REFERENCES.

¹ BRITISH MEDICAL JOURNAL, March 4th, 1889. ² 4th Edition, 1901. ³ 4th Edition. ⁴ *System of Medicine*, 1897. ⁵ *Quain's Dictionary of Medicine*, 2nd Edition, 1902. ⁶ BRITISH MEDICAL JOURNAL, July 16th, 1893. ⁷ *Ibid.*, March 10th, 1900. ⁸ *Ibid.*, February 21st, 1903. ⁹ *Ibid.*, March 10th, 1900. ¹⁰ *Ibid.*, March 23rd, 1901. ¹¹ *Ibid.*, February 2nd, 1900. ¹² *Loc. cit.* ¹³ *Loc. cit.* ¹⁴ *Loc. cit.* ¹⁵ *Loc. cit.* ¹⁶ *Diseases of the Stomach and their Surgical Treatment*, 1901. ¹⁷ *Loc. cit.* ¹⁸ *Loc. cit.* ¹⁹ *Diseases of the Stomach*, 2nd Edition, 1901.

A PRELIMINARY REPORT ON THE TREATMENT OF ADVANCED PULMONARY TUBERCULOSIS BY INTRAVENOUS INJECTIONS OF IODOFORM.

By THOMAS W. DEWAR, M.D. EDIN., F.R.C.P.,
Dublanc, N.B.

In submitting this short preliminary report of an incomplete research on which I have been engaged for some time I shall confine myself chiefly to a description of the method. The results obtained have been so striking that several of my medical friends who have examined patients before treatment was begun and after are of opinion that it warrants publication.

All the patients treated have had tubercle bacilli, cocci and elastic tissue in the sputum, and in all both lungs were affected. In every instance there has been a great and sometimes rapid improvement in the physical signs, temperatures have become normal, weight and vigour increased, and expectation and organisms diminished. This has been achieved in patients with cavitation, whose condition was regarded as practically hopeless by independent physicians of the highest repute. It was my original desire to publish completed accounts of a number of cases with charts and diagrams in which the arrest had stood the test of time, and to which the term "cure" could have been applied with some justice, to record others where it had only stayed the advance of the disease, and to admit the residuum in which it had exercised no beneficial effect whatever. Such a report, accompanied by the independent certification of other medical men will alone now carry conviction to the profession should a claim be put forward that a cure has been found. This is necessary when we consider the pathology of the disease, its varied modes of dissemination (after implantation), the extreme range of age in which it is found, the frequent complexity of the infection, its latency and power of insidious advance. An analysis of even a hundred cases would be an imperfect gauge of any therapeutic measure. Here in a country district the number of phthisical patients is small, and as most of those who are in a position to leave the towns for treatment gravitate to the various sanatoria, it would be a work of years before I was in a position to tabulate even such a small number. The impossibility, therefore, of getting material on which to work will, I trust, extenuate the imperfections and shortcomings of premature publication. While fresh air is a desirable adjunct, I have recently treated one of my worst cases without it. In fact the nurse had difficulty in getting even imperfect ventilation.

It has been my lot, as it is the lot of most general practitioners, to have had to attend a good many patients suffering from advanced tuberculous disease of the lungs. Some of these had wintered abroad, some being in sanatoria; others had had neither of those advantages. All, however, had been under treatment of some kind or other, in the face of which the mischief had advanced with greater or less rapidity. The partial success which of late years has attended efforts at combating the mischief by direct attack in situ by way of the veins led me to make some experiments in that direction. In this search the much-discussed iodoform seemed to possess distinct qualifications. Despite the difference of opinion which exists as to its antiseptic qualities and how these are effected, and that it has a sickly penetrating odour most offensive to many, it is still one of the most trusted antiseptics with the operating surgeon. In selecting it as the bactericidal agent in an active attack on tubercle in the lung there were many points in its favour.

1. Its purity and known safety as an antiseptic agent.
2. Its ready elimination.
3. Its slow volatility and therefore sustained action.
4. It seems to have an affinity for dead or dying tissues, that is, the situations where the trouble is most active.

Could it be conveyed to the lung capillaries and chiefly deposited there, it seemed reasonable to expect amelioration in the condition and possibly such an emphatic arrest that

auto-immunization, increased tissue resistance, or whatever other forces ensure the occasional unaided recovery in advanced cases of this disease, might have their opportunity to act. To effect this it required to be in solution, and its great solubility in ether was taken advantage of. At first this seemed an ideal solvent. The ethereal solution would be rapidly conveyed to the lung capillaries. There the ether might be expected to volatilize and leave some solid iodoform in situ. Having satisfied myself by injection that this solution was safe, the remedy was applied to several patients.

The breath and mouth at once smell and taste of the solution. Soon the ether is dissipated, but for several hours after (depending on the dose) the breath smells of iodoform and the patient is conscious of the smell and taste. This stability of iodoform after injection is very interesting and desirable. The liberation of free iodine to even a small extent would rapidly irritate the coating of the veins, and assist in the production of thrombosis, besides causing severe coughing. Further, this persistence seems to point to the iodoform itself as iodoform exerting the beneficial influence rather than to the decomposition of the compound, freeing pure iodine. I have repeatedly examined the urine with the starch test at varying intervals after injecting, but have failed to get the iodine reaction. On this point, however, I do not desire to be dogmatic. This slow sustained action of the drug may be counted upon, while at the same time it diminishes the risk of cumulative action. Patients soon become tolerant of the taste, and unless the injections are pressed I have met with no bad effects whatever while employing small doses. Pushing the drug in large daily doses positively seems to saturate the system. I have, after discontinuing it for several days, detected the smell in the palms of the hands and the skin of the body. The patients are then so constantly conscious of it that the appetite is affected. It is undesirable and necessary to push the injections to this extent. In the course of this work I have observed that soon after the injections are begun evidence of disease is revealed, sometimes where none was suspected at first. This diagnostic quality of the injections is valuable. The productions of fine crepitations or *râles* at an apex formerly dry, resonant, and apparently healthy is important. It proves how subtle the malady is, and how untrustworthy the most careful physical examinations occasionally may be.

Briefly, then, these are the good points, but it has important drawbacks, referable both to the ether and the iodoform. The chilling effects of the ether on the vein walls, diminishing their calibre and temporarily stiffening, if not partially freezing, them, has to be guarded against as much as possible. In a case (five years' duration) with extensive cavitation in the upper lobes of both lungs and consolidation at both bases anteriorly, with absence of breath sounds and little or no chest action, it occasioned such sudden persistent breathlessness and palpitation that I had to discontinue the treatment. As the patient could take the ether alone without any discomfort, the natural conclusion is that the iodoform was the offending cause. This did not occur once but several times, and even with such small injections as 5 minims. It is possible that this embarrassment may be found a constant characteristic and contraindication in very advanced disease where the margin of available lung tissue is only equal to continuing life under the most passive conditions and no more. To save such cases is of course the dream of the physician, but we might reasonably expect that the paralyzing influence which iodoform exerts on the motor ganglia of the heart would be intensified when it has been debilitated by unduly rapid action and the wasting effects of toxins.

Before beginning the treatment of any case, we must first examine carefully the available superficial venous system both in the arms and legs. The more extensive this is, the greater is the probability that we shall arrest the progress of the disease. Therefore men are more favourable subjects for treatment than women, and women than children. I have never had occasion to use it in children, and I fear from their natural timidity it would not be possible to carry it out. Nothing can be more disconcerting than a request to undertake the treatment of a plump or even fat young woman of 18 or 20 with extensively diseased lungs, whose total available venous system is represented by two dim blue areas $\frac{1}{2}$ in. long at the bends of the elbows. It will demand the most scrupulous care and dexterity to administer injections regularly for six months or a year. While nothing is simpler than to give an intravenous injection once in a large vessel, it is a matter of some difficulty to give a hundred through a small restricted venous supply to avoid thrombosis and have

Chart 1.—A. B., aged 40.

Chart 2.—C. D., aged 18.

the vessels still patent at the end of a year. Patients with advanced phthisis are either in bed or on a sofa or deck chair outside if the weather permits. The hands and upper extremities are exposed and cold and the lumen of the veins small. In short, we come to the worst cases under the most advantageous conditions.

While not wishing to deter any one from undertaking the treatment, I would suggest that the busy, hardworked practitioner, with little time at his disposal, should not attempt it. Mistakes are exceedingly painful to the patient. The successful injection is painless. Pain is an imperative indication to withdraw the needle at once, and not attempt it again in that particular vein for forty-eight hours at least. So far as possible the operator should avoid using the same vein except at intervals, or, if he has no choice, he should try to avoid entering the needle exactly at the same spot. It is almost unnecessary to add that the skin over the vein to be used is treated antiseptically. It is impossible to be too careful in cleaning and rendering aseptic the syringes and needles.

The solubility of iodoform in ether is 1 in 7. The solution I use is not quite saturated. If a saturated solution is employed before the operator can get the needle into the vein some of the ether has volatilized. The needle will be found blocked with iodoform, and the plunger of the syringe probably jammed, rendering injection impossible. I begin generally with daily injections of from $\text{m} \times \text{v}$ to $\text{m} \times \text{vii}$. The solution must be introduced very slowly. With large full veins, and lungs not too much disorganized, it is possible to give very large doses. To two patients I have given at one time as much as $\text{m} \times \text{xlvi}$, representing at least 6 gr. of pure iodoform. I do not think such large doses are necessary, and the long chilling of the vein with such a big injection is apt to prove permanently injurious to it. Every vessel that becomes occluded diminishes the patient's chance of recovery. I employ the finest precipitated iodoform that can be obtained and the purest ether of specific gravity 720. Inferior forms of iodoform and ether make a solution which rapidly decomposes and liberates iodine. The solution should be made fresh if possible for each patient, and immediately before the injection, and exposed to light as little as possible. As would be expected with a large dose ($\text{m} \times \text{xiii}$ to $\text{m} \times \text{xv}$) there is frequently momentary unconsciousness, but if the earlier injections have been successful neither patient nor friends will object when told that this may possibly occur. Space does not permit of my giving drawings of the apparatus which I have devised to assist me, nor of enumerating the little details of technique which I have found necessary. These can be better shown than described.

It has been my experience that the continuous successful injection of an ethereal solution of iodoform is followed *pari passu* by an improvement in the patient's condition in every way, and that except in very advanced disease it appears to be innocuous in moderate doses. Subjoined by way of illustration are the charts of two patients. In one the whole of the upper lobe of the right lung was affected, and a cavity existed. The left apex was also the seat of disease. He has had a hundred injections at least, and is now well in every way. The left apex is now clear, and the right exhibits the physical signs of a cicatrized cavity, the remainder of the upper lobe having cleared up. He coughs very little in the morning, sputum about half a drachm in twenty-four

hours, sometimes less. Organisms still present in small numbers. During the next few weeks after the chart reproduced there were occasional slight rises of temperature, but without any untoward symptoms. Twelve weeks after beginning treatment temperature became normal, and has remained so now for six months (Chart 1).

In the other the whole of the right lung was infiltrated and breaking down, and the left apex had begun to give way. In this instance the patient has lived for years in the country under the best hygienic conditions, and the windows of the house had been open day and night all the year round. In spite of this the disease got implanted. The recovery here, too, is very remarkable. Organisms can still be found (Chart 2).

The potentiality of the method seems great, and should my experience be confirmed, it may enable many wage-earners to continue at work while gradually regaining better health.¹ That it is powerful to arrest I have now no doubt, and therefore an agent of some importance in mitigating the terrible mass of human suffering which is primarily the lot of the afflicted, and in its wake leaves too often privation and destitution the only heritage to their dependents.

NOTE.

¹ I have two patients at present so doing.

CASE OF AORTIC DISEASE WITH UNUSUAL COURSE.

By H. E. BRUCE-PORTER, M.R.C.S., L.R.C.P.,
Windsor.

MAJOR —, aged 43, married, was invalided from India with "valvular disease of heart," as his Medical Board found that he had double aortic and double mitral murmurs, and there was albumen present in the urine. In their opinion his condition was so grave that it was necessary to send a medical officer down country in charge of him. He was brought by easy stages from Marseilles, and on arrival in London I met him and took him to his brother's house, where he was to remain for a couple of days; several times during that drive of twenty minutes' duration I feared the end was coming. Breathlessness was intense and speaking was almost an impossibility, but after he had been put to bed I gave him $\frac{1}{2}$ gr. morph. sulph. with $\frac{1}{16}$ gr. atrop. sulph. which steadied his heart and, considering his condition, he had a fairly quiet night.

Next day on my advice he was seen by Dr. Pye-Smith who, after he had pointed out the great risks of a journey, consented to the patient being taken by road to Windsor. I now went into the previous history of the patient; he had always led an active life and was generally considered very healthy. About two and a-half years ago he suffered from indigestion and had palpitation. He was examined as to fitness for active service some twelve months ago and passed fit. This, however, must not be taken to mean that he was free from cardiac trouble; as I know in examining officers for foreign service army medical officers are very kind and one of the first questions put is, "Do you feel all right? and I suppose you want to go." So long, therefore, as the heart seems to be doing its work, it would be passed though the subject of a murmur, the reason being that if rejected for active service