Condition on Admission.

She was a fairly well nourished child, temperature subnormal, breathing comfortably. There was a loose cough with but little expectoration. On examining the chest there were marked signs of fluid in the left pleural cavity with some displacement of the heart to the right, the deep cardiac dullness reaching $2\frac{1}{2}$ in. to the right of the middle line. The heart was in other respects normal. Examination of the alimentary and nervous systems revealed nothing worthy of note.

After-History.

On January 15th her chest was aspirated and 1 pint of fluid withdrawn, following this 3j of adrenalin chloride solution was injected and half a pint of sterilized air pumped in. Immediately after the paracentesis the heart was found to be back in its normal site. The pleural fluid was clear and yellowish in colour, alkaline and loaded with albumen (5 per cent.). Its specific gravity was 1020, and on centrifuging and examining the deposit 95 per cent. of the cells were seen to be mononuclear. Following the aspiration there was a transient elevation of temperature to 100.4° F., otherwise the temperature has been subnormal. The patient progressed favourably, and on January 22nd, 1904, the following note was made. "No reaccumulation of fluid, the precordium quite resonant, the whole of the left side of the chest is resonant."

I have purposely avoided giving you any statistics as to the number of times I have employed one or both of these procedures. I recently heard a gentleman say that in order to prove anything by statistics you should have 100,000 cases. I should have thought a smaller number would have sufficed. Personally, I would rather have 100 well-observed cases than 100,000. However, some people are difficult to satisfy, and I hope you will all be qualified and in good practices long before the cases have accumulated to 100,000. I think inductive reasoning is too slow a process for those who are moving in the van of progress, and I prefer to draw my deductions from well-ascertained facts. So far I am quite satisfied with my results, and I intend to continue the treatment. I have applied these methods to the pleural, pericardial, and peritoneal cavities, and recently, at my suggestion, my friend, Mr. Damer Harrison, has injected adrenalin chloride solution into the lateral ventricle in a case of hydrops ventriculi. If our diagnosis of cerebellar tumour be correct the adrenalin is not likely to have any permanent effect. After removing several ounces of fluid from the ventricle he left in a small drainage tube, and that night the dressings were saturated twice with cerebro-spinal fluid; the following day he injected 10m of adrenalin chloride solution on each of two occasions, and on the day after 20m.

I am not going to-day to draw your attention to other methods of treatment, but I wish you clearly to understand that I do not consider these methods necessary or advisable in every case.

In a large number of cases of pleurisy and pericarditis the fluid gets gradually absorbed without any artificial means for its removal, and in certain cases of tuberculous peritonitis the surgeons have been fairly successful, but not nearly so successful as some of them would like us to believe, by free drainage. A considerable number of cases are hopeless, and there is not much to be gained by attempting the impossible. You recollect a short time ago in Ward 12 a small boy, suffering from tabes mesenterica, where the whole of the glands of the abdomen were one caseous mass. I got Mr. Paul to open his peritoneal cavity and drain away the ascitic fluid, in order to afford the boy some relief. Such was all that any of us expected or could hope for.

With ordinary care the treatment which I have recommended is easily carried out, and the instruments are fairly perfect, but I hope that every one who follows me will use all aseptic precautions. It would not be very pleasant to set up an empyema, a purulent pericarditis, or a septic peritonitis. I think the risks of doing so are small, but still the possibility of such occurrences should be borne in mind. Many cases become purulent from the nature of the infection without any interference of any kind, and therefore in every case the fluid withdrawn should be examined for fear in some cases you might blame the treatment for conditions which were in no way the result. If I found purulent or semi-purulent fluid I would inject neither adrenalin nor air, but have the cavity freely opened and drained. I have seen a few cases of localized empyema cured by aspiration alone, or by aspiration and washing out with hydrogen peroxide, but still I think the best treatment is that of free drainage. I have been asked by several medical men why I do not use oxygen. Of course there is oxygen in the air, but when a man asks you that question he means Brins's oxygen bottled up in a cylinder. Well, my objection to pure oxygen is that I think it would be absorbed too quickly, and I am of opinion that its chemical affinity is

not more active than that of the air. I can conceive of certain cases, such as those where there is an excessive number of leucocytes or apparently commencing formation of pus where oxygen in the nascent state, such as that in hydrogen peroxide, would be an advantage. But this treatment would not be without risk if a large quantity of peroxide were used as the fluid might be rapidly absorbed and the oxygen too quickly liberated in the blood. I have never known such a thing happen, but I think it well to give a word of warning as to its possibility.

The injection of air has another advantage which I have not yet mentioned. You know that in elderly people with rigid chest walls, if there be a large collection of fluid and the whole of it be withdrawn there is a great risk, from the sudden diminution of pressure, of collateral hyperaemia and oedema of the healthy lung which, in not a few cases, has led to rapid death. Now this risk can be entirely obviated by the injection of air, and part of the air may be injected, say, when half the liquid is drawn off. The air rises to the surface, and hence it is very easy to re-establish the siphon and draw off the remainder of the liquid, you can then inject the adrenalin and more air. I think it will be found sufficient to inject half as much air as the bulk of the liquid withdrawn. It is just as simple to calculate the bulk of air when you know the capacity of your pump as it is to measure the liquid which you have taken away. It is worth remembering that

air expands $\frac{1}{490.9}$ for each degree of Fahrenheit which it is raised. So if you introduce air at 60° F., when it has warmed up to 100° F., it will have expanded $\frac{1}{4}$ of its bulk. When the joiner had the 4 pints in his peritoneal cavity he was well blown up, but did not feel at all uncomfortable, and I suggested to him that he might play a tune on the big drum.

SOME POINTS IN THE TREATMENT OF HAEMOPTYSIS AT A SANATORIUM.

By J. PENN MILTON, M.R.C.S.ENG., L.R.C.P.LOND.,
Medical Superintendent, Devon and Cornwall Sanatorium, Didworthy,
South Brent, Devon.

THE following remarks are based on the experience that I have gained, first, from having been a patient at a well-known German sanatorium in the Black Forest, where I was cured; secondly, from having worked at different sanatoria since then; and thirdly, by treating patients making an "after-cure" in their own homes. It will be admitted that work in a sanatorium furnishes the best opportunities for studying the prodromata of haemoptysis, the relation of haemoptysis to the progress of the disease and to the idiosyncracies of the patient, the natural methods by which the bleeding is arrested, and, finally, the effects of treatment.

Haemoptysis may be classified as follows:

CLASS I.—Occurring early in the disease—that is, as the first initial sign of pulmonary tuberculosis and before consolidation can be demonstrated by physical signs.

The patient may be robust and appear in good general health when without premonition haemoptysis takes place. There may be no history of either trauma or exertion, though sometimes it follows on violent exercise—that is, tennis, football, etc. This form of haemoptysis is probably due to congestion of the vessels near the tubercles, the blood escaping from the pulmonary capillaries by diapedesis.

The treatment depends on the amount of blood lost. In these early cases my experience has been that even a large haemoptysis does not endanger life to any serious extent. For cases not presenting the contraindications mentioned below, exercise most probably is not amiss; such exercise, however, must be carefully graduated by the medical man, it should be short of fatigue and breathlessness, the pace a crawl, and the walk sheltered. The view concerning the rationale of exercise that I hold in haemoptysis is that the blood vessels, cutaneous and otherwise, in all parts of the body, more especially those of the limbs, become dilated, and take a certain quantity of blood away from the lungs; this amply compensates for the extra amount of blood that, induced by exercise, passes through the lungs. Practical experience will bear this out, but this treatment must be applied individually and not generally. The method of exercising cases where haemoptysis is present is not originally mine, I heard it first enunciated by a great German and world-known authority at whose sanatorium I was a patient.

Haemoptysis in early cases usually occurs before patients

come to a sanatorium, but there are those with consolidation who have it whilst at a sanatorium. With these latter my treatment is to employ exercise under the conditions mentioned above, and to keep them on the ordinary diet. I have had no bad results, nor any occasion to doubt the wisdom of my treatment. The patient certainly prefers it to being kept in bed until all bleeding ceases, being emptied by saline purges, and put on a milk diet. These early cases commencing with haemoptysis as a rule do well, the disease being detected from the start, so enabling the patient to undergo treatment at once. The old experience was that cases of phthisis commencing with a considerable haemoptysis frequently ran an acute course. There may be exceptions, but my experience has been quite the opposite, and all such patients that I have had under sanatorium treatment from the outset have invariably done well and become cured.

The contraindications for exercise are:

1. If fever is present previous to or after the attack, that is, if the rectal temperature is 37° C. or over on awaking in the morning, and 38° C. and over at night. Then rest in bed should be absolute with ordinary sanatorium diet, the amount of which is regulated by the emaciation or not of the patient, the more emaciated or the higher the fever the more food is required.

2. If the amount of blood lost is large and the patient is much weakened by the loss. This requires rest in bed and as liberal a diet as possible, regulated as in No. 1, with the extra consideration that he has lost a large amount of blood. I have never noticed that a full reasonable diet does any harm in cases of this description.

3. If the patient is in a highly nervous condition, which the medical man is unable to quiet.

In these cases rest on a lounge chair in a sheltered spot out-of-doors or in the patient's bedroom is necessary. Sometimes $\frac{1}{4}$ gr. of morphine in tabloid form placed beneath the tongue will quiet him. The personality of the doctor, however, does as much real good as anything. Exercise may be commenced at the doctor's discretion, and the ordinary diet adhered to. In these early cases of haemoptysis medicines, beyond a saline purge, are usually not necessary.

CLASS II.—When the disease has been present for some time and the physical signs reveal a decided extent of consolidation.

The patient in these cases is in failing health, and as a rule is subject to a bronchial winter cough, with expectoration, disappearing generally in the summer, but now continuing, combined with general lassitude, loss of appetite, anaemia, loss of weight, and no inclination for work, which, however, the patient continues to perform. These symptoms may not be urgent, and he fails to recognize the seriousness of his condition until blood in the expectoration is noticed; the bleeding as a rule is slight, and is most probably due to tuberculous ulceration of the bronchial mucous membrane. The presence of pulmonary tuberculosis is detected usually in the second stage and tubercle bacilli in the sputum are found.

The treatment should be directed to strengthening the lowered vitality and to improving nutrition by sanatorium treatment and forced dieting. Exercise, short of fatigue, the distance being regulated by the temperature. The haemoptysis as a rule requires no special treatment. If fever is present it must be treated by rest in bed if high, and by rest on a *chaise longue* in the bedroom if slight.

CLASS III.—Late in the disease, when cavitation is present.

Haemoptysis in this class is of more serious import, attended, as it often is, with grave risks to life, the patient in many cases rapidly passing beyond the reach of treatment. The haemorrhage proceeds from a branch or branches of the pulmonary artery, and is due either to (a) a ruptured pulmonary aneurysm—that is, an artery either in the wall of a cavity or stretching across it usually becomes obliterated; if not, being unsupported, an aneurysm results, and any exertion, such as by running or by lifting heavy weights—that is, a gladstone bag, etc.—causes it to rupture; or (b) by softening of the coats of an artery by ulceration, which happens especially in the caseous forms of the disease. The amount of blood lost is in proportion to the size of the vessel ruptured. The haemoptysis may come on suddenly and in large quantities, or slight blood spitting may occur two or three days previous to the attack. (If due regard is paid in suspected cases to this latter symptom, by ordering absolute rest, the greater evil may be prevented.) Where the onset is sudden, the quantity lost may be great. It is said that Nature may provide the best treatment by causing fainting, which

allows a thrombus to form of sufficient strength to stop the bleeding. It is questionable if this, however, really occurs.

Treatment.—The object to be attained is to favour the formation of a thrombus, which is gained by (1) lessening the frequency of the heart beats; (2) resting the lungs as much as possible; (3) lowering the blood pressure. The first two can be effected by seclusion and absolute rest in bed, from which the pillows can be removed, and a hot-water bottle placed at the feet, for which the patient is usually grateful. He should not talk or make any unnecessary movement, and be fed and looked after by an attendant until all danger is passed. Morphine is the drug *par excellence*, and may be given in doses of gr. $\frac{1}{4}$ or gr. $\frac{1}{2}$. The tabloid may be placed beneath the tongue, or if a quicker action be desired, it may be given hypodermically. The number of administrations must be left to the discretion of the doctor. This drug reduces the anxiety of the patient, and therefore quiets the heart beats, lessens the irritability of the respiratory centre, and allays the cough. The third object can be obtained by the administration of saline purgatives, ensuring free purgation, and so lowering the general and pulmonary blood pressure. This must also be left to the discretion of the doctor, whose judgement will be guided by the condition of the patient. Ice to suck may be given, and, as one author remarks, if it does nothing else, it produces in the mind of the patient a feeling that something is being done for his relief, and tends to diminish nervous excitement. The utility of an icebag on the sternum in this class of case, or anywhere else in contact with the chest wall, is doubtful. The diet at first should be light and unstimulating, consisting of raw eggs, milk, raw beef sandwiches, etc.; this should be gradually increased to the ordinary diet. Alcohol, unless there is collapse or high fever, should not be given. It is most important to return to a full and nourishing diet as soon as possible, especially in those cases of acute active disease, where it is so necessary for the patient to put on weight or not to lose it, as the case may be. With a haemorrhage, however, bringing a patient close to dissolution everything must be sacrificed to stop the bleeding and save life, and abundant feeding, which can be carried on in some cases, must be abandoned. If the blood clots cause obstruction in the bronchial tubes, with cyanosis and dyspnoea, the morphine, if still being administered, must be stopped, and Nature will usually remedy matters by encouraging the expulsion of the obstruction, for when the blood clots are allowed to remain they often become infected by micro-organisms, producing a septic condition with broncho-pneumonia (which complication is applicable to all cases of haemoptysis). One does not expect this, however, at a sanatorium, where the atmosphere is (or ought to be) pure and free from all such micro-organisms. The patient must remain in bed in such cases until the sputum has been free from blood for at least a week; this, however, is decided by his temperature and general condition. The personality of the doctor, if strong, has a tonic effect on the patient, especially in bad cases where it is absolutely necessary that the latter should have every reassurance of his recovery.

CLASS IV.—In any stage in plethoric subjects.

There is a class of patient, often with arrested disease, in whom a liberal diet has induced plethora. Usually he is very fit and able to take a lot of exercise. Owing to his plethoric condition an occasional attack of haemoptysis occurs, varying, but as a rule never great in quantity. The lung surrounding the part diseased might be described as being in an engorged condition, the blood escaping, it is to be presumed, by diapedesis from the weakest spot. In these cases the bleeding is Nature's method of relieving blood pressure, and should not be interfered with. These cases often complain of symptoms similar to those caused by an excess of uric acid for two or three days previous to an attack, that is, flushings of face, singing in ears, and fullness in the head, etc.

The treatment indicated here is: (1) To lower the blood pressure by administering full doses of magnesium sulphate or other saline purgative, followed by a seidlitz powder, or some Apenta water next morning on awaking. (2) A full amount of exercise, provided always that there is no contraindication, such as fever. (3) A modified diet, in which vegetables, especially green ones, play a large part, a minimum amount of meat, and alcohol should be forbidden.

When the symptoms described above first manifest themselves 30 gr. of sodium salicylate, combined with an aperient, often gives relief, and prevents the haemoptysis. To give an example. I once had a patient who had a small cavity at the

right apex, and who was very plethoric in spite of careful dieting and plenty of exercise. Immediately on the presence of any such symptoms, as referred to above I resorted to the treatment described, and no haemoptysis resulted, although previously without such treatment an attack resulted. Exceptions are met with, and the following case is one in point:

The patient, a man, who on arrival at this sanatorium weighed 15 st. 3 lb. (1 st. above his normal weight), and was very flabby, with a large patch of solid pleura with some disease in the adjoining lung at the right base, slight consolidation at both apices, and tuberculous laryngitis, has had, after about two months of sanatorium life, four attacks of haemoptysis, namely, on October 7th and 21st, and on November 6th and 21st. The attacks always come on at the same time—after the mid-day dinner—the quantity of blood lost has always been the same, just over 1 pint. There have been no premonitory symptoms as already mentioned, beyond a slight uneasiness felt in the chest. On the last occasion (November 21st), however, flushings and slight uneasiness were experienced, which the patient did not communicate to me until afterwards, so I was unable to follow my usual course in this case. The advent of the above symptoms, together with the regular periods of the attacks, tend to show that they are in the main determined by the blood pressure, which evidently rises to a certain point with resulting haemoptysis and then falls. My treatment all along in this case has been to reduce the weight, which is now 14 st. 6 lb.; it will be seen from this that he has had a moderate diet, and the amount, one would think, not enough to induce plethora. The patient, however, has a temperature which unfortunately prevents his taking only a small amount of exercise, consequently one of the most important details in the treatment of plethora, namely, exercise, is unable to be followed.

It must be borne in mind that the treatment described is not applicable to every case, but each one must be treated individually. For instance, where cavitation is present, and where it is suspected that the bleeding may come from the leaking of a large or the rupture of a small pulmonary aneurysm, the treatment must be modified accordingly, by lowering blood pressure and rest, with very careful exercise if given at all. In these cases experience is the main thing to rely on, together with a perfect knowledge of the case.

Wind exposure is always liable to bring on an attack of haemoptysis, and, therefore, should be avoided by having the sanatorium in a sheltered country.

TWO CASES OF LUNG DISEASE TREATED WITH THE EMANATIONS FROM THORIUM NITRATE.

By GORDON SHARP, M.D. EDIN.,
Leeds.

ACTING on the suggestion of Mr. Frederick Soddy, M.A., contained in the BRITISH MEDICAL JOURNAL,¹ I have been employing during the past few weeks the emanations from thorium nitrate solution in the treatment of two cases of diseases of the lungs, details of which will be given presently.

500 c.cm. bottle (17.598 oz.) containing 100 grams ($3\frac{1}{2}$ oz.) thorium nitrate in solution. The outlet tube (the smaller) acts as a mouthpiece. The inlet (the larger tube) should be straight not bent as in the drawing.

APPARATUS EMPLOYED.

The apparatus employed consists of an ordinary gas washing bottle modified to suit the special conditions. This has been made for me by Messrs. Reynolds and Branson. Every part of the apparatus is of glass, and the inlet and outlet tubes are attached to the stopper, so as to form one continuous piece.

The outlet tube is drawn in the shape of a mouthpiece, by means of which the inhalations can be made. The arrangement will be readily understood by a study of the accompanying figure.

CHARGING THE BOTTLE.

The bottle has a capacity of 500 c.cm., or, roughly, 17.598 oz., and in this quantity of water are dissolved 100 grams of thorium nitrate, or as near as possible $3\frac{1}{2}$ oz. When solution has been effected drop by drop of dilute ammonia is added to neutralize any excess of nitric acid that may be contained in the thorium. As soon as the first cloud of white thorium hydroxide is thrown down no more ammonia is to be added. Later on small quantities of thorium fall to the bottom of the bottle, but this is not important. The solution having been so prepared, more water is added to fill the bottle, in order that when the stopper with the inlet and outlet tubes is in position the "dead air" space above the liquid may be as small as possible. Having stood for twenty-four hours so that gaseous emanations may have time to collect, the solution is ready for use. Two patients may inhale the emanations continuously for one hour a day each at an interval of eleven hours—that is to say, one patient could start at 9 in the morning and inhale for one hour, while the other could inhale for one hour at 9 in the evening. By observing this rule time is given for the emanations to re-collect after each exhaustion.

Mr. Soddy says a small tube of pounded caustic potash may be inserted in the mouthpiece tube to absorb moisture and to neutralize the possible presence of nitric acid vapour. I have not found any need for such a tube. In the inlet tube I place a few pieces of dry thorium nitrate. This may act as an additional help in preventing the escape of emanations when the apparatus is not in use. When the bottle is not in use the inlet and outlet tubes should be closed by glass taps or glass stoppers to prevent leakage of the accumulating gaseous contents. In my present apparatus I have no such arrangement, so I have to close the inlet tube with a strip of glass thickly smeared with white vaseline, and the narrow opening of the outlet tube I cover up with the same unguent. Carbonaceous or easily oxidizable matter must not be employed as stoppers.

For further particulars Mr. Soddy's article should be studied.

CASE I.—Suspected Phthisis.

A boot-fastener, aged 24, had suffered from a "neglected cold" for many weeks previous to my seeing him on November 4th, 1903. He complained of shortness of breath, persistent cough with expectoration of white frothy material, increasing weakness, and he said he had lost 6 to 7 lb. in weight within two months. I examined his chest and found on the right side behind and over the lower lobe increase of vocal fremitus, scattered patches of dullness, and soft mucous râles. There was no heart trouble and no kidney trouble. I thought it was a case of incipient phthisis and had his sputum examined on one occasion, but with a negative result. He was put on Begbie's mixture alternating with Easton's syrup. He also took cod-liver oil and malt extract, and he himself suggested living out of doors as much as the weather warranted, and this was carried out. At the end of six weeks he showed no signs of improvement, and at this period his chief complaint was of shortness of breath on exertion and the persistent cough. I now started him with the inhalations from thorium nitrate solution, and at the end of fourteen days he felt so much improved that he went back to work and has been at work for over a week, although he comes daily to have the treatment. The chest condition is improving.

CASE II.—Suspected Phthisis: Pleuritic Onset.

A brickmaker, aged 23, was first seen in the beginning of September, 1903, the history being that he had spit blood two months before I saw him. He now complained of pains on the left side of the chest below in the collar bone. Distinct pleuritic rubbing could be detected over this region. He again spat blood in small quantities on five separate occasions and at intervals of two or three weeks. He says he had lost half a stone in weight. Mustard plasters were repeatedly applied over the area of pleuritic rubbing, and internally he was treated with the usual round of tonics; he was also sent to the country for one month but was hardly any better. His sputum was not examined. He had at the beginning of December, 1903, arranged to try an extended change of air, when I asked him to undergo the thorium treatment. He had altogether twenty-one sittings, and he has improved so much that he has returned to his work, and when I last examined his chest the pleuritic friction had disappeared.

Let me add I do not claim for the emanations a specific action, nor, indeed, any action at all, but I believe I am warranted in giving the treatment a further trial, and I place these results on record in the hope that others may give it a trial also. In this way we shall find out if these emanations possess any virtue in the treatment of the class of diseases I have mentioned. Having watched the patients while inhaling I could perceive that, quite apart from any virtue possessed