again. Lately has been treated by rest and Scott's dressing	Internal organs healthy. Left knee somewhat swollen, more especially at the inner side. There is marked swelling over the inner side of the head of the tibia and tenderness on pressure at that part. The main synovial thickening is just above this. There is a slight amount of flexion without pain; attempts to bend it beyond half a right angle cause pain; the joint cannot be fully extended (Before the Koch period I would have cut down on the inner side of the head of the tibia and removed as much of the affected tissues as possible)	.01''; .01'; .015''; 1'015; 2'02''; 1'02'; 1'03'; 2'04; 1'045; 2'04; 4'05-06; 1'08; 1'1; 1'12; 2'15; 2'15; 2'2'; 2'1 (operation, interval of 11 days); 1'05''; 1'04'; 2'06'; 1'07'; 1'1; 2'1; 1'19; 1'1; 2'1. Injections discontinued

Total number, amount, &c., of injections.	Additional treatment.	Condition when last seen.	Notes.
Commenced Jan. 25th, 1891. Total number of injections up to April 8th, 1891 = 30. Total amount of fluid used up to the same date = 1'419 grms.	On Feb. 10th the usual anterior incision was made and the hip-joint examined. There was very little synovial thickening, and the cartilages were intact. The abscess was also opened, and did not communicate with the joint. It was thoroughly cleared out. Wound stitched, drainage-tubes being inserted into both wounds. On Feb. 15th both tubes were left out. <i>Partial arthrectomy after 6 injections</i> Tubercles were found in the synovial membrane on microscopical examination	Note on April 5th.—“The wounds are apparently soundly healed and the thickening in front of the joint has disappeared, Patient in good health.” <i>Result.</i> —Healing of the arthrectomy wound and the abscess. Disappearance of the thickening in front of the joint. (I would now treat such a case as I would have done formerly, without employing Koch's treatment)	The first reaction was severe, the chief symptom being rapid breathing; there was no evident local reaction. In this case it was thought advisable to operate at an early stage. The wounds healed rapidly, both being soundly healed by March 11; they remain healed.
Injections commenced Nov. 30th, 1890; discontinued Feb. 18th, 1891. Length of treatment = 80 days. Total number = 28. Total amount of fluid used = 1'945 grms.	On Jan. 23rd an incision was made into the joint on the inner side, the synovial membrane was granular on the surface, but very slightly thickened; a portion was removed for microscopical examination. The incision was continued downwards over the inner side of the head of the tibia, and some cheesy material was found under the periosteum, close to the upper part of the bone. A hole was also gouged in the bone because it was thought that there might be a tubercular deposit in the bone, but only highly vascular inflamed bone was found. The wound was stitched up—no drain. Healing occurred by first intention. Back splint (no splint had been used previously) On microscopical examinations of the tissues removed tubercles, many of them undergoing atrophy were found. In the synovial membranes especially they were very much degenerated	Patient seen on April 1st. and said that the knee was quite comfortable. The waterglass bandage was not removed, but he was given permission to walk with the bandage on. <i>Result.</i> —Improvement in all respects for a time. Removal of portions of the affected tissue, healing of the wound. (In such a case I would not now trouble to use Koch's method, but would operate in the manner previously indicated)	After the first injection there was a good deal of pain in the knee, some effusion into the joint and enlargement of the part. This soon subsided, and as the treatment went on the enlargement decreased somewhat, the synovial thickening diminished, and the range of painless movement of the knee markedly increased; in fact, the patient could bend the knee to a right angle without pain. A trace of albumen was found in the urine the day after the first injection, but disappeared next day and did not recur. Patient was allowed to walk about on Jan. 12th, but this was followed by recurrence of swelling, slight pain, and fluid in the joint. These symptoms subsided on rest, but as the tibia now remained tender, the operation was performed. The patient was sent home on Feb. 18th, the whole limb being put up in waterglass. He returned on March 16th and the waterglass was removed. The line of incision remained soundly healed, and was somewhat drawn in at its centre. Knee still somewhat larger than the other, but quite free from pain or tenderness. There was an obscure sense of fluctuation at the inner side of the knee in the neighbourhood of the incision. Waterglass reapplied.

No.	Name, age, sex, &c.	History.	Condition before injection.	Frequency and amount of injections.
18	P. C., set. 5, male, K. C. H.; admitted Nov. 30th, 1890; discharged Feb. 20th, 1891; re-admitted on March 23rd, 1891 <i>Diagnosis.</i> — Disease of knee-joint; enlarged glands in neck	No tubercular family history. The disease began at least 6 or 8 months ago. Has not been treated	Internal organs healthy. An enlarged gland on right side of neck. The knee is flexed, swollen, and very painful on any attempt at movement or pressure. The synovial membrane is moderately thickened and there is apparently enlargement of the internal condyle of the femur. The knee is $\frac{1}{2}$ -inch larger in circumference than the other (Before the Koch period I would have persevered in the expectant treatment in this case)	.002"; 1.003'; .003'; 1.004'; 2.005; 1.006; 2.007; 1.009; 4.01-012; 1.015; 1.02; 1.03; 2.04; 1.04; 1.05; 2.06; 2.07; 2.07; 1.07; 1.08; 2.08; 1.08; 1.1; 2.1; 1.1; 1.1; 2.1; 1.1; 1.1; 1.1; 2.1; 1.1. Sent to convalescent home on Feb. 20th, and while there had 7 injections of .1. On his return on March 23rd the treatment was discontinued
19	W. J., set. 9, male, K. C. H., admitted Dec. 12th, 1890 <i>Diagnosis.</i> — Disease of knee-joint	No tubercular family history. Five weeks before admission fell on to his right foot off a tree, and felt pain in the right knee, which began to swell at once, and has steadily increased in size and become more painful. Has been treated by rest and splints	Systolic murmur at apex and base of heart; dilatation. Other organs healthy. On admission the right knee-joint was markedly swollen, being $1\frac{1}{2}$ in. larger in circumference than the left over the centre of the patella. No fluid in joint. Tender on pressure. Joint cannot be completely extended, but can be flexed rather beyond a right angle, but flexion is painful. Patient was kept at rest in bed for 19 days, and during that time the swelling of the knee increased $\frac{1}{4}$ th of an inch (Before the Koch period I would have given a farther trial in this instance to absolute immobilisation, &c., but I have no doubt that before many weeks had elapsed complete arthrectomy would have been necessary)	.002"; 2.002'''; 2.002'''; 2.002"; 2.002'; 1.003'; 1.003'; 1.004'; 1.005'; 1.005'; 2.007'; 1.008'; 1.008' (operation, interval of 16 days); 1.002"; 1.003'; 1.005'; 2.005'; 1.008'; 1.009"; 2.01'; 1.015"; 1.02"; 1.02"; 1.02; 1.03'; 2.04'; 1.05"; 2.05'; 1.06'; 1.06; 1.06-(06, 06)-06-07'; 1.80; 1.09'; 2.1. To continue

Total number, amount, &c., of injections.	Additional treatment.	Condition when last seen.	Notes.
<p>Commenced Dec. 8th, 1890; discontinued on March 23rd, 1891.</p> <p>Total number of injections = 39.</p> <p>Total amount of fluid used = 2·366 grms.</p>	<p>Extension and sand bags. Sent to convalescent home on Feb. 20th, 1891, with the leg in plaster of Paris, and to go on with injections. On March 31st complete arthrectomy was performed. The synovial membrane was much thickened, and the articular cartilage was eroded, especially over the lower part of the inner condyle of the femur and the inner tuberosity of the tibia. Several cheesy foci were found in the tibia at this part. Wound stitched up; no drain.</p> <p><i>Complete arthrectomy after 39 injections.</i></p>	<p>Note on April 8th, 1891.—“Patient is very comfortable. The dressings have not yet been changed. Glands in neck quite small.”</p> <p><i>Result.</i>—Improvement for a time as regards pain, and to some extent as regards swelling. Abscess formation: complete arthrectomy. Glands smaller. (In such a case I would now persevere with expectant treatment, and not employ Koch's method)</p>	<p>Nothing noteworthy as regards the reactions, with the exception of a papular rash in patches on the back and sides after the first injection. The knee swelled and became more painful after the first injection, but this soon subsided, and on Jan. 13th it is noted that there was no pain on jarring or moving joint, and the knee was only $\frac{1}{2}$ inch larger in circumference than the other. The improvement as regards the thickening then seemed to come to a standstill. On Feb. 20th the limb was put up in plaster of Paris, and he was sent to a convalescent home to have 1 injected twice a week. At that time movement of the joint was painless, and it was $\frac{1}{2}$ inch larger than the other, the chief thickening being about the internal condyle.</p> <p>When the patient was readmitted on March 23rd, an abscess was found on the inner side of the knee, and there was considerable pain on movement. On March 31st complete arthrectomy was performed</p>
<p>Commenced Dec. 31st, 1890.</p> <p>Total number of injections up to April 8th = 38.</p> <p>Total amount of fluid used up to that date = 1·04 grms.</p>	<p>On Feb. 3rd the joint was opened by long vertical incisions on each side of the patella; the synovial membrane was markedly thickened, but there was not nearly so much soft material as in the other cases; portions were clipped away, and as much removed</p>	<p>Note on April 6th.—“The wounds appear to be soundly healed, but there is still much synovial thickening. No pain, and patient can lift leg off the bed without pain.”</p> <p><i>Result.</i>—Slight improvement; partial arthrectomy; healing of wound; disappearance of pain. Thickening of synovial membrane still remaining, but not increasing. (At the present time I would treat such a case as before indicated, reserving the Koch treatment in case the wounds would not heal. At the same time there is little doubt that advantage has been gained by the treatment, for without it I feel sure the wounds would have broken down after the partial arthrectomy. Whether the treatment will have been ultimately of advantage in this case cannot yet be decided)</p>	<p>The first 2 injections caused pretty severe symptoms, chiefly cough, sickness, and headache. There was also a good deal of pain in the knee after the first 2 injections, and after the first it increased 2 inches in circumference. It, however, very quickly went down to and below its original size, and on Jan. 14th it was $\frac{1}{2}$ inch less than it was originally. It, however, increased again, and before the operation on February 3rd the measurement was the same as the original one. The wounds healed by first intention. Complete arthrectomy performed in the middle of May. Healed.</p>

from the surface by washing out, rubbing with sponges, &c., as possible, but much tubercular material was left behind. Stitched: no drain; back splint. *Partial arthrectomy* after 13 injections. The wounds healed by first intention. Two guinea-pigs were inoculated with portions of synovial membrane on Feb. 3rd, but have not become tubercular; numerous tubercles were present in the synovial membrane

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Total number, amount, &c., of injections.	Additional treatment.	Condition when last seen.	Notes.
<p>Commenced on Dec. 3rd, 1890. Total number of injections up to April 8th, 1891 = 81. Total amount of fluid used up to that date = 5·81 grms.</p>	<p>Till the operation no retentive apparatus was applied. On Jan. 23rd incisions were made on the inner and outer sides of the joint, and a good deal of soft tissue was removed, but I intentionally did not clear the joint out so thoroughly as I would otherwise have done. The wounds were stitched up; no drain. External splint with shoulder-cap.</p>	<p>Note on April 5th, 1891.—“There is a granulating patch about the size of a shilling in the middle of each scar, but the granulations are much healthier than they were, and considerable healing has occurred during the past week. General condition of the patient good.”</p> <p><i>Result.</i>—Improvement for a time. Partial arthrectomy. Healing and subsequent healing down of scars. Lately healing occurring</p>	<p>The first reactions were somewhat severe, the chief trouble being cough and sickness, and after the first injection the arm became painful and more swollen, but this did not occur subsequently. The elbow became more moveable and painless, and the swelling diminished somewhat (to about $\frac{1}{2}$ in. more than the other). As, however, matters became stationary, the joint was opened as before described. The wounds healed up, but on Feb. 15th it was found that the scars were beginning to break down in two places, and this continued till about half of each of the scars had broken down. Since that time the condition for a time remained stationary, but quite recently healing has been going on.</p>
<p><i>Partial arthrectomy after 19 injections.</i></p>	<p>Tubercles found in synovial membrane on microscopical examination. Two guinea-pigs were inoculated with portions of synovial membrane on Jan. 23rd, and became tubercular</p>	<p>(In a similar case I would now persevere with expectant treatment for a time without using Koch's method)</p>	
<p>Commenced Dec. 4th, 1890. Stopped March 8th, 1891. Continued for 94 days. Total number of injections=34. Total amount of fluid=1·439 grms.</p>	<p>No splint was employed in the first instance. On Jan. 16th the abscess over the head of the radius was cut out and found to consist of a mass of cheesy material with very little fluid in it. Wound left open. On March 10th complete arthrectomy was performed. A quantity of cheesy pus was found in the joint, the synovial membrane was much thickened and broken down, the articular cartilages extensively destroyed, and a soft caseating deposit in the lower part of the greater sigmoid cavity, which had evidently been the starting-point of the disease. Wound stitched up; drain inserted on the outer side 3 days later.</p>	<p>Note on April 6th.—“The wounds have healed by first intention except on the outer side where the drainage tube was. This was left out to-day. Patient in good health.”</p> <p><i>Result.</i>—No improvement. Complete arthrectomy. Healing of wound</p> <p>(In a similar case I would now perform complete arthrectomy at once, and only use the tuberculine if necessary. I can see no advantage from the treatment in this case)</p>	<p>The constitutional effects of the injections were chiefly the fever, headache, and a little tendency to sickness. After the first injection there was a good deal of pain and swelling in the elbow joint, but this did not recur. It seemed as if a little hemorrhage had occurred into the abscess as the skin over it became black and blue. For a time the movements of the elbow became painless, and slightly increased in range, and the measurement of the elbow became slightly less, but the improvement was very little marked and soon came to a standstill. On Jan. 16th the abscess was removed. The wound healed very slowly but had healed by March 8th. In the beginning of March it was found that the elbow had greatly increased in size and that a quantity of fluid was present in the joint, and on March 10th complete arthrectomy was performed.</p>
<p><i>Complete arthrectomy after 34 injections.</i></p>	<p>Two guinea-pigs were inoculated on Jan. 16th with the wall and contents of the abscess and became tubercular</p>		

No.	Name, age, sex, &c.	History.	Condition before injection.	Frequency and amount of injections.
22	F. C., set. 1½, female, P. G. C. H., admitted Dec. 5th, 1891. <i>Diagnosis.</i> — Disease of elbow-joint; subcutaneous tubercular nodule; enlarged glands in neck; corneal ulcer	Pbthysical family history. Disease of right elbow began about a month before admission, attributed to fall. No previous treatment. Subcutaneous nodule over outer side of left patella noticed for 14 days. Corneal ulcer on right eye noticed for 7 days	Rickety child. Internal organs healthy. Enlarged glands in neck. Right elbow much swollen, the swelling involving the whole region of the joint. Fluctuation on inner and outer sides. Measurement over olecranon 1½ inches more than on other side. Arm somewhat extended (angle of 100°). Movement through angle of 15°. Small subcutaneous nodule over outer side of left patella, size of a bean; skin over it red and adherent. Peripheral corneal ulcer on right eye. (In such a case before the Koch period I would have performed complete arthrectomy at once, and have removed the nodule over the knee)	'0015''; 1'0015''; 1'0015''; 1'0015''; 2'002''; 1'003''; 1'003''; 2'004''; 1'005''; 1'005''; 2'007''; 1'008''; 1'009''; 1'01''; 1'01''; 2'012''; 1'012''; 1'012 (operation, interval of 12 days); 1'01''; 1'012''; 2'012''; 1'012''; 2'015''; 1'02''; 1'02''; 1'02''- 02-02/-02/-02-02-03; 1'03''-03-03-04''-04''; 1'04''; 1'04''-05-06-07''- 08''; 2'1''-1'-1'-15'-2'-2''; 1'25''; 2'2''; 1'2''; 1'25''; 1'2''-2. Treatment discontinued
23	C. K., set. 3, male, K. C. H., admitted Dec. 1st, 1890; discharged March 18th, 1891 <i>Diagnosis.</i> — Strumous dactylitis; enlarged cer- vical glands; sinus in buttock	Tubercular family history. A year ago patient had an abscess in the left buttock and a sinus has remained ever since. Strumous dactylitis first noticed last August	Internal organs healthy. At the lower part of the left buttock is a septic sinus into which a probe passes for about 2 inches but does not go to bone. There is a typical strumous dactylitis of the left ring finger, affecting the first phalanx. No sign of suppuration but great tenderness on pressure (Before the Koch period I would have cut out the sinus in the buttock; have put the finger at rest and employed the usual remedies)	'002''; 2'002''; 1'002''; 1'003''; 2'003''; 2'003''; 1'004''; 1'005''; 1'005''; 2'006''; 2'007''; 1'007''; 1'007''-008''; 1'01''; 2'012''; 2'012''; 2'015''; 1'02''; 1'02''; 2'03''; 1'03''; 1'04''; 2'05''; 1'06''; 1'08''; 2'08''; 1'09''; 1'1''; 2'1''; 1.1; 1'1''; 2'1''; 1.1; 1.1. Treatment stopped

Total number, amount, &c., of injections.	Additional treatment.	Condition when last seen.	Notes.
<p>Commenced Dec. 9th. Total number of injections = 53. Total amount of fluid used = 2-799 grms. Treatment discontinued on March 24th, 1891</p> <p>tissue was not thoroughly carried out. Wounds stitched up. No drain. The nodule over the knee was also cut out and was found to be a thin-walled cyst (tubercular under microscope) containing a drop of pus</p> <p><i>Partial arthrectomy after 18 injections.</i></p> <p>Numerous tubercles were found in the synovial membrane on microscopical examination. Two guinea pigs were inoculated on Jan. 22nd, and became tubercular</p>	<p>On January 22nd the elbow was opened on the inner and outer sides. No fluid was present, but a mass of caseous material and softened synovial membrane was found and scraped out. The removal of the tubercular</p>	<p>Note on April 6th, 1891.—“The eye is quite well. The sore over the elbow is much smaller and healthier than it was, but still leads into the joint. Glands <i>in statu quo</i>. Slight purulent discharge from both ears”</p> <p><i>Result.</i>—No improvement; scars broke down after the arthrectomy</p> <p>(In a similar case I would at the present time perform complete arthrectomy at once, and leave the question of Koch's treatment till I saw whether the wounds healed or not. In this particular case a better result would in all probability have been obtained in that way)</p> <p>April 20th.—Quite lately the temperature has become continuously high, and consolidation of the lungs is occurring (? tubercular). Died in May. No P.M. allowed</p>	<p>After the first injection the temperature reached 104.6°, and the child was pretty ill; there was local reaction in the elbow and the nodule; nothing special about the eye. The condition of the eye rapidly improved and the ulcer had healed by Dec. 23rd. The nodule over the knee diminished to the size of a pea and then remained stationary. After the operation the incision on the inner side of the elbow healed by first intention, and remains healed. That on the outer side healed by first intention, but began to break down on Feb. 16th. Ultimately the whole scar broke down, but began to heal when the higher doses were reached. On March 16th about 30 seconds after the injection of 25 grms. the child began to scream, became very flushed all over the body, and immediately afterwards became very markedly cyanosed; the pulse became imperceptible. This passed off within 5 minutes and the child seemed well. The temperature quickly rose, and was 104.4° two hours after the injection. Two hours subsequently it fell to 101°, but subsequently rose and reached 104° in the evening. It came down to normal next evening. On the evening of the injection there was a scarlatiniform rash all over body and legs, which faded next day and was not followed by desquamation. The treatment was discontinued on March 24th, because a small abscess formed in the back and the temperature became irregular. On Dec. 18th there was a slight sero-purulent discharge from both ears, which still continues. A small abscess formed at one side of the rectum, burnt on Jan. 19th, and healed in 10 days.</p>
<p>Commenced Dec. 3rd, 1890. Stopped March 1st. Continued for 88 days. Total number of injections = 35. Total amount of fluid used = 1-313 grms.</p>	<p>On Jan. 16th an abscess on the finger was opened and a little cheesy stuff scraped out of bone. Wound left open. This did not heal.</p> <p>On March 3rd the sinus in the finger was laid open and a quantity of cheesy material was removed, and with it portions of bone, including the proximal end of the first phalanx. Wound left open</p> <p>Two guinea pigs were inoculated with the material removed on Jan. 16th and became tubercular</p>	<p>Note on April 6th, 1891.—“Condition of finger remains about the same; an opening still persists and there is a good deal of swelling around it. The sinus in the buttock is again almost entirely healed, and the glands are decreasing in size. General condition good”</p> <p><i>Result.</i>—Temporary improvement as regards finger; subsequent abscess formation. Healing of sinus and diminution in size of glands; temporary relapse as regards these 2 points after stopping the treatment</p> <p>(At the present time I would treat such a case as I would have done before and not employ the Koch treatment. The sinus could have been got more quickly and certainly well by dissecting it out, and the treatment was of no apparent advantage as regards the finger)</p>	<p>After the first 2 injections the temperature rose to 105°, but the child was not markedly ill. The sinus in the buttock discharged freely and the skin around became red and swollen. The finger also became enlarged and more painful. On Dec. 15th the sinus in the buttock was found healed and has remained well since. For a time the finger improved, it became painless and the swelling diminished somewhat, but at the beginning of Jan. signs of abscess formation appeared, and an incision was made on Jan. 16th. This did not heal but presented the ordinary appearance of a tubercular sinus, and was therefore again operated on on March 3rd, and the injections were discontinued. At that time the sinus in the buttock was healed and the glands in the neck smaller. About the middle of March the sinus in the buttock broke down and the glands on the right side of the neck and above the right elbow began to enlarge.</p>

No.	Name, age, sex, &c.	History.	Condition before injection.	Frequency and amount of injections.
24	P. A. S., æst. 54, male, P. G. C. H., admitted Dec. 9th, 1890; discharged March 5th, 1891 <i>Diagnosis.</i> — Strumous dactylitis; phthisis	Tubercular family history. Disease began 3 years ago. Patient has been operated on twice, the interior of the bones being thoroughly scooped out on each occasion. These wounds have healed. Glands in axilla have also been removed.	Signs of consolidation with crepitation at left apex. Other organs healthy. Proximal phalanges of middle and ring fingers of left hand much enlarged. Small unopened abscess on outer side of middle finger. Fingers tender on pressure	'002''' ; 2'002'' ; 1'002''' ; 1'002'' ; 2'002'' ; 1'002 ; 1'004'' ; 1'004'' ; 1'004 ; 2'005 ; 1'007 ; 2'01' ; 1'012 ; 2'015 ; 1'02 ; 1'025' ; 2'03 ; 1'036 ; 1'04 ; 2'05 ; 1'06 ; 1'06 ; 2'06' ; 1'08' ; 1'07' ; 2'07' ; 1'07 ; 1'07' ; 2'07 ; 1'07 (operation, interval of 5 days) ; 1'07 ; 2'08 ; 2'1'' ; 2'1
25	C. B., æst. 38, female, K. C. H., admitted Feb. 5th, 1891. Discharged April 11th, 1891 <i>Diagnosis.</i> — Spinal disease	Marked tubercular family history. When 7 years old suffered from right hip-joint disease commencing after a fall, and she did not recover completely from this till she was 20 years of age. (Suppuration did not occur, and no operation was performed.) Since that time she has remained well till 6 months ago, when she fell and hurt her back, and has suffered pain there ever since, but has had no efficient treatment for it	Internal organs healthy. The right leg is adducted (20°), flexed (55°) and 1 inch shorter than the left, the shortening being entirely limited to the femur. The movements at the hip are extremely limited. There are well-marked signs of spinal disease and considerable antero-posterior curvature of the spine at the lower dorsal region, commencing at the 6th dorsal, ending at the 10th dorsal vertebra, and most marked opposite the 9th dorsal. Great tenderness on pressure on spines and transverse processes. Pain on stooping, and aching when standing or sitting. No sign of abscess	'002-003 ; 1'005' ; 1'008' ; 2'01'' ; 1'01' ; 2'01'-01-01- 015 ; 1'015 ; 2'02, 02)- (02, 03)-(02, 03)-(02, 02)- (02, 02)-(03, 03)-(03, 03)- (04, 04)-(04, 04)-(05, 06)- '06-(06, 06)-(06, 07, 07)- (08, 08)-(09, 09)-(09, 07)- '1-(1, 1)-(1, 1)-(1, 1)- (1, 1)-(1, 1)-(1, 1)- (1, 1)-(1, 1)-(1, 1)- (1, 1)-(1, 1)-(1, 1)- (1, 1)-(1, 1)-(1, 1)- (1, 1). To continue

Total number, amount, &c., of injections.	Additional treatment.	Condition when last seen.	Notes.
<p>Commenced Dec. 9th, 1890. Treatment stopped on March 9th, 1891. Total number of injections = 34. Total amount of fluid used = 1.283 grms.</p>	<p>On Feb. 16th the small abscess on middle finger scraped out; contained only a little cheesy material. Wound left open. Healed readily</p>	<p>Note on April 6th.—“Fingers in much the same condition as before the treatment except that there is now no abscess. General health good; lungs normal”</p> <p><i>Result.</i>—Fingers very much the same. Phthisis much improved</p>	<p>Nothing special to note about the reactions; there was marked swelling of the fingers at first, but this soon subsided and they became less swollen and painless. The abscess, however, persisted, and was therefore scraped out on Feb. 16th. Since then the condition of the fingers has remained stationary.</p>
<p>Commenced Feb. 10th, 1891. No. of injections up to April 10th, 1891 = 76. Total amount of fluid used up to the same date = 4.888 grms.</p>	<p>Absolute rest on the back, fixed by means of sandbags. Sayre's jacket applied on April 4th</p>	<p>On April 3rd, 1891, there was entire absence of pain or tenderness about the back, and the patient expressed herself as feeling quite well. She was put up in a Sayre's jacket preparatory to her discharge from the hospital</p> <p><i>Result.</i>—Complete loss of pain or tenderness in the spine</p> <p>(How far the same result would have been got without the Koch treatment it is of course impossible to say. I think, however, that it is hardly worth while employing the Koch treatment in these cases unless it is found that absolute rest, &c., fail to arrest the progress of the disease)</p>	<p>The constitutional effects of the injections were slight, but she complained of pain in the spine after each of the early injections. She also had a good deal of diarrhoea after the 4th and 2 subsequent injections, but this passed off completely. She also at this time complained of a little pain in her hip, but this did not recur. The pain in the spine recurred from time to time as the injections were pushed, but there was no general reaction, and for the last few weeks there has been no pain or tenderness. Back still well when seen in June. The treatment was given up when she left hospital.</p>

We had twelve cases of disease of the larger joints with unbroken skin which were treated by Koch's method in the first instance, and of these two (Nos. 11 and 12) have apparently completely recovered; how far this recovery will be permanent time alone will show. The remaining ten required operation; of these seven would have been operated on, at or soon after admission, before the Koch period, leaving three in which the conditions, which determined operation, appeared during treatment. In one of these three cases (No. 13) the determining cause of the operation was the occurrence of dislocation, but I cannot say that operation was absolutely essential in this instance; in another (No. 20) the determining cause was cessation of improvement, and here also the operation at that time was probably not essential, though I have no doubt that it would have ultimately been required (I operated in these cases under the impression conveyed by Koch's paper that the tubercular material would be found broken down and easily removeable, and that in this way operation would expedite the cure); in the third case (No. 18) operation was rendered necessary by the occurrence of suppuration.

Of the operations performed excision was done in one case (No. 14); the scar has here partially broken down. Complete arthrectomy was done in two instances (Nos. 18 and 21), and it is as yet too early to say whether or not there will be recurrence. Partial arthrectomy (*i. e.* partial removal of the affected tissue) was performed in seven cases, and of these three remain healed, and recurrence has taken place in four; of these four cases two are now improving again (Nos. 20 and 22) as regards the local condition, and the other two have broken down quite recently (Nos. 13 and 15); in Nos. 20 and 22 the rapid recurrence was no doubt to some extent my fault, because I did not take pains to remove all the loose tubercular material from the joint, being then under the influence of the view that the tuberculine caused caseation of the tubercular tissue, and that, therefore, it would be readily removed by scraping and irrigation. It is worthy of note that in the

case in which the partial arthrectomy has given the most promising result (No. 16) the operation was performed after six injections had been given, that is to say, the Koch treatment followed rather than preceded the operative interference.

In one case of acute spinal disease all symptoms disappeared in a few weeks, but here absolute rest was also employed.

In the two cases of dactylitis I cannot say that any advantage was derived from the treatment as regards the fingers. In one case, however (No. 23), a sinus which had remained open for a year healed almost at once, and the enlarged glands in the neck diminished in size; and it is very interesting to note that soon after the treatment was stopped recurrence took place in these parts (this recurrence being, however, apparently only temporary), as if the use of the fluid had been keeping the disease in check.

B. Cases with Aseptic Sinuses, or with

No.	Name, age, sex, &c.	History.	Condition before injection.	Frequency and amount of injections.
26	E. C., set. 15, male, K. C. H., admitted Oct. 2nd, 1890. Discharged Jan. 27th, 1891. <i>Diagnosis.</i> — Tubercular disease of os calcis and of the sheath of one of the extensor tendons	No tubercular family history. The disease in the ankle began at the end of 1888, after a kick, and an abscess formed on the outer side of his foot and burst. At the end of 1889, he was again kicked, and a fresh abscess formed in the same situation. In 1888 he also had abscesses at the back of the left leg. About 15 months before admission he had a blow on the knuckles of the right hand followed by abscess, which has never healed. Patient was first admitted on Jan. 30th, 1890; the sinuses on the outer side of the os calcis were opened up and a quantity of cheesy material scooped out of the bone. The ulcer on the hand was also scraped. As the latter did not heal it was scraped again on March 21st, and a portion of the thickened sheath of the extensor tendon of the 3rd finger was cut away. The latter wound healed, but the sore at the knuckle did not. The patient was readmitted on Oct. 2nd, 1890, and on Oct. 4th the os calcis was again scraped and gouged out, and a hole was made through and through the bone with an opening below the internal malleolus; the hand was also scraped	Internal organs healthy; 2 sinuses, one on the inner and one on the outer side of the right os calcis. A probe can be passed right through the bone, and a good deal of bare bone can be felt. There is also a small ulcer over the knuckle of the 3rd finger of the right hand, but the scar along the tendon seems quite sound	'01"; 2'01"; 1'01"; 1'01"; 1'01"; 1'01"-015"; 1'015; 1'015'; 1'015; 2'02; 1'025; 1'03; 1'04; 4'05-06; 1'08; 1'1; 4'12; 3'15; 2'1; 2'1; 2'12. Treatment discontinued
27	C. N., set. 5, male, P. G. C. H.; admitted Dec. 4th, 1890. <i>Diagnosis.</i> — Hip-joint disease with sinus; previous partial arthrectomy	Phthisical family history. Disease of right hip began Oct. 1889; no known cause. Was admitted first in Feb., 1890, and arthrectomy was performed on Feb. 20th. A sequestrum was removed from the neck of the femur. The head was partially dislocated, and was replaced. Acetabulum filled with soft material. Cheesy material in joint, and the synovial membrane had cheesy points in it. As much of the diseased tissue was removed as possible. The wound never healed completely, and part of the scar subsequently broke down. Very little progress had been made up to the date of admission, although he had been in a convalescent home for several months	Internal organs healthy, Hip stiff in good position. Sinus in scar leading to joint with flabby granulations. Very little discharge. Much thickening around joint (Before the Koch period I was several times on the point of excising the child's hip joint, and I have no doubt I should ultimately have done so)	'003"; 2'003"; 1'008"; 1'002"; 2'008"; 1'008; 1'005"; 1'005"; 2'006"; 1'007"; 2'008; 2'01"; 1'012; 2'015; 1'02; 2'025"; 1'025'; 1'02; 2'02; 2'03; 2'04; 1'05'. Injections of '06 continued twice a week

Sinuses which have been rendered Aseptic.

Total number, amount, &c., of injections.	Additional treatment.	Condition when last seen.	Notes.
<p>Commenced Nov. 26th, 1890; Discontinued on Jan. 21st, 1891. Length of treatment = 56 days. Total number of injections = 23. Total amount of fluid used = 1.135 grms.</p>	None.	<p>Patient was seen on March 25th, 1891. The sinus in the foot was in the same condition as when he was discharged. There was some increased thickening over the knuckle and a small crust, which has formed within the last few days.</p> <p><i>Result.</i>—Sinus in foot remained unhealed, but the bare bone disappeared: apparent disappearance of the tubercular tenosynovitis. Relapse of the latter after cessation of treatment.</p> <p>(In this case I do not think that any real advantage was gained by the Koch treatment)</p>	<p>Nothing noteworthy as to the general reactions. There was never any marked reaction about the foot; there was at first a little redness and an increased discharge. The sore over the knuckle, however, reacted markedly, the partially healed cicatrix breaking down, but there was no effect where the tendon sheath had been removed. On Dec. 27th no bare bone could be felt on probing the sinuses in the foot, and the sore over the knuckle had completely healed.</p>
<p>Commenced Dec. 9th, 1890. Total number of injections up to April 8th, 1891 = 42. Total amount of fluid used up to the same date = 1.515 grms.</p>	Sent to convalescent home on Feb 27th, 1891	<p>Note on April 7th, 1891.—“Sinus apparently soundly healed. No thickening. Child in good health.”</p> <p><i>Result.</i>—Great improvement. Rapid healing of the sinus, and disappearance of the thickening.</p> <p>(This is the sort of case in which I think that Koch's treatment will be of great value, and I would adopt it again under similar circumstances)</p>	<p>During the first reaction the temperature reached 104°$\frac{4}{10}$ ten hours after the injection, and next day about the same time it again reached 104°: there was a good deal of local reaction. The most severe reaction was after the third injection, but there were no dangerous symptoms. On the 13th of Jan. it is noted that the sinus is soundly healed, and all thickening has disappeared. Since that time the scar has steadily contracted. At the middle of March was allowed to get about in his Thomas's splint. Treatment stopped in April. Remained well in July.</p>

No.	Name, age, sex, &c.	History.	Condition before injection.	Frequency and causes of injections.
28	<p>S. W., æt. 13, female, K. C. H.; admitted Oct. 6th, 1890; discharged Feb. 20th, 1891, to be treated as out-patient</p> <p><i>Diagnosis.</i>— Spinal dis- ease with aseptic sinuses in the right lumbar and iliac regions</p>	<p>No tubercular family history. About 5 months before admission patient began to feel aching pain in the back and was always wanting to lie down. About a month ago she noticed a swelling in her right side. No known cause. When admitted there was slight curvature involving the 12th dorsal, and the 1st, 2nd, and 3rd lumbar vertebrae, and there was pain on pressure over these spines and transverse processes.</p> <p>There was a large lumbar abscess on the right side, and also a large fluctuating swelling in the right iliac fossa reaching as far as the middle line and as high as the umbilicus. The two abscesses communicated. On Oct. 14th both abscesses were opened, thoroughly scraped and washed out, 2 oz. of a 10 per cent. emulsion of iodoform in glycerine injected, and the wounds stitched up. Both wounds afterwards broke down and sinuses remained. On Nov. 4th drainage-tubes were inserted, and a second opening made behind corresponding to the hole in the fascia through which the pus had made its way. The drainage-tubes were removed at the beginning of December</p>	<p>Internal organs healthy. There are 2 openings in the right lumbar region and one just above Poupart's ligament. A long bullet probe goes in for its full length into all the sinuses. There is not much discharge, but the wounds show no sign of healing. Curvature and pain on pressure over the spine as before mentioned</p> <p>(In this case before the Koch period I would have adopted one of two courses, either to continue to treat the sinuses aseptically, the average duration of the case till healing is complete being on an average 8 months, or to scrape out the sinuses again, wash them out, inject iodoform and glycerine, and stitch them up, hoping in this way to obtain union by first intention. The latter is what I intended to do)</p>	<p>'005"; 1'005"; 2'006"; 1'005"; 1'006"; 4'006"; 1'007; 1'008"; 3'01; 1'01; 1'012; 2'012; 1'015; 1'02; 2'03; 1'04; 1'06; 2'08; 1'12; 1'12'; 2'12; 1'12; 1'1; 2'1; 1'1; 1'1; 1'12-1. Sent to convalescent home for a month, where '1 was injected twice a week. Since her return on March 23rd '1 has been injected three times a week</p>
29	<p>T. K., æt. 5½, male, P. G. C. H., admitted Feb. 10th, 1891</p> <p><i>Diagnosis.</i>— Hip-joint disease with sinus; previous partial arthrectomy</p>	<p>No phthisical family history. Right hip-joint disease for 14 months; no definite cause. Was admitted first in Feb. 1890, and arthrectomy was performed on Feb. 7th. A sequestrum was removed from the neck of the femur, and as much as possible of the capsule was taken away. The cartilages were intact. Wound healed by first intention except at middle, where a small sinus remained, which healed at the end of April. This remained healed till Sept. 3rd, when a probe could be passed in for a considerable distance</p>	<p>Internal organs healthy. Hip-joint stiff, slightly adducted and everted, completely extended. No shortening. Some thickening felt in front of joint. Sinus leads down to bare bone in neck of femur; very little discharge. A good deal of thickening in front of the joint and enlarged glands in both groins. A few small enlarged glands in neck</p> <p>(Before the Koch period I would in this case have persevered with antiseptic dressings for some months, and had the sinus not closed I might then have operated)</p>	<p>'002"; 3'002"; 1'002"; 1'002"-002-002-(002, 002)- 1'002-(003, 003)-005- (005', 005)-008-012; 1'012-013-02-035'-05'- 07-1'-1'-(1, 1')-1'-1'- (1, 1)-(1, 1)-15'-(15, 15)- (15, 15)-(15, 15); 1'2; (2, 2)-(2, 2)-(2, 2)- (25, 25)-(25', 25)-3; (3, 3)-(3, 3)-(3, 3)-3; 1'3; 2'3. Still under treat- ment</p>

Total number, amount, &c., of injections.	Additional treatment.	Condition when last seen.	Notes.
<p>Commenced Dec. 13th, 1891</p>	<p>Absolute rest in bed. Antiseptic dressings. Subsequently plaster jacket and a month in convalescent home</p>	<p>Note on April 6th, 1891.—“Patient still wearing the Sayre's jacket. The sinuses remain soundly healed, and there is no pain in the back. General condition of patient is good”</p> <p><i>Result.</i>—Healing of the sinuses. Disappearance of pain</p> <p>(In a similar case I would now employ Koch's treatment. There can be no question that it was of great benefit to the patient in this instance)</p>	<p>The patient suffered very little at the commencement of the treatment. After the first injection the only symptoms were headache and pain in the back and general malaise. On Dec. 19th it is noted that the sinus in the back had almost healed, and that in front was looking much more healthy. On Dec. 30th both the posterior wounds were soundly healed, and a probe could not be passed into the anterior wound for more than 1 inch. On Jan. 7th there was a small scab over this wound, and when that was picked off a probe could not be introduced. When the dressing was changed on Feb. 8th this wound was found soundly healed, and she had then no pain or tenderness over the spine. A Sayre's jacket was applied on Feb. 17th, and she was sent to the convalescent home on Feb. 20th to have 1 injected every 3 days. She returned at the end of March and went back to her school, arranging to attend for injection every other day. Remains well in July.</p>
<p>Injections commenced on Feb. 10th. Total number of injections up to April 8th, 1891 = 60. Total amount up to April 8th, 1891 = 7.709 grms.</p>	<p>None</p>	<p>Note on April 4th, 1891.—“Sinus still open, but much retracted and smaller. No thickening in front of joint. Inguinal glands still large on both sides and more distinct. Glands in neck in statu quo”</p> <p><i>Result.</i>—Improvement in so far that the bare bone has become covered and the sinus is become drawn in</p> <p>(This is a case where I now think that this treatment should be of value, and in which I would use it. There seems little reason to doubt that so far advantage has been gained by it)</p>	<p>In the first three reactions the temperature went above 104°, and there was cough, sickness, and headache. After the first injection the hip swelled up and became tender, but this quickly subsided. On March 3rd it is noted that most of the thickening about the hip has disappeared, there is very little discharge; the sinus still persisted, and the orifice was level with the surface of the skin.</p> <p>Treatment stopped in May. Not yet healed.</p>

No.	Name, age, sex, &c.	History.	Condition before injection.	Frequency and amount of injections.
30	<p>J. P., set. 8, male, K. C. H., admitted Feb. 10th, 1891.</p> <p><i>Diagnosis.</i>— Recurrent disease of knee after arthrectomy; septic sinus rendered aseptic</p>	<p>One brother has spinal disease, no other tubercular family history. Has suffered from disease of his left knee-joint for 5 years; has been in various hospitals, and was admitted into my ward in Oct., 1889. On Oct. 16th of that year I performed a partial arthrectomy, removing all the diseased synovial membrane in front of the joint but not dividing the ligaments to get at the back. The wound healed by first intention, and on Nov. 6th the leg was put up in plaster of Paris and the child sent home. For some months the joint went on very well, but he was readmitted at the end of July, 1890, with recurrence of the disease. Complete arthrectomy was then performed. The wound healed by first intention, and the patient was sent out wearing a plaster of Paris case. In October it was found that a small abscess had formed over the external condyle</p>	<p>Internal organs healthy. Two sinuses on the outer side of the left knee-joint; otherwise the part appears healthy. On Feb. 13th these sinuses were connected, and the cavity which went down to the outer side of the femur thoroughly cleared out, wound left open</p> <p>(The above is the treatment which I would have adopted before the Koch period)</p>	<p>'002; 1'003; 1'005-01''; 1'01''; 1'01''; 2'01''; 1'01''- 01''-01''-15''-02''-02''-03''- 04''-04''-015''-02; 1'08-04- 05'; 2'06-07-08-09'-1-1- (1, 1)-(1, 1)-(1, 1)- (1, 1)-(1, 1)-(1, 1)- (1, 1)-(1, 1)-(1, 1)- (1, 1)-(1, 1). To continue</p>
31	<p>F. R., set. 19, female, K. C. H., admitted Feb. 14th, 1891</p> <p><i>Diagnosis.</i>— Disease of wrist-joint with septic sinus rendered aseptic</p>	<p>Tubercular family history. Disease of left wrist began 15 months ago. No known cause. Abscess opened 4 months ago</p>	<p>No lung trouble. Some pus in urine and irritability of bladder. Disease of left wrist-joint. Thickening around joint, especially over lower end of radius. Great pain on the slightest movement, septic sinus towards the inner side of the back of the wrist leading into the joint and to bone. On Feb. 24th the wrist-joint was excised by the long posterior incision, the sinus being enlarged and also utilised. The wound was sponged out with undiluted carbolic acid, the long incision stitched up and a drainage-tube put in where the sinus was. The long incision healed by first intention, and the sepsis had evidently been eradicated. The drainage-tube was still in when the injections were begun</p> <p>(Before the Koch period I would have excised the wrist-joint in this case)</p>	<p>'002''; 2'002'; 1'003''; 1'003''-003''-003-(003, 003)- (004, 003)-(005, 005)- (008, 008)-(01, 01)- (01, 02)-(02, 02)-(02, 03)- (03, 03)</p>

Total number, amount, &c., of injections.	Additional treatment.	Condition when last seen.	Notes.
<p>Commenced Feb. 20th, 1891. Total number of injections up to April 8th, 1891 = 49. Total amount of fluid used up to the same date = 5.1 grms.</p>	<p>Antiseptic dressings</p>	<p>Note on April 5th.—“Dressing changed to-day after a week’s interval. A point the size of a pin’s head not yet quite healed.”</p> <p><i>Result.</i>—Rapid healing of the wound</p> <p>(This is the sort of case in which I think Koch’s treatment is of value)</p> <p>April 20th.—The sinus was found healed at the next dressing</p>	<p>The first 3 injections produced no local or general effect. The subsequent ones caused headache, cough, and pain in the left knee. There is nothing further to note; the wound gradually filled up and at the last note was almost completely healed.</p> <p>Treatment stopped in May. Remains well.</p>
<p>Injections commenced on March 20th, 1891. Number of injections up to April 8th = 24. Amount of fluid used up to the same date = 257 grms.</p>	<p>Usual treatment after excision of wrist</p>	<p>Note on April 8th, 1891.—“Some oedema around wrist, long wound apparently soundly healed, small wound looking healthy and closing rapidly, very little discharge.”</p> <p><i>Result.</i>—Still under treatment; improving so far; too early to judge</p> <p>(According to my present views the treatment adopted in this case promises a better result than excision alone)</p> <p>April 20th.—Wounds completely healed; no thickening</p>	<p>The patient was not particularly ill after the injections. There was a good deal of local reaction, which still continues. There was no increase in the pus in the urine. Drainage-tube left out on April 5th.</p> <p>Sent home in May, quite healed.</p>

We had six cases where there were *aseptic* sinuses in connection with disease of bones and joints. Of these, one (No. 32) has only been under treatment for a very short time. Of the remaining five, two (Nos. 27 and 28) have completely and apparently soundly healed, and have so far derived the greatest advantage from the treatment; while one (No. 30) is almost absolutely healed, and I think will be found quite healed when the dressing is next changed. In one case (No. 29) healing is not yet complete, but the condition is steadily improving, and the bare bone which was present in the first instance can no longer be felt. In one case (No. 26), so far as the bone is concerned, no marked benefit has been derived, though bare bone felt at first has now disappeared; in this instance the delay in healing is, I think, due to the conditions of the sinus itself rather than to the presence of tubercular disease. In this patient a tubercular sore on the hand healed under treatment, but has relapsed to some extent since the treatment was discontinued. (Note on April 20th.—Of these six cases only two (Nos. 26 and 29) now remain unhealed.)

C.—CASES WITH SEPTIC SINUSES.

c. Cases with

No.	Name, age, sex, &c.	History.	Condition before injection.	Frequency and amount of injections.
32	<p>B. S., æt. 19, female</p> <p><i>Diagnosis.</i>— Disease of spine with septic sinus; disease of elbow with septic sinus; disease of occipital bone</p>	<p>No tubercular family history. In Feb., 1889, abscess formed in leg, and pain in back was complained of. In commencement of 1890 abscess formed in connection with two ribs, and were opened. In March a psoas abscess was opened in the left lumbar region. In July signs of left elbow-joint disease commenced, and an abscess was opened in Oct. In Nov. swelling and pain were noticed over the occipital bone</p>	<p>Patient anæmic and weak. Sinuses in connection with ribs, spine and elbow. Large fluctuating tender swelling over occipital bone. Lungs and other organs healthy. No hectic temperature</p> <p>(Before the Koch period I would have simply provided free escape for discharge in the first instance)</p>	<p>·005''' ; ·007''' ; ·007''' ; ·007''' ; ·008''' ; ·008''' ; ·008''' ; ·008''' ; ·008''' ; ·008''' Treatment discontinued</p>
33	<p>A. E. K., æt. 22½, male, K. C. H., admitted Nov. 29th, 1890, Discharged March 24th, 1891</p> <p><i>Diagnosis.</i>— Tubercular disease of the right os calcis and the astragalo-calcaneal joint with septic sinus</p>	<p>No tubercular family history. When about 9 months old swelling first noticed on outer side of right ankle. Has been treated at various hospitals since. An abscess formed, and broke some months ago</p>	<p>Internal organs healthy. Marked swelling about the right heel and ankle, especially on the outer side. A septic sinus is present below and behind the external malleolus, and leads directly inwards to bare and soft bone, apparently the upper surface of the os calcis and the astragalo-calcaneal articulation. No loose bone can be felt</p> <p>(Before the Koch period I would have cleared out the diseased bone)</p>	<p>·0023''' ; ·0023''' ; ·008''' ; ·003''' ; ·003''' ; ·003''' ; ·003''' ; ·003''' ; ·004''' ; ·004''' ; ·005''' ; ·005''' ; ·005''' ; ·005''' ; ·006''' ; ·006''' ; ·006''' ; ·008''' ; ·008''' ; ·008''' ; ·008''' ; ·011''' ; ·012''' ; ·015''' ; ·02''' ; ·03''' ; ·03''' ; ·04''' (operation, interval of 18 days); ·01''' ; ·02''' ; ·02''' ; ·03''' ; ·03''' ; ·03''' ; ·04''' ; ·03''' ; ·06''' ; ·07''' ; ·07''' ; ·07''' ; ·08''' ; ·09''' ; ·11''' Treatment stopped on March 20th, 1891</p>

Septic Sinuses.

Total number, amount, &c., of injections.	Additional treatment.	Condition when last seen.	Notes.
<p>Injections commenced on Nov. 28th, 1890; discontinued on Jan. 2nd, 1891. Under treatment for 35 days. Total number of injections = 10. Total amount of fluid used = '074 grms.</p>	<p>None beyond the ordinary dressings, rest in bed, and splint for the arm</p>	<p>Last seen on April 3rd, 1891. Patient much thinner and somewhat weaker than in November. All former sinuses still open, and an additional sinus leading to the occipital bone, which is bare. Tenderness and small fluctuating swelling over upper part of sternum. No hectic temperature; lungs and other organs healthy. Patient's general condition is improving, but has still occasional retching</p> <p><i>Result.</i>—Improvement during treatment as regards the unopened swelling over the occipital bone; spinal condition unaltered; condition of elbow and general state of patient worse</p> <p>(I would not now employ the Koch treatment in such a case. It was a hopeless case from the first)</p>	<p>After the first injections patient suffered much from malaise and sickness. The elbow became more painful, but the swelling over the occipital bone after the initial increase steadily diminished, and almost disappeared before the treatment was stopped. Towards the end of Dec. the retching and incapacity to take food became worse, and the pain in the elbow increased. Cultivations were made from the sinuses in the loin and elbow, and <i>staphylococcus cereus albus</i> was obtained. On Jan. 6th, 1891, the elbow was freely opened, and a quantity of tubercular material scraped out. After the anæsthetic she had continuous sickness for several days, which greatly reduced her. On account of her feeble condition and the possibility that the retching before the operation might have been connected with the treatment and the presence of the pyogenic organisms, it was deemed unadvisable to resume it after the operation. The patient slowly recovered from the operation, and the swelling over the occipital bone re-formed, and was incised on Feb. 12th. At the end of Jan. pain and swelling were observed over the upper part of the sternum on the right side, and some cheesy material was evacuated at the beginning of March.</p> <p>Died in May.</p>
<p>Commenced Dec. 3rd, 1890. Treatment stopped on March 20th, 1891, lasted for 107 days. Total number of injections = 41. Total amount of fluid used = 1'0146 grms.</p>	<p>On Feb. 3rd the opening was enlarged and a loose sequestrum was found and removed, the cavity from which it was taken being scraped and sponged with undiluted carbolic acid. Wound left open. On March 23rd it was again scraped out</p>	<p>Note on April 6th, 1891.—“Cavity in os calcis with free external opening. No bare bone, wound looks healthy. Less swelling”</p> <p><i>Result.</i>—No apparent effect on the disease</p> <p>(I cannot see that the patient has obtained any advantage from the Koch treatment; in a similar case I should now follow the old lines and only use tuberculin if the wound failed to heal and if I had got it aseptic)</p>	<p>Not seriously ill after the injections, but especially after the 4th, 5th, and 6th much cough. After the 1st injection the heel on the outer side became red and much swollen, and there was greatly increased discharge. The thickening diminished considerably, but as bare bone was still felt, the sinus was opened up on Feb. 3rd. The wound did not heal, and it was again thoroughly scraped out on March 23rd.</p>

No.	Name, age, sex, &c.	History.	Condition before injection.	Frequency and amount of injections.
34	H. A., æt. 21, male, K. C. H., admitted Dec. 1st, 1890. Discharged on Feb. 16th, 1891. <i>Diagnosis.</i> — Disease of elbow-joint with septic sinuses	Tubercular family history. The disease in his left elbow began 14 months ago without apparent cause. At first there was only a feeling of weakness in the elbow, and some swelling. Then 11 months ago, when opening a window, had pain which rapidly increased with increase of swelling. Abscesses soon formed, and were opened from time to time, and the joint was thoroughly cleared out after division of the olecranon last August by Mr. Clutton. The sinuses did not heal	Internal organs healthy. Right elbow-joint much swollen, the swelling being of a soft pulpy character, with numerous septic sinuses leading into the joint and to soft carious bone; the whole appearance of the part is that typical of a bad case of tubercular disease with septic sinuses. No movement is possible. The elbow is held at a little beyond the right angle. The circumference of the joint at the level of the tip of the olecranon is $1\frac{1}{2}$ in. larger than on the left side	$\cdot 01''$; $\cdot 1\cdot 01'$; $\cdot 1\cdot 015'$; $\cdot 4\cdot 015''$; $\cdot 1\cdot 015'$; $\cdot 2\cdot 02$; $\cdot 1\cdot 025$; $\cdot 3\cdot 025''$; $\cdot 4\cdot 03''$; $\cdot 2\cdot 03'$; $\cdot 1\cdot 04$; $\cdot 1\cdot 06'$; $\cdot 2\cdot 08''$; $\cdot 3\cdot 06$; $\cdot 2\cdot 08'$; $\cdot 1\cdot 08$ (operation interval of 13 days); $\cdot 1\cdot 04$; $\cdot 1\cdot 06'$; $\cdot 2\cdot 08''$; $\cdot 1\cdot 08$; $\cdot 1\cdot 1$; $\cdot 2\cdot 1$; $\cdot 1\cdot 12$; $\cdot 1\cdot 1$. Discharged, and twice a week had $\cdot 1$. Treatment stopped at the end of March
35	E. P., æt. 3 years, female, P. G. C. H., admitted Dec. 3rd, 1890. Discharged on Mar. 10th, 1891. <i>Diagnosis.</i> — Disease of radius with septic sinus; enlarged cervical glands	No phthisical family history. The disease of the radius began a year ago after injury. Has been in a general hospital and operated on without benefit	Enlarged glands in neck. Internal organs healthy. Septic sinus at back of lower end of right radius leading upwards to bare bone; no loose fragment felt. End of radius considerably thickened (The treatment in such a case before the Koch treatment would have been operation with the view of removing the affected portions of bone)	$\cdot 002''$; $\cdot 5\cdot 002''$; $\cdot 4\cdot 002''$; $\cdot 1\cdot 002''$; $\cdot 1\cdot 002''$; $\cdot 1\cdot 002''$; $\cdot 2\cdot 002''$; $\cdot 1\cdot 002''$; $\cdot 7\cdot 002''$; $\cdot 3\cdot 002'$; $\cdot 4\cdot 004''$; $\cdot 1\cdot 004$; $\cdot 1\cdot 005''$; $\cdot 2\cdot 005$; $\cdot 1\cdot 006'$; $\cdot 1\cdot 007'$; $\cdot 2\cdot 008$; $\cdot 1\cdot 01$; $\cdot 1\cdot 006'$; $\cdot 2\cdot 012$; $\cdot 1\cdot 015$; $\cdot 1\cdot 02$ (operation 12 days' interval); $\cdot 1\cdot 012'$; $\cdot 1\cdot 015$ — $\cdot 02$ — $\cdot 02$ — $\cdot 02$ — $\cdot 02$ — $\cdot 03''$; $\cdot 1\cdot 03$ — $\cdot 03$ — $\cdot 04$ — $\cdot 05$ — $\cdot 06''$; $\cdot 2\cdot 06'$; $\cdot 07$; $\cdot 1\cdot 08$ — $\cdot 1$ — $\cdot 12$; $\cdot 2\cdot 15$ — $\cdot 15$; $\cdot 1\cdot 15$. Treatment discontinued
36	E. M., æt. 26, female, K. C. H., admitted Dec. 16th, 1890, discharged on Feb. 23rd to be treated at home <i>Diagnosis.</i> — Disease of fibula with septic sinuses	Phthisical family history. Six years ago had disease of right thumb, from which bone was removed. This was followed by abscesses in the forearm. Four years ago abscesses formed in connection with the lower end of the fibula, and sinuses have remained since from which small pieces of dead bone have lately come out	Internal organs healthy. Scars on right forearm and thumb, the last phalanx of which has evidently been almost entirely destroyed. About 2 inches above the external malleolus are 2 septic sinuses leading to bare and soft bone about 1 inch in extent. There is thickening of the right tibia towards its upper part, but this is not at all painful (Before the Koch period I would have laid open the sinuses and thoroughly scraped and gouged away the diseased bone, but I think it is not at all improbable that the removal of the affected piece of the fibula would have been ultimately necessary in order to effect a cure	$\cdot 01''$; $\cdot 4\cdot 008''$ (interval of 9 days); $\cdot 008''$; $\cdot 2\cdot 008''$; $\cdot 2\cdot 008''$; $\cdot 1\cdot 008''$; $\cdot 1\cdot 008''$; $\cdot 2\cdot 01$; $\cdot 1\cdot 012$; $\cdot 1\cdot 012$; $\cdot 2\cdot 015'$; $\cdot 1\cdot 015$; $\cdot 1\cdot 02'$; $\cdot 2\cdot 03'$; $\cdot 1\cdot 04$ — $\cdot 05$ — $\cdot 05$; $\cdot 1\cdot 06'$; $\cdot 1\cdot 06'$; $\cdot 1\cdot 06$; $\cdot 2\cdot 07'$; $\cdot 1\cdot 08'$; $\cdot 2\cdot 08'$; $\cdot 1\cdot 08$; $\cdot 4\cdot 09$; $\cdot 1\cdot 09$; $\cdot 1\cdot 09$; $\cdot 4\cdot 1$; $\cdot 1\cdot 1$; $\cdot 2\cdot 1$; $\cdot 1\cdot 1$; $\cdot 1\cdot 1$; $\cdot 2\cdot 1$; $\cdot 2\cdot 1$

Total number, amount, &c., of injections.	Additional treatment.	Condition when last seen.	Notes.
<p>Injections commenced Dec. 3rd, 1890; stopped at end of March. Total number of injections = about 34. Total amount of fluid used = about 2·275 grms.</p>	<p>On Dec. 9th the sinuses were opened up and drainage-tubes inserted; the joint was not scraped out.</p> <p>On Jan. 23rd the sinuses were again opened up and the joint thoroughly scraped out; the tubercular material came away very readily</p>	<p>Note on April 6th, 1891.—“All the sinuses are still open, and there is no very marked improvement in the condition of the joint as compared with its state before treatment was commenced”</p> <p><i>Result.</i>—No noticeable improvement</p> <p>(In such a case I would not now use Koch's treatment)</p>	<p>The first reaction was not very severe, but the elbow swelled up very much, and there was increased discharge from the sinuses. During the course of the treatment several small acute abscesses formed, and were opened from time to time. The tissues around the elbow became much firmer, and the measurements less. The patient was discharged on February 16th to be treated as an out-patient; at that time the wounds were granulating well, and, with the exception of one in front of the elbow, were looking well and healing up rapidly. Bare bone could only be felt at one part. Excised in May.</p>
<p>Commenced Dec. 9th, 1890. Total number of injections = 42. Total amount of fluid used = 1·349 grms.</p>	<p>On Feb. 5th the sinus was enlarged and a loose sequestrum was found and removed, undiluted carbolic acid applied, wound left open.</p> <p>is healing up well. Glands smaller</p> <p>(In such a case I would now operate in the first instance, and if I got the wound aseptic, and if it would not heal advantage might be obtained from this treatment. Possibly some advantage may have been got here from the previous use of the treatment, in that the separation of the sequestrum may have been favoured)</p>	<p>Still a small short sinus at one part of the scar which does not go to bare bone. General health good. Glands smaller than at first</p> <p><i>Result.</i>—During the treatment the sequestrum became loose: the wound</p>	<p>The first 2 reactions were severe, the chief symptoms being coughing, swelling of glands in neck, pallor, and sickness. There was swelling and increased discharge from the wound. After the operation the wound gradually closed but has not yet quite healed.</p>
<p>Commenced Dec. 28th, 1890. Number of injections up to April 6th, 1891 = 34. Total amount of fluid used up to that date = 1·772 grms.</p>	<p>The sinuses were opened up on Jan. 15th, and a counter opening was made behind. Bare bone was felt. Tubes inserted</p>	<p>Note on April 6th.—“All the sinuses are still open, but are very small and drawn in and there is very little discharge. No bare bone can be felt”</p> <p><i>Result.</i>—Sinuses closing up. Bone no longer bare</p> <p>(In a similar case I would now lay open the sinuses, scrape the bone, try to render the wound aseptic and commence Koch's treatment at once. I think that in this case the treatment was decidedly beneficial in leading to the removal of the carious material at the surface of the bone)</p>	<p>The first reaction was not very severe; there was a good deal of local reaction and the discharge was profuse and very offensive. A small piece of bone came away on Dec. 31st. She suffered from diarrhoea after the first 2 injections and was slightly jaundiced. Nothing further noteworthy as regards reactions. On Feb. 1st no bare bone could be felt, and when she was sent home to be treated by Dr. Brown the sinuses were healing rapidly; the tubes had been left out some days previously.</p>

No.	Name, age, sex, &c.	History.	Condition before injection.	Frequency and amount of injections.
37	F. M., et. 10, male, K. C. H., admitted Dec. 29th, 1890, discharged Feb. 5th, 1891, to attend as out-patient <i>Diagnosis.</i> — Recurrent disease after excision of elbow-joint; septic sinus	Disease of elbow joint, commenced when 3 years old. After an injury and an abs- cess formed soon afterwards. Has been operated on twice by Mr. Wood, and a year ago the joint was ex- cised by Mr. Barrow. At Mr. Barrow's re- quest the patient was submitted to the Koch treatment as a sinus still remained unhealed, and as there was a fresh development of tuber- cular disease in con- nection with the internal condyle	Internal organs healthy. Sinus in bend of elbow not leading to bone. Over the internal condyle is a soft semifluctua- ting mass with the skin red over it and a small opening. Movements of joint fair (Before the Koch period I would have thoroughly cleared out the mass over the internal condyle and scraped out the sinus)	.003"; 1'003'; 1'004"; 2'004"; 1'004'; 1'005'—006; 1'008'; 1'01'; 1'015; 2'02; 1'03; 1'04; 2'05'; 1'05; 1'05 2'06; 3'07; 2'08; 5'09. Has attended once or twice a week since the 18th of Feb., and had .1. Treatment stopped on April 8th

Total number, amount, &c., of injections.	Advanced treatment.	Condition when last seen.	Notes.
<p>Commenced Dec. 31st, 1890. Total number of injections = about 34 Total amount of fluid used = about 2·002 grms.</p>	<p>None</p>	<p>Note on April 8th.—“The sinuses still exist and show no tendency to heal. The condition being practically the same as before the treatment”</p> <p><i>Result.</i>—No improvement</p> <p>(I would now treat such a case in the same manner as before the Koch treatment, and if it seemed necessary afterwards, that treatment could be employed in addition)</p>	<p>After the first injection a good deal of fluid was discharged from the swelling over the internal condyle. The thickening soon disappeared and only a small sinus was left. After the 2nd injection the patient developed a papulo-vesicular rash in patches on the sides and back exactly in the lines and presenting the superficial appearance of herpes zoster. This gradually died away in about a fortnight. There is nothing further to note.</p>

There were six cases of diseases of bones and joints with *septic* sinuses. Of these four cannot be said to have derived any benefit; one (No. 36) undoubtedly has, and one (No. 37) is healing after operation, and possibly the separation of the sequestrum has been expedited by the treatment. In No. 32 it is interesting to note that the tubercular deposit where the skin was unbroken improved under treatment, but that those with septic sinuses did not; indeed, one, the elbow, became worse. Add here Case No. 1, where there were septic sinuses in connection with a metacarpal bone, and where the condition improved markedly under treatment, having healed in the first instance.

DISEASES OF GLANDS.

III.—DISEASES

No.	Name, age, sex, &c.	History.	Condition before injection.	Frequency and amount of injections.
38	<p>P. O. F., æt. 30, male, K. C. H., admitted Nov. 30th, 1890. Discharged Jan. 29th, 1891</p> <p><i>Diagnosis.</i>— Tubercular glands in neck and axilla with abscesses</p>	<p>Sister died of phthisis. Glands in neck began to enlarge 6 years ago, and those in axilla 1 year ago. Have been increasing much during the last year. Medical treatment</p>	<p>Internal organs healthy. There is a large mass of enlarged glands matted together and situated in the right anterior triangle at the upper part and beneath the sterno-mastoid; there were two small abscesses on the surface of this mass, a large number of hard but separate glands along border of sterno-mastoid and in posterior triangle, quite visible. On the left side of the neck there were also a number of large glands, especially at the upper part of the anterior triangle, but they were not so large as to cause deformity. In the right axilla there was a large mass of glands matted together and projecting at the anterior and inner border of the axilla. At the back of the left wrist there is a fluctuating swelling evidently connected with the sheaths of the tendons</p> <p>(Before the Koch period I would have recommended excision of the glands)</p>	<p>·01''; 2·006''; 3·008''; 3·006''; 2·006''; 1·006''; 1·007''; 1·008''; 4·008''; 2·008''; 1·008''; 1·008''-01''; 1·015; 1·02''; 1·03''; 2·03'' (operation, interval of 6 days); 1·03''; ·03''; 1·035''; 2·04'. Discharged to go on with treatment at home. (He only had 4 injections at home)</p>
39	<p>L. B., æt. 12, female, P. G. C. H., admitted Dec. 6th, 1890. Discharged to attend as out- patient on Jan. 23rd, 1891</p> <p><i>Diagnosis.</i>— Tubercular cervical glands</p>	<p>Doubtful phthisical family history. Enlarged glands in neck for a year. No evident cause. Corneal nebula on right side</p>	<p>Internal organs healthy. Enlarged glands along posterior border of both sterno-mastoids. On right side opposite middle of sterno-mastoid there is one gland hard and of the size of a Brazil nut; the others are about the size of beans: upper lip swollen and fissured</p> <p>(Before the Koch period I would have left these glands alone, giving a placebo such as cod-liver oil, &c.)</p>	<p>·005''; 1·004''; 1·005''; 1·005''; 2·005''; 1·005''; 1·007''; 1·009''; 2·01''; 1·012''; 1·012''; 2·015; 1·02''; 2·025; 3·03; 2·035; 1·04''; 1·04; 2·05; 1·06''; 1·06''; 2·06; 2·06; 3·06; 4·06; 2·06; 5·07. Treatment stopped</p>

OF GLANDS.

Total number, amount, &c., of injections.	Additional treatment.	Condition when last seen.	Notes.
Commenced Dec. 3rd. 1890. Total number of injections = 25. Total amount of fluid used = about 489 grms.	On Jan. 16th the abscesses in the neck were scraped out; they were quite superficial, and only contained a small quantity of cheesy material. The mass in the axilla was excised, and found to consist of a number of large, almost completely caseous glands. The wound healed by first intention. The glands were in the main cheesy, but portions were found containing tubercles. Two guinea-pigs were inoculated with portions of the glands on Jan. 16th, and became tubercular	When discharged on Jan. 29th the wounds were completely healed. The mass in the neck was about $\frac{1}{4}$ of its original size, and the individual glands of which it was composed could be readily felt. The glands on the left side were also distinctly smaller. The swelling on the wrist remained the same In a note dated April 7th, 1891, Dr. Garrod Thomas says: "I examined him to-night and find that the glands originally affected (right side) are smaller, but there are several fresh ones considerably involved just above the clavicle on the left side; the wrist and armpit are quite well" <i>Result.</i> —Improvement in that the glands became somewhat smaller and much less matted together (In such a case I would still recommend excision, but it is quite a question whether it would not be advantageous to precede the operation by a few injections. Certainly the operation would be very much easier, safer, and more satisfactory if the periadenitis were in this way got rid of)	The first reaction was a severe one, the chief symptoms being headache, vomiting, and rigor. An erythematous rash appeared on his chest about 10 hours after the injection, and faded in a few hours. There was considerable local swelling, and one of the abscesses in the neck burst and discharged a little pus. During the next few reactions the rash and rigors generally recurred, and he had a good deal of nausea. The mass in the neck diminished gradually in size, and the individual glands could be made out a few days after the treatment was commenced.
Commenced Dec. 9th, 1890. Stopped Feb. 16th, 1890. Treatment continued for 69 days. No. of injections = 27. Total amount of fluid used = 824 grms.	None	When the treatment was stopped the glands were distinctly smaller than they were originally <i>Note</i> on April 6th.—"Glands much smaller than at last note. The lip is well" <i>Result.</i> —Distinct diminution in the size of the glands. Apparently no tendency to relapse (I would not now trouble to use the Koch treatment in such a case)	Nothing noteworthy about the reactions except that the upper lip swelled after the first injection. The patient did not suffer from the treatment at all, but after the 4th injection she was noticed to be slightly jaundiced; no other symptoms; this passed off in 2 or 3 days. As the glands were almost stationary and small, and there were no reactions, the treatment was stopped.

No.	Name, age, sex, &c.	History.	Condition before injection.	Frequency and amount of injections.
40	<p>G. G., æt. 2, male, K. C. H., admitted June, 1890. Discharged Jan. 26th, 1891</p> <p><i>Diagnosis.</i>— Tubercular disease of inguinal and cervical glands</p>	<p>No phthisical family history nor history of syphilis. Last summer patient was operated on for hydrocele of the cord and afterwards for phymosis. The patient was sent home on the same day that circumcision was performed. When seen some days later the circumcision wound presented the appearance of a tubercular ulcer. The scar from the hydrocele operation broke down shortly afterwards, and presented the same appearance. The testicle became tubercular and was removed in autumn. Glands in both groins became tubercular and broke down. The child rapidly wasted</p>	<p>Large ulcers in both groins, with greyish sloughy surfaces. Enlarged gland on left side of neck. Child much emaciated; abdomen large and tense. No lung symptoms. Hectic temperature. As the parents were extremely anxious that this treatment should be tried, their wish was acceded to</p>	<p>·001'; 3·002''; 1·0023'; 1·003''; 1·004''; 1·005- ·006; 1·007; 1·008'; 1·01'' 3·006''; 4·008; 2·01'; 1·01''; 1·01''; 15·005; 3·005</p>
41	<p>E. C., æt. 5, female, P. G. C. H., admitted Dec. 8th, 1890, discharged Jan. 26th, 1891.</p> <p><i>Diagnosis.</i>— Tubercular glands; sinus leading to diseased bone</p>	<p>Tubercular family history. Six months ago was in Infirmary with disease of left fibula. Some bone was removed by operation. An abscess formed in lumbar region lately and has burst</p>	<p>Internal organs healthy. Scar about 3 inches long adherent to the lower end of the fibula. Bone enlarged at upper end of scar. There is a large mass of enlarged glands in the right iliac fossa, and a sinus joint above the right posterior superior iliac spine leading to bare bone at upper part of crest of ilium. No signs of vertebral or sacroiliac disease</p>	<p>·002''; 1·003''; 1·003'''; 1·002'''; 2·0025''; 1·003''; 1·004''; 1·004''; 1·004''; 1·005; 1·007; 2·01; 1·015; 2·02; 1·025; 1·03'; 2·035; 1·04; 1·04'; 2·05; 1·06; 1·06'. Sent to convalescent home and ·06 given twice a week</p>
42	<p>A. A., æt. 7, female, P. G. C. H., admitted Sept. 22nd, 1890</p> <p><i>Diagnosis.</i>— Tubercular glands with septic sinuses in groins; tubercular glands in neck; slight phthisis</p>	<p>Has attended the hospital for 2½ years with suppurating tubercular glands in both groins, and has been admitted and operated on several times. Sinus opened and scraped on Sept. 25th, and caseous material removed from left iliac fossa. The remains of the glands on the right side were cut out</p>	<p>Enlarged glands in neck. Small area of erepitation at angle of left scapula. Liver enlarged, occasional attacks of diarrhoea. Scars of old sinuses in both groins, and a sinus in each groin discharging pus. On both sides there is thickening in the iliac fossa, most marked on the left; eyes and ears normal. Hectic temperature</p>	<p>·003''' 1·003''; 1·003'''; 1·002'''; 2·003''; 1·003''; ·003''; 1·004; 2·005; 1·005'. Treatment abandoned</p>

Total number, amount, &c., of injections.	Additional treatment.	Condition when last seen.	Notes.
Commenced on Nov. 26th; last injection on Jan. 25th. Length of treatment 62 days. Number of injections=17. Total amount of fluid used = 1023 grms.	None	Died at home about the end of February. Parents did not inform us of the death till a fortnight later, and therefore there was no post-mortem examination. One of the glands in the neck had rather increased <i>Result.</i> —No noticeable effect as regards groin; increase in one cervical gland (I would not now employ the Koch treatment in such a case)	There were no general effects after the injections beyond the elevation of temperature. No distinct local reaction except in the cervical glands. After the first injections the temperature in the intervals became normal instead of hectic, and the child seemed much brighter and took food better. The injections were given up on Jan. 4th, but a fortnight later the hectic temperature returned and the child began to go downhill rapidly; hence the resumption of the injections. As, however, the parents wished to take the child home, they were allowed to do so. When discharged the local condition was very much the same as when the treatment was begun, but the child was thinner and weaker.
Commenced Dec. 9th, 1890. Total number of injections up to April 8th, 1891 = 42 Total amount of fluid used up to the same date = 16245 grms.	Sent to convalescent home on Jan. 26th, 1891	Note on April 7th.— "Condition the same as when sent to the convalescent home <i>Result.</i> —Some diminution of the mass in the iliac fossa; sinus <i>in statu quo</i> (In such a case I would not now employ the Koch treatment)	No noteworthy general symptoms. At first there was increased swelling in the iliac fossa, and increased discharge from the sinus. The swelling in the iliac fossa soon diminished, and when the child went to the convalescent home on Jan. 26th it was much smaller than it was originally. A small piece of dead bone had come away, but bare bone could still be felt. There was no local reaction in the fibula.
Commenced Dec. 9th, 1890. Left off on Dec. 30th, 1890. Continued for 21 days. Total number of injections = 10. Total amount of fluid used = 034 grms.	Excision of hip after the treatment was stopped. See notes. The joint was much inflamed; there was evidently an acute septic arthritis	Note on April 6th, 1891.— "Wounds healed, except where drainage-tubes are. A good deal of purulent discharge. Hectic temperature. Child anæmic and losing flesh. Condition of lungs unaltered" <i>Result.</i> —Extension of septic process under treatment. No improvement as regards tubercle (According to my present views, I would not now employ the treatment in such a case. There seems little reason to doubt that harm was done here by the treatment in that the extension of the septic process (not of the tubercle) was favoured)	After the 1st injection there was much local reaction in left groin. The discharge from the sinuses afterwards diminished, and for a time the condition of the patient was satisfactory. On Dec. 31st symptoms of disease of the left hip-joint commenced, and the discharge from the sinuses was much more profuse. As the temperature remained high after the last injection, the treatment was abandoned. On Jan. 27th the left hip-joint was excised, the sinuses were opened up, and a counter opening made in the left lumbar region. The hectic temperature has continued, though not very marked.

To these we must add thirteen others where enlarged glands were present, but which are mentioned under other headings. In seven of these (Nos. 3, 11, 12, 15, 22, 53, and 54) no perceptible difference can be made out in the size of the glands; in four (Nos. 8, 18, 35, and 45) it is noticed that they were somewhat smaller; in one the glands were looser but not smaller (No. 29); and in one (No. 23) they became smaller under treatment, but one or two of them enlarged after the treatment was stopped. In five cases the enlargement of the glands was the principal or only apparent affection, and in three of these (Nos. 38, 39, and 41) there was no external communication. In all three the glands diminished somewhat in size, and in one (No. 38) where they were at first much matted together the periadenitis disappeared in a very striking manner. Of two cases where there were sinuses in connection with the glands, in one no noticeable effect was produced (No. 43), while in the other (No. 42), whatever may have happened to the glands themselves, the septic suppuration spread in the neighbouring tissues to a very serious extent.

TUBERCULAR PHTHISIS, ETC.

IV.—TUBERCULAR

No.	Name, age, sex, &c.	History.	Condition before injection.	Frequency and amount of injections.
43	W. P., æt. 11, male, P. G. C. H., admitted Dec. 8th, 1890, discharged to attend as out-patient on Feb. 14th, 1891 <i>Diagnosis.</i> —Tubercular peritonitis	Tubercular family history. Was admitted into hospital under Mr. Boyd in May, 1890, with signs of tubercular peritonitis and a history of wasting of 8 months' duration. On May 31st Mr. Boyd opened the abdomen and found a tubercular mass in the sub-peritoneal tissue, matted intestines studded with miliary tubercles, and 2 pints of turbid fluid in peritoneal cavity. Hard masses were also felt in the pelvis. Cavity washed out with warm water, and 2 drachms of iodoform and glycerine emulsion injected. Wound stitched up and healed by first intention. Patient sent to convalescent home in July much improved. Readmitted in October, the scar having opened at the lower part. A quantity of caseous material was removed from the subperitoneal tissue. This wound healed, but broke down again about the end of November	A few crepitations at right apex in front. No other physical signs. Has occasional attacks of abdominal pain, headache and vomiting. Abdomen not distended, skin not inelastic, and no ascites. Slight dulness over hypogastric and iliac regions. On deep pressure hard masses felt in neighbourhood of umbilicus and scar. In middle of scar is small sinus covered with a scab. Small ulcer on outer side of left buttock. Weight 3st. 8½ lbs. (Before the Koch period I would simply have continued the antiseptic dressings)	'003''; 2'003''; 1'003''; 1'003''; 2'003''; 1'003''; 1'003''; 1'003''; 2'004''; 1'005'; 1'007''; 2'009'; 1'012'; 4'015'; 1'02''; 2'02'; 1'02''; 6'015'; 1'015'; 2'02'; 1'025'; 1'03'; 2'03'; 1'03'; 1'04'; 1'05-05; 2'06; 2'06; 1'06'; 1'07; 2'07; 1'07'; 1'07; 2'07; 1'09; 1'1; and 1 once a week afterwards

V.—TUBERCULAR IRITIS

44	E. B., æt. 9, female, Moorfields Ophthalmic Hospital, under the care of Mr. Warren Tay <i>Diagnosis.</i> —Tubercular iritis	No definite tubercular family history. Speck on iris noticed for three weeks. No complaint of pain, but eye inflamed. No evidence or history of syphilis	A few enlarged glands in neck. No disease found in internal organs. "Slight occasional shooting pains in right eye. A good deal of circumcorneal congestion. Aqueous, turbid. Iris, light cocoa brown (left iris bluish grey), many posterior synechiæ. Four small rounded white deposits near lower papillary margin. Marked keratitis punctata. T + (?) Vision is bare perception of bright light"	'001''; 1'001''; 1'002''; 1'002''; 1'002''; 1'002''; 4'002; 5'004'; 2'005; 4'007
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PERITONITIS.

Total number, amount, &c., of injections.	Additional treatment.	Condition when last seen.	Notes.
Commenced Dec. 8th, 1890. Total number of injections up to April 8th, 1891 = 41. Total amount of fluid used up to same date = 1'661 grms.	None	Note on April 6th, 1891.— "Wound healed. Patient apparently in good health. No pain or swelling in the abdomen" <i>Result.</i> —Improved; sinus healed; thickening in pelvis subsided (It is probable that this is one of the cases in which advantage will be gained by the Koch treatment)	The first reactions were severe, the chief trouble being sickness. There was also a little temporary albuminuria. On Jan. 17th the reaction after '02 was again severe, there being sickness and diarrhoea, the latter persisting for several days accompanied with abdominal pain; several of the motions contained blood. There was no marked increase of discharge from the sinus which had healed by Dec. 23rd. The weight went down to 3st. 5½ lb. on Dec. 28th, and remained till Jan. 26th. On Feb. 5th it was 3 st. 7 lbs.

AND CORNEAL ULCERS.

Commenced Dec. 3rd, 1890. Last injection on Dec. 31st. Under treatment for 28 days. Total number of injections = 10. Total amount of fluid used = '028 grms.	Eye excised on Jan. 7th, 1891. On examination numerous tubercles were found in the iris. Two rabbits and one guinea pig were inoculated on Jan. 7th with portions of the iris, and became tubercular	The patient has not been seen since she left the hospital at the end of Jan. <i>Result.</i> —No apparent effect. Continued progression of the disease	Although the temperature after the fourth and fifth injections was above 104° the child was not particularly ill. There was never any distinct local reaction. On Dec. 8th it was noted that the "cornea is steamy. More bulging in ciliary region, especially below. The white nodules are becoming confluent, and there is a large swelling at the outer part." On Dec. 23rd, after an interval of five days, it was evident that fresh tubercles were appearing; indeed the whole iris had become mottled white, and the original tubercles were merged into the swollen iris and hardly distinguishable. As the condition got worse, the eye was excised on Jan. 7th, 1891. On Jan. 13th '009° was injected, and a distinct reaction occurred, the temperature reaching 101·5° eighteen hours after the injection, but no evidence of local reaction could be found anywhere. On Jan. 7th portions of the iris were introduced into the eyes of two rabbits, and into the subcutaneous tissue of the abdomen of a guinea pig. Three weeks later there was distinct tubercular iritis in both rabbits, and in the guinea pig there was a nodule at the seat of inoculation, and markedly enlarged inguinal glands on that side.
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No.	Name, age, sex, &c.	History.	Condition before injection.	Frequency and amount of injections.
45	L. P., æt. 10, female, P. G. C. H., admitted Dec. 31st, 1890. <i>Diagnosis.</i> — Corneal ulcers; enlarged glands in neck	Intense photophobia and discharge from both eyes for 8 months. For last 6 months has only opened eyes in the dark. Treatment.—Boracic lotion.	Mr. Jessop's notes.—“In both eyes follicular conjunctivitis. On right eye central corneal nebula, apparently no active ulceration going on. No iritis. On left eye an active ulcer below centre of cornea not very deep.” Intense photophobia. Weight on Jan. 16th 2 st. 11½ lbs. Enlarged glands in neck	·002''' ; 3·002''' ; 4·002' ; ·002''' ; 2·002''' ; 1·002'' ; 1·003'' ; 1·003' ; 1·0035'' ; 2·0035' ; 1·005'—007'—009'' ; 1·01—01'—01'—01'—01'— (01', 01') ; 015'—(015', 02') ; 1·(02, 02)—03''—03' ; 1·03'— ·045'—16'—08'—1'—12 ; 1·15''—15'—2'—25—25''—25' ; 1·25' ;—25''—25'—3' ; 1·2' ; 1·3'—3' Treatment discontinued on March 25th

In connection with this case see also No. 22, where there

VI. TUBERCULAR LARYNGITIS.

46. C. W., æt. 28, tubercular laryngitis without any evident phthisis, under the care of Dr. Greville Macdonald. I regret that as Dr. Macdonald happened to be ill when these notes were being compiled, I cannot give the details of the case. Speaking from memory, however, I may say that the patient had been under treatment for some months with tubercular ulceration of the larynx (bacilli present), and the greater part had healed; a small portion of the ulcer, however, was not easily accessible, and remained stationary. The treatment was begun at the commencement of December, ·001 being given at first with only very slight local or general reaction. Four more doses were given at that time, the last being ·01, but without producing any general febrile reaction, though locally there seemed to be some increased redness and swelling. The treatment was then given up for some weeks, but as no improvement occurred, it was resumed after about 5

Total number, amount, &c., of injections.	Additional treatment.	Condition when last seen.	Notes.
Commenced Jan. 15th. Total number of injections = 46. Total amount of fluid used = 3·801 grms.	Cod liver oil. Boracic lotion. Sent to convalescent home on March 25th, 1891	Note on April 7th.—“The local and general condition have continued to improve since the patient left the hospital. There is hardly any photophobia; no congestion; no ulceration. Small nebulae on each cornea. Cervical glands rather smaller” <i>Result.</i> —Healing of the ulcers; gradual cessation of the photophobia; slight diminution in size of glands	During the reactions there was sickness and headache, but no marked increase in the eye symptoms. On Jan. 22nd Mr. Jessop notes that there is active ulceration in the right corneal nebula; photophobia and slight discharge from the eyes. On 29th he notes less congestion on the right side, and ulcer still active on left. On Feb. 5th he notes eyes improved. On Feb. 19th he states, “Left eye, conjunctiva much congested and slight muco-purulent discharge, corneal ulcer healing up, and less photophobia. In right eye conjunctiva congested, no active corneal mischief, nebula as before.” The condition has steadily improved. On Feb. 20th weight 2 at 12½ lbs. There was no loss of weight during the early treatment.

was a corneal ulcer which healed quickly under treatment.

weeks, the first dose given then being ‘01. This was followed by severe general and local reaction. The next dose was ‘004 without reaction, and in all 10 injections were given without reaction after the first. During this treatment, however, fresh ulceration appeared in the neighbourhood and on the epiglottis, and the treatment was, whether wisely or not I cannot say, given up. I have no doubt, however, that we made a mistake in throwing aside the treatment at first, and in another like case, instead of abandoning the treatment on the second occasion, I should be inclined to reduce the dose and employ the “continuous” method of administration.

To this case may be added 3 other cases which will be found in the list of phthisis cases. In one (No. 48) only a few injections were given, and no change was noticed in the laryngeal condition. In the other two (Nos. 49 and 50) the ulceration healed, and has not, so far as I know, broken down again. The total result, then, is 4 cases, 2 healed, 1 *in statu quo*, and 1 worse.

No.	Name, age, sex, &c.	History.	Condition before injection.	Frequency and amount of injections.
47	Mrs. M., æet 39, under the care of Dr. Waterhouse. <i>Diagnosis.</i> — Phthisis	Tubercular family history. General health good until 4 years ago when she was nursing her sister who was dying of phthisis at Mentone, and was much exposed during the earthquake. She came home with cough and numerous tubercle bacilli in sputum. Since then she has wintered abroad, and the disease has only progressed slowly till last summer, when it began to extend more rapidly	Patient rapidly losing flesh; profuse night sweats. Hectic temperature (evening temperatures 102° and 103°). Going down hill very rapidly and not expected to live more than a couple of months. As the patient and her friends begged to have a trial of the treatment it was agreed to give her a few injections to see if any good was likely to be done. There was a large cavity at the left apex with dulness and crepitation involving the upper half of the lung. Dulness and crepitation at the right apex but no definite signs of a cavity	·002''; 1·002''; 1·003''; 2·0035''; 1·004''; 1·005''; 1·006''; 1·008''; 1·008''; 2·008''. Treatment stopped. (Most of these reactions are marked moderate, but as a matter of fact the evening temperatures before the treatment was commenced ranged about 103°, and in a considerable number of instances after the injections the highest temperature was 102°, and the other symptoms of reaction were for the most part absent)
48	Dr. B., æet 27, medical man, under the care of Dr. G. A. Sutherland <i>Diagnosis.</i> — Phthisis and tubercular laryngitis	Tubercular family history. Six months ago symptoms of lung disease began, and have been getting rapidly worse since September, when slight hectic fever set in, loss of appetite, wasting and weakness. His voice first became husky in August	Suffers from frequent cough with expectoration (about 5 oz. daily), nummular, bacilli abundant. At right apex consolidation, with bronchial breathing, and below the clavicle impaired resonance and occasional crepitations. Cavity (?) immediately below clavicle. Dulness with weak breathing and crepitations at right base posteriorly. Left lung apparently normal. Larynx examined by Dr. Greville Macdonald, who found slight ulceration on posterior wall of larynx, with congestion and swelling of both cords. Other organs healthy. Weight 10 st. 3 lbs. Patient complains of complete loss of appetite and great weakness	·002''; 1·002''-·003''-·003''; 1·004''; 1·004''-·005''-·007''- ·007''; 1·01''; 1·012''; 1·015''; 1·015''; 1·02''-·02''; 1·02''; 1·025''; 2·03''; 1·035''; 1·05''; 2·05''; 1·06''; 1·08''; 2·1''; 2·1''; 2·1''; 2·12''; 2·15''; 2·1''; 2·1''; 2·1''; 2·1''; 2·1''; 1·1''; 1·1''; 1·1''; 2·1''; 1·1''; 1·1''; 1·1''; 1·1''; 1·1''; 1·1''; 1·1''. Left for New Zealand on March 11th. To continue 1 every day or every second day according to circumstances
49	Mrs. H., æet 40, under the care of Dr. G. A. Sutherland <i>Diagnosis.</i> — Phthisis and tubercular laryngitis.	No tubercular family history. The commencement of the disease dates from July, 1889, and the symptoms lately have been cough, profuse expectoration, increasing weakness and loss of flesh, huskiness, diarrhoea alternating with constipation, fever, and profuse night sweats. No hæmoptysis	Advanced disease of both lungs, right chiefly affected with a large cavity below the clavicle; no cavity on left side. Ulceration affecting the posterior part of the right vocal cord and the posterior wall of the larynx. Hectic temperature; evening temperature about 102°; profuse nummular expectoration with numerous bacilli	·0015''; 1·002''; 1·008''-003''; 1·004''; 1·005''-007''; 2·007''; 1·007''; 1·008''

PHTHISIS.

Total number, amount, &c., of injections.	Additional treatment.	Condition when last seen.	Notes.
Commenced Nov. 27th, 1890. Last injection on Dec. 16th, 1890. Under treatment for 19 days. Number of injections = 10. Total amount of fluid used = 0495 grms.	None	Died on Feb. 10th, 1891. No post-mortem examination permitted <i>Result.—In statu quo</i>	The chief symptoms during the reactions were increase of cough and difficulty of breathing. The treatment was stopped because it did not seem to be doing any good and the patient was getting weaker. There was no evidence that the treatment had done any harm. When it was stopped on Dec. 16th there was no alteration in the physical signs, the night sweats had stopped and the temperature at night was lower than before the treatment, and continued so for some weeks; the patient however was becoming progressively weaker. After the first injection a patch of herpes appeared on the right trochanter and afterwards developed into a bed sore, as she lay constantly on that side.
Commenced Nov. 28th, 1890. Number of injections up to March 9th = 45. Total amount of fluid used up to that date = 2749 grms.	None	Note on March 9th.— "Occasional cough in the morning. About $\frac{1}{4}$ an ounce of mucus dotted with pus expectorated during the 24 hours. Extremely few bacilli. The only physical signs are consolidation at right apex with slight bronchial breathing and no crepitations nor signs of cavity. Over the rest of right lung there is slightly impaired resonance; breathing rather faint, vesicular. Left lung apparently normal. Larynx normal. Weight 10 st. 7 $\frac{1}{2}$ lbs. (Patient states that 10 st. 7 lbs. is his normal weight.) General condition excellent" <i>Result.—Great improvement</i>	After the first injection some moist sounds were also noticed at the left apex behind, otherwise no marked increase in the lung symptoms. Improvement was noted on Dec. 8rd, and steadily progressed with the exception of slight hæmoptysis on Feb. 9th, which did not recur. After the first injection the voice was huskier and there was acute oedema of the posterior wall of the larynx. On Jan. 6th Dr. Macdonald reported that the ulceration had quite healed, and it has remained well since. The bacilli became much fewer, but have not yet entirely disappeared. His general condition rapidly improved; he regained his appetite and strength, fever disappeared, and he was able to walk long distances without fatigue. Patient lost 2 lbs. during the first few weeks, but has lately been gaining weight. He left England on March 11th as surgeon to a steamer sailing to New Zealand. Returned in July. Larynx remains well. Lungs very much improved. Still continuing the treatment.
Commenced Nov. 28th, 1890; discontinued Dec. 14th, 1890. Under treatment 16 days. Number of injections = 10 Total amount of fluid = 0475 grms.	None	Died of hæmoptysis about a month after the treatment was discontinued. No post-mortem examination, as the patient had left London <i>Result.—In statu quo</i>	As regards the reactions, the only sign was slight increase over the normal hectic temperature. There was no alteration in the lung or laryngeal symptoms. The treatment was only commenced at the very earnest request of the patient and her relatives, and as it had no apparent effect on her condition, it was discontinued on Dec. 14th.

No.	Name, age, sex, &c.	History.	Condition before injection.	Frequency and amount of injections.
50	W. R. S., æt. 27, medical man, under the care of Dr. Guthrie <i>Diagnosis.</i> — Phthisis and tubercular laryngitis	Family history. One brother had necrosis of tarsus. Patient had influenza in Feb., 1890, followed by general bronchitis. Eustachian catarrh, and otitis media, with perforation of both tympana. Cough severe. Night sweats and wasting. Severe attacks of hæmoptysis in August and November, 1890, and acute laryngitis. Signs of early consolidation at left apex, noted after hæmoptysis	Anæmic. Weight 11 st. 4 lbs.; has been gaining lately. No hectic or night sweats. Constant paroxysmal cough with much expectoration. 3v-3x daily of frothy mucus containing little solid matter (bacilli found a few days later). Very deaf. Both tympanic membranes gone. Voice weak and hoarse. Cords much congested; do not meet on phonation. Superficial ulceration of posterior part of left vocal cord (Dr. Macdonald). At left apex dullness in Sup. Sc. F. and resonance diminished to 3rd rib in front and mid-scapula behind. Expansion deficient. Breath sounds weak. Inspiration clogged; expiration prolonged. Faintly bronchial in Sup. Sc. F. Faint moist râles over this area. Breath sounds somewhat harsh and expiration prolonged over right lung, but no accompaniments	'001; '002-'003-'004'; '005'; '006-'008-'01'; '01'; '012; '015'; '02'; '02''; '02'; '02'; '025'; '03'; '04'; '05; '07'; '1'; '12; '15; '2''; '15'; '15'; '15'; '11'; '1'; '11'; '11'; '12'; '1; '12; '12; '14'; '14'; '12; '1; '1. Left as surgeon on board a steamer to continue injections every 3 days or oftener if possible
51	Mrs. F., æt. 29, under the care of Dr. Guthrie, went home on Jan. 29th, 1891 <i>Diagnosis.</i> — Phthisis	Symptoms of phthisis for 2 years. Tuberculosis on mother's side. 4½ years ago, laryngitis (aphonia) congestion of vocal cords). 3 years ago, abscess in great toe; right metatarso-phalangeal joint. 16 months ago, dry pleurisy left apex. 12 months ago, wasting, and cough. Yellow lumpy phlegm. Never hæmoptysis. Profuse night sweats 9 months ago, cavity at left apex formed	Complains only of cough. Expectoration 3j-3ij daily, purulent nummulated. Contains bacilli about 5 to the field. No night sweats for last 6 months. No hectic. Spare and delicate looking. Finger tips clubbed. Slight œdema over shins. Weight 8 st. 4 lbs.; used to weigh 9 st. At left apex cavity size of Tangerine orange. Deficient expansion. Dullness from lower border of 2nd left rib in front to middle line of scapula. Tympanitic resonance in first left space. "Cracked pot" sound. Amphoric breath sounds with moist râles at end of inspiration but not abundant. Loud whispering pectoriloquy all over dull area, and increased vocal resonance. Right chest. Harsh breath sounds at inner part of 2nd space, no accompaniments. Larynx.—Showed congestion (slight) of vocal cords. No ulceration. Heart.—Normal. Urine.—Normal	'002''; '002-'003-'004'; '005''-'006''-'008'; '01'; '01'; '01'-'012'; '015''-'015''; '015''; '015''; '02''; '03'; '05'; '05''; '05''-'065'; '08'; '1''; '08''; '08'; '08'; '1'. Went home on Jan. 29th to continue injections of '1 twice a week. At the end of March she was advised to continue the injections and increase their frequency

Total number, amount, &c., of injections.	Additional treatment.	Condition when last seen.	Notes.
<p>Treatment commenced on Nov. 28th. Total number of injections up to March 9th = 40. Total amount of fluid used up to that date = 2·881 grms.</p>	<p>Cod-liver oil and hypophosphites</p>	<p>Note on February 6th.—“Considerable improvement. Weight fell from 11 st. 4 lbs. to 10 st. 11½ lbs. during first fortnight of injections. Present weight 11 st. 2 lbs. Much more colour in cheeks; general health good; a few bacilli still present in sputum. Amount of sputum varies from 1½ to 3 oz., and is very watery. <i>Chest</i>.—Resonance distinctly better below left clavicle; still impaired, but not absolutely dull in left Sup. Sc. F. Air entry good; expiration prolonged; a few crackling râles above clavicle and in Sup. Sc. F. <i>Larynx</i>.—Slight congestion. Ulcer on vocal cord not quite cicatrised.”</p> <p>In the middle of March he wrote: “I feel perfectly strong, and except for a very occasional cough, hoarseness, and tendency to cold feet, am all right. No bacilli in sputum last week. Two examinations, and no dulness anywhere in the chest or back.”</p>	<p>Reactions never severe, attended usually by increase of cough, and on two occasions by headache, gastric pain, and vomiting. Pain and tenderness over left side of larynx was complained of on December 22nd, and lasted a few days. Signs of slight dilatation of right bronchus were noted on Dec. 11th, with tenderness on percussion, and a few pleural frictions on 2nd right space. Pleurisy soon subsided. Neither voice nor hearing improved. Went home to continue injections at home on Feb. 7th, 1891. Left in the middle of March as surgeon on board a vessel bound for the West Coast of Africa.</p>
<p>Commenced, Nov. 28th, 1890. Total number of injections up to end of March = about 44. Total amount of fluid used up to same date = about 2·707 grms.</p>	<p>Cod-liver oil and hypophosphites</p>	<p>On April 6th Dr. G. E. Williamson reports, “I examined Mrs. F. a week ago. Her general condition is much improved, she looks much stronger, eats and sleeps well. Her breathing on going uphill is also improved. The expectoration is about ½ oz. in the 24 hours, nummular and yellow. The chief local improvement in the lungs is the almost complete absence of moist sounds.”</p>	<p>Reactions severe only on 2 occasions, after .015 and .1 respectively. Similar doses repeated caused no malaise. Signs of right apical catarrh and patch of consolidation under right scapula size of shilling appeared during 3rd week of inoculation and persisted. Signs of slight right apical pleurisy noted about same time, which soon disappeared. On Jan. 28th Dr. Guthrie reports, “Dulness slightly less at left apex below clavicle. Very few moist râles. No apparent change in size of cavity. Still a few moist crepitations at right apex, and small patch of consolidation beneath right scapula persisted. General condition highly satisfactory; gained 2 lbs. during inoculation period. Can walk 8 to 9 miles without fatigue. Expectoration less, 3½—3iss per diem, still purulent and nummulated, and a few bacilli present.”</p> <p>On March 18th she wrote that the cough was very distinctly better.</p> <p>At end of June still steadily improving. Treatment being continued.</p>
		<p><i>Result</i>.—Improved, and improvement progressing</p>	

No.	Name, age, sex, &c.	History.	Condition before injection.	Frequency and amount of injections.
52	F. W. F., set. 29, male, medical man, under the care of Dr. Frederick Taylor <i>Diagnosis.</i> — Phthisis	No tubercular family history. In Oct., 1881, had an attack of hæmoptysis, lasting 3 days, but not profuse; no previous symptoms and no physical signs. Since then has had 6 attacks; the last 8 months ago. No physical signs discovered till last July, when patient developed somewhat acutely physical signs of tubercle at the left apex associated with much pyrexia. Was ill for 2 or 3 weeks, and then till November was pretty well, but had cough and expectoration. This became much worse in Nov., accompanied with loss of appetite, loss of flesh, had night sweats and much increased cough and expectoration	Nov. 29.—Pale and thin with much cough, and with tremor on exertion; expectoration of mucopus; night sweats; weight, 10 st. 12 oz. Examination of chest (with Dr. Goodhart). Slightly impaired movement under left clavicle; very slight impairment of resonance above clavicle, on clavicle and in first space; slightly deficient vesicular murmur, and increased expiratory murmur above clavicle. Crackling râles above clavicle, and below down to level of nipple. Behind the same râles from apex over scapula to midway between spine and lower angle (7 in. from 7th cervical spine). Slightly increased vocal resonance at left apex. Right side, apex healthy. Occasional sibilus below clavicle	·002''' ; 2·002''—002''—003''— ·004''—004'' ; 1·005'' ; 1·005'' ; 1·005'' ; 1·005'' ; 1·006'' ; 1·007'' ; 1·007'' ; 1·008'' ; 1·005'' ; 1·006'' ; 1·007'' ; 4·008'' ; 1·008'' ; 1·01' ; 2·012' ; 2·012' ; 1(?)''' ; 4·01' ; 1·012' ; 1·014'' ; 3·012'' ; 3·012' ; 1·015'' ; 3·02' ; 2·025'' ; 1·035'' ; 1·035'' ; 3·04' ; 5·03'' ; 1·04'' ; 1·04'' ; 2·04'' ; 1·045'' ; 2·05'' ; 1·045—05—05''' ; 2·04'' ; 1·04'' ; 1·04. To go on with injections every day or every second day, gradually raising the dose
53	E. R., set. 9, female. P. G. C. H., admitted Dec. 5th, 1890, under the care of Dr. Herringham. Discharged to attend as out-patient on Jan. 24th, 1891 <i>Diagnosis.</i> — Phthisis; enlarged cervical glands	Tubercular family history. Wasting and cough for nearly 2 years. When first seen in Jan., 1890, she complained of cough and sweating at night, and there were signs of consolidation and breaking-down at right apex. This condition continued much the same till admission, her weight being 2 lbs. less than when first seen	A few enlarged glands in sub-submaxillary region. Slightly impaired resonance at both apices, with some crepitation on the left side. No sputum could be obtained for examination. No night sweats or diarrhoea. Other organs normal. Weight 3 st.	·002'' ; 1·002'' ; 1·003'' ; 1·004'' ; 2·004'' ; 1·005'' ; 1·007'' ; 009'' ; 2·01' ; 1·015'' ; 1·02'' ; 2·03'' ; 1·03'' ; 2·04'' ; 1·05'' ; 1·05'' ; 2·05'' ; 1·06'' ; 1·06'' ; 2·06'' ; 1·06'' ; 1·06'' ; 2·06'' ; 3·07'' ; 2·07'' ; 3·07'' ; 2·07'' ; 3·07'' ; 2·07'' ; 3·07'' ; 1·07'' ; 2·07'' ; 1·07 (6 days' interval ·09 and ·1 once a week (4 subsequently)
54	E. M., set. 8½, female. P. G. C. H., admitted Dec. 8th, 1890, under Dr. Sidney Phillips. Discharged Jan. 26th, 1891. Readmitted Mar. 11th <i>Diagnosis.</i> — Phthisis and enlarged glands in neck	No phthisical family history. Subject to winter cough. Four months before admission, severe cough commenced with expectoration; loss of weight and night sweats	Enlarged glands in neck, various organs except lung healthy. Consolidation at base of right lung reaching as high as angle of scapula posteriorly, and 3rd rib anteriorly, with bronchial breathing and fine and coarse crepitations. No sputum could be got for examination. Night sweats not marked. Weight 2 st. 8 lbs. Temperature normal	·001'' ; 1·001'' ; 1·002'' ; 4·002''' ; 1·002'' ; 1·004''' ; 1·004'' ; 1·005'' ; 1·005'' ; 1·006'' ; 2·008'' ; 1·01'' ; 2·015'' ; 1·02'' ; 1·025'' ; 2·03'' ; 1·035'' ; 1·04'' ; 2·05'' ; 1·06'' ; 1·6. Sent to convalescent home, and had ·06 twice a week. After readmission of March 11th (·06, ·07)—1'—1'—15; 1·2'—25'' ; 1·3'' ; 3'—3'—35'' ; (1·3, 3)—3 : (2·3, 3)—3'—3'— 3'' ; 3'' ; 3

Total number, amount, &c., of injections.	Additional treatment.	Condition when last seen.	Notes.
<p>Commenced Dec. 1st, 1891. Total number of injections up to March 21st, 1891 = 46. Total amount of fluid used up to that date = about 9 grms.</p>	None	<p>March 21, 1891 (interval of 16 weeks). Feels and looks much better than in November. Has very little cough, practically no expectoration. Sleeps fairly well and rarely sweats at night (did so on 15th, but only slightly). Appetite good. Weight, 10st. 3½lb. Examination of chest:—Left side, impairment of resonance scarcely to be noticed; breath sounds deficient; crackling râles above clavicle, and less marked down to nipple level, but as compared with state on Nov. 29th have cleared up over costal cartilages (inner half of area); whisper audible above clavicle. Behind left side, râles from apex down to nearly same point as on Nov. 29th, i.e., 6in. from 7th spine, but confined to inner half. Right side, breathing supplementary above and below clavicle; no râles. Increased vocal resonance and audible whisper above cavicle</p> <p><i>Result.</i>—Great improvement in general health, cough, expectoration, sweating, physical vigour, slight increase in weight. Physical signs, diminished extent on left side. Very slight early indications at right apex (clicks have been heard on 2 occasions)</p>	<p>The first reactions were somewhat severe, but there was no evident increase in the pulmonary signs. On Jan. 16th I injected by mistake a decigramme instead of a centigramme which I had intended. I at once incised the swelling and also injected some absolute alcohol to precipitate the tubercule, and thus no doubt a good deal of the fluid was got rid of; the subsequent reaction was about as severe as the first reaction. On March 13th, after a second dose of '05, the patient had also a pretty severe reaction, apparently a cumulative effect; the only instance of the kind which I have observed at such a late period in a case. This patient also went on reacting much longer than any other that I have had, as shown by the fact that after 46 injections I had only got up to 4 centigrammes. He left on March 23rd as surgeon on board a vessel bound for the Cape of Good Hope to continue the treatment for some months.</p> <p>Seen in June. General health good. Condition of lungs slightly improved. Did not continue injections after leaving England.</p>
<p>Commenced Dec. 9th, 1890. Number of injections up to April 8th, 1891 = 38. Total amount of fluid used up to that date = 1'881</p>	None	<p>On April 6th Dr. Herringham notes: "The local condition is, I think, exactly the same as when the treatment was begun; the general health is rather improved." Condition of glands about the same</p> <p><i>Result.</i>—Slight improvement</p>	<p>No noticeable increase in the lung symptoms occurred after the first injections. Improvement noticed at the end of December, and when sent home the improvement was very marked, the percussion note at left apex being normal and no crepitations present. At right apex a few râles were occasionally heard on deep inspiration, and there also the percussion note was normal.</p>
<p>Commenced December 9th. Total number of injections up to April 8th = 54. Total amount of fluid used up to same date = 6'459 grms.</p>	Sent to convalescent home on Jan. 26th	<p>Note on April 6th.—"Her present condition is the same as on Jan. 26th. No general symptoms, and patient is apparently in good health. Glands <i>in statu quo</i>"</p> <p><i>Result.</i>—Marked improvement</p>	<p>Nothing to note about the reactions. During the course of the treatment the crepitations diminished considerably, and the consolidation became much less marked with the exception of the base of the lung anteriorly. When sent to the convalescent home on Jan. 26th the condition was as above, there being left only a small area of dulness around and below the right nipple with occasional crepitations. Very slight cough. No night sweats when in hospital. At the home the disease seemed to relapse somewhat, and she was therefore readmitted and the treatment pushed. Since that was done improvement has again taken place. The weights were on Feb. 8th, 2 st. 8 lbs.; Feb. 16th, 2 st. 11½ lbs.; Feb. 28th, 2 st. 11 lbs.; Jan. 9th, 2 st. 11½ lbs.; Jan. 17th, 2 st. 11½ lbs.; Jan. 26th, 2 st. 12½ lbs.; March 2nd, 2 st. 13 lbs.</p>

No.	Name, age, sex, &c.	History.	Condition before injection.	Frequency and amount of injections.
55	J. H. S., æt. 30, medical man, under the care of Dr. Leslie Ogilvie <i>Diagnosis.</i> — Phthisis	No history of phthisis in the family. Been active and well till about the beginning of December, when he felt tired and overworked. Had hæmoptysis on Dec. 30th, which continued for about a week. Bacilli tuberculosis found in sputum about Jan. 4th in large numbers	<i>Personal appearance.</i> —General nutrition and muscular development deficient. Thin face; high cheek bones. Clear delicate complexion with slight hectic flush. <i>Symptoms.</i> —Debility. Short cough with mucous expectoration, though not abundant, and containing numerous tubercle bacilli. <i>Physical signs.</i> —Flat chest, deficient expansion of right apex. Percussion note fairly resonant. Inspiratory murmur feeble. No crepitations heard. Vocal resonance and fremitus normal. Fauces congested. Larynx normal. Pulse 80, regular and full. Evening elevation of temperature (about 100° F.) Weight on Jan. 12th = 8 st. 9 lbs.	'003''; 2'002'-'003''; 1'003''; 1'003''; 1'003'; 1'004'; 1'005'; 1'007'; 1'008'; 1'01''; 1'01; 1'015'; 02''; 1'025'; 1'04'; 2'06'; 1'06'; 1'07'; 1'08; 1'09; 1'1; 1'1. Went home, 1 to be injected every other day for a time, and then every day

Thus there were nine cases of phthisis, of which two were hopeless from the first (Nos. 47 and 49), and in which no change was noted in the lungs during the short injection period. Of the remaining seven cases all improved in general condition, some of them very markedly so; as

Total number, amount, &c., of injections.	Additional treatment.	Condition when last seen.	Notes.
<p>Injections commenced on Jan. 14th, 1891. Total number of injections up to April 8th = about 38. Total amount of fluid used up to that date = about 2.21 grms.</p>	<p>None.</p> <p>"General appearance improved. No cough or expectoration. No crepitations heard. Respiratory sounds normal. A gland on the left side of the neck, which became prominent during the treatment, is smaller, but is still enlarged slightly. No bacilli when sputum last obtained for examination. Pains which were felt after each injection in the left knee and elbow are no longer noticed. Weight on 28th of Feb. = 8 st. 13 lbs."</p> <p>In a note on March 14th he says that expectoration has now entirely ceased, and that his weight was 9 st.; and on March 30th he writes that his lungs were examined 2 days previously and that nothing abnormal could be detected. His weight was then 9 st. 1½ lbs., and he felt better able to bear fatigue</p> <p><i>Result.</i>—Improved, and improvement continuing</p>	<p>At the commencement of March it is noted.—</p>	<p>Nothing special to note about the reactions. After two injections, auscultation disclosed crepitation and harsh inspiration over an area between 2nd and 4th ribs in front towards axillary border on right side. This continued for about 10 days. Complained a good deal of pain in left knee and elbow after the early injections. Patient went home at the beginning of March and resumed his practice.</p>

regards local condition in one (No. 53), it is said to be the same as at first, while in the others there has been improvement, varying from "slight" to "very remarkable." To these we must add No. 24 (improved) and No. 42 (*in statu quo*).

VIII.—INJECTIONS IN NON-TUBERCULAR OR DOUBTFUL interesting, and may

No.	Name, age, sex, &c.	History.	Condition before injection.	Frequency and amount of injections.
56	S. M., æt. 54, female, K. C. H., admitted Dec. 9th, 1890 <i>Diagnosis.</i> — Anæsthetic leprosy	Born in Germany. Was a nurse in Calcutta for 27 years, and had cases of leprosy under her care. Came to England 10 years ago. The disease began in 1880 with pain and stiffness in joints and a macular rash over abdomen; shooting pains in limbs. Shortly afterwards the body was covered with dark red raised painless blotches, first noticed about the head, each lasting for a year to a year and a half. In 1881 hands and feet swelled, pieces of bone came from ends of fingers and toes, and nails dropped off. At the same time she complained of numbness and feeling of weight in limbs. Deformity of the fingers has come on since, but for the last 7 years the disease has been practically quiescent. In September last first complained of photophobia, lachrymation and pain in the right eye	Internal organs apparently healthy. Anæsthesia not complete anywhere, but sensation is very imperfect as high as the middle of the legs and forearms, and somewhat impaired higher up. Pain on pressure on calves especially on right side, no definite enlargement of nerves; possibly the right ulnar behind the internal condyle is a little thicker than the left. Fingers flexed into palm; cannot be extended; cannot oppose thumb. No anæsthetic patches over body	·01''' ; ·01'' ; 2·01''' ; 3·005''' ; 2·002' ; 3·004' ; 5·004' ; 1·005' ; 1·006' ; 3·008-01 ; 3·012 ; 1·015 ; 1·015 ; 2·02 ; 3·08 ; 2·05 ; 1·06 ; 1·08 ; 2·1 ; 1·1-1 ; 2·1 ; 1·1 ; 2·1. Injections discontinued

57. E. S., æt. 23, female, was admitted on account of a little pain in her knee. This disappeared in a few days with massage. A centigramme was injected, and to our surprise there was considerable general reaction, the temperature reaching $103\cdot4^{\circ}$ 27 hours after the injection. There was no reaction in the knee at all, but the patient showed us 2 scars on the right arm which had resulted from chronic abscesses and which had reacted. She told us that they were not quite well before the injection, but they gave her no trouble, and she had forgotten to mention them.

58. A student at the hospital with a sinus on trochanter, not supposed to be tubercular. 1 centigramme produced no effect.

59. A. F., a woman with an undoubted rheumatic knee, did not react to 1 centigramme.

60. J. D., æt. 31. A case of typical lupus erythematosus, did not react after 1 centigramme.

61. W. S., æt. 5. Post-nasal growths, did not react after 2, 4, and 6 milligrammes.

62. H. R., æt. 6. Post-nasal growths, did not react after 2 and 4 milligrammes.

63. J. F., æt. 15 months. Syphilitic epiphysitis of lower end of tibia, did not react after 2 milligrammes.

64. E. P., æt. 7. Inflammation of hip after acute rheumatism, did not react after 2, 4, and 8 milligrammes.

65. A case of syphilitic disease of the nose, palate, pharynx, &c., in a boy, did not react after 2 milligrammes, but after 1 centigramme there was a

CASES. (The first, a case of leprosy, is very be given in detail.)

Total number, amount, &c., of injections.	Additional treatment.	Condition when last seen.	Notes.
Commenced Dec. 10th, 1890. Discontinued on Feb. 18th, 1891. Length of treatment = 70 days. Total number of injections = 27. Total amount of fluid used = 1.156 grms.	None	Report from Dr. Walter C. S. Burney, Superintendent of the Greenwich Union Infirmary, dated April 4th, 1891.— “She states that before she was injected she suffered with pains in the extremities every month, lasting from 4 to 5 days. These pains have not since reappeared. The anæsthesia of the arms existed up to the junction of the middle and upper third of the radius whereas it now does not reach higher than about the middle of the metacarpal bones; about the same may be said of the lower extremities. She has increased in weight and this cannot be attributed to any extra diet. She complains that she has not been able to get her breath so well since the injections; she has had one or two slight fainting fits. On the whole I am of opinion that she has greatly improved, and the patient herself attaches great importance to the relief of the periodic pains.”	The first reaction was severe, the chief symptoms being rigor, vomiting and oppression of breathing. There were shooting pains in arms and legs, a large vesicle formed on the inner side of the left great toe, and there was swelling of the left fore and middle finger. Next day a macular rash in the form of a line was seen on the lower folds of the mammæ meeting in the centre. Another line across the upper part of the abdomen and a semi-circular patch below and on the right of the ensiform cartilage. There was also another line at the posterior edge of the right buttock. After the 3rd injection the patient was collapsed in the evening, when the temperature 6 hours after the injection was 97°, pulse 44 and respirations 40 and very shallow. The symptoms subsided as the temperature rose; the highest temperature was 103°. Fresh bullæ appeared on the left leg and on the right heel and ankle. There was no further trouble, the rash faded between each injection and came out again during the reactions; it had not entirely disappeared when she left the hospital. After the 16th injection patient asserted that she could open her hand better than before the treatment and that she herself felt better; the anæsthesia was somewhat less marked. When she left the hospital she still asserted that she was better in these respects.
	Result.—Improvement in some respects		

general febrile reaction (temperature above 102°) but no local reaction whatever.

66. A. B., female, æt. 49, was admitted with a scar at the left angle of the mouth with several ulcerating patches on it. Patient had suffered from ulceration here for 23 years, and a great variety of diagnoses have been made, among others that of lupus. It seemed most probably a case of rodent ulcer, but a series of injections were given commencing with .002 grammes. She had general febrile reactions, not severe, after the first six injections, but we never could satisfy ourselves as to any local reaction. Not the slightest alteration occurred in the disease during treatment.

67. Mrs. W., a nurse under the care of Dr. Greville MacDonald with masses of soft tissue in both nostrils, as to the nature of which many diverse opinions have been expressed by those who have made clinical or microscopical examinations, some thinking that it must be some form of tubercular disease. In her case a number of injections were given, beginning with .002 and going as high as .3, and towards the end of the treatment the part was scraped from time to time. There were distinct febrile reactions from the first, and the patient said that there was increase in the nasal discharge, but the local reaction was never very definite. Whether the improvement which followed the treatment was entirely due to the scraping, or to it and the tuberculine combined, and whether the disease was tubercular or not, are points which are not yet clear. For my own part I have always been sceptical of its tubercular nature, and I cannot find any evidence of tubercle in the portions which I have examined microscopically.

(For report of the discussion on this paper, see 'Proceedings of the Royal Medical and Chirurgical Society,' Third Series, vol. iii, p. 124.)