

The agglutination is a specific phenomenon, but this specificity is only relative inasmuch as a typhoid serum may likewise exhibit a certain degree of agglutinating power on some strains of the colon organism. Similarly I have found that the precipitins are not absolutely specific. A typhoid serum which agglutinates a certain strain of the colon bacillus will at the same time produce a slight precipitate in a filtered culture of the same colon organism. Finally, I have observed that if an animal be immunised with different bacteria at the same time a poly-agglutinating serum results, in the same way that a serum results which will produce a precipitate in filtered cultures of the several organisms used for immunisation. This had already been observed by Wolff as regards a poly-agglutinating serum.

I next proceeded to study the precipitins which might be produced by the serum of animals that had been treated with filtered broth cultures of bacteria.

Kraus, experimenting in this direction with the diphtheria bacillus, came to entirely negative results, and was led to the conclusion that there is no formation of precipitins in the serum of animals treated with germ-free filtered cultures. I may say at once that experimenting like Kraus with the diphtheria bacillus I came to a similar conclusion. But the results are of a different character if the experiments are extended to other bacteria. For example, cultures of the typhoid bacillus, colon bacillus, and staphylococcus aureus were freed from the organisms by filtration through a Berkefeld filter and the filtrates were injected into rabbits. In the blood of all the treated animals it was easy, after a certain time, to detect the formation of specific precipitins, as will be seen from the following experiments.

EXPERIMENT I.—The filtrate from an *old* broth culture of the typhoid bacillus was added to three series of test tubes. To the first series were added varying quantities of the serum of a rabbit (from one cubic centimetre to one-twentieth of a cubic centimetre) which had been treated with filtered cultures of the typhoid bacillus. To the second series were added the same quantities of serum taken from an animal treated with filtrates of cultures of the colon bacillus, and to the third the serum of a rabbit which had received filtered cultures of the staphylococcus aureus. After being kept for 20 hours at blood heat two tubes of the first series contained distinct precipitates—viz., those to which one cubic centimetre and half a cubic centimetre of the typhoid serum had been added. The test tubes in the second and third series, on the other hand, remained perfectly clear.

EXPERIMENT II.—An *old* broth culture of staphylococcus aureus was passed through a Berkefeld filter, and the filtrate added from a rabbit treated with staphylococcus filtrate, to a second half a cubic centimetre of serum from a rabbit treated with typhoid filtrate, and to a third half a cubic centimetre of serum from an animal treated with colon filtrate. At the end of 12 hours a precipitate occurred in the first tube and not in the other.

EXPERIMENT III.—To the filtrate of diphtheria cultures I added in varying quantities the serum of a horse immunised in the usual manner with diphtheria toxin. I was, however, not able to detect any precipitin, although the tubes were kept at blood heat for 48 hours.

The above observations show that on immunising animals with bacterial free filtrates of cultures of the typhoid bacillus, colon bacillus, and staphylococcus aureus it is possible to induce a formation of precipitins in their blood. The results were negative in the case of filtered cultures of the diphtheria bacillus. This fact, is in my opinion, an additional argument in favour of the intimate relation existing between the agglutinins and precipitins. For if we treat an animal with filtered diphtheria cultures we do not induce in its blood a formation of agglutinins (or only very slightly), but if we treat an animal, e.g., with filtered typhoid cultures, the blood will acquire a marked agglutinating power, though not so strong as if we had carried out the immunisation of the animal with unfiltered cultures.

A final series of experiments was made in order to determine whether precipitins were formed in the serum of animals that had been treated with *dialysed* cultures of bacteria. For this purpose typhoid cultures were taken (45 days old) and dialysed by means of a Martin gelatin filter. The dialysates were injected several times into two rabbits, five cubic centimetres at a time being inoculated subcutaneously. 12 days after the first injection the agglutinating power of the blood of the animals was tested and it was found that it had acquired distinct agglutinating properties, a distinct agglutination of typhoid bacilli being produced by

a dilution of 1 in 500. This confirms the observation made by Macfadyen that it is possible to induce a formation of agglutinins by treating animals with dialysed cultures. I tested the blood at the same time for the formation of precipitates, using as test material old filtered cultures of the typhoid organism. The results were positive. The serum of the animals treated with the dialysed cultures produced in doses of 0.5 and 0.25 cubic centimetre a precipitate in the filtered typhoid broth. The serum did not produce any precipitate in filtered cultures of staphylococcus aureus or the colon bacillus. My experiments, therefore, lead me to the conclusion that it is possible to induce the formation of precipitins as well as agglutinins by injecting dialysed cultures. My experiments lay no claim to completeness and it is my intention to continue and to expand them. Thus it would be interesting to test whether the serum of typhoid fever patients causes a precipitate in filtered typhoid cultures.

The experiments which I have made point to the following conclusions: 1. The blood serum of animals treated with different preparations of natural albumins contains specific precipitins for the albumins. 2. The blood serum of animals treated with unfiltered bacterial cultures produces a precipitate in filtered cultures of the organisms in question. 3. The serum of animals treated with *filtered* cultures of bacteria likewise develops specific precipitins which produce precipitates in the filtered cultures of the same bacteria. 4. An exception was in the case of diphtheria cultures, the injection of which did not lead in my hands to the production of precipitins. 5. Animals which are treated with dialysed typhoid cultures develop the specific precipitins in their serum. 6. There is a close connexion between the agglutinins and the precipitins.

I am greatly indebted to Dr. Allan Macfadyen for the help afforded me in the course of the experiments, as well as for the performance of the necessary inoculations.

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## SOME PRACTICAL POINTS IN THE TREATMENT OF CONGENITAL TORTICOLLIS.

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THE main facts known about congenital torticollis have been described by many writers and therefore I propose to limit my remarks to a few practical points in the conduct of these cases. These points may be summarised as follows.

1. Division of the contracted sterno-cleido-mastoid muscle is usually required to cure the deformity. The anterior fibres of the trapezius and also deep bands of cervical fascia are also sometimes involved. 2. A retention apparatus is not usually necessary in the treatment of uncomplicated congenital torticollis, either before operation or as a means of retaining the head in a straight position after the division of a contracted muscle. 3. In operating we have to decide between an open wound and a subcutaneous section. The open wound (assuming that strict antiseptic precautions are taken) is desirable in the majority

of cases and certainly it ought to be made when the clavicular attachment of the muscle has to be divided. When the sternal origin alone requires division and the contraction is sufficiently severe to cause the tendon to be raised away from the deeper tissues—then the subcutaneous operation may be performed as a safe procedure. It is impossible to divide the clavicular attachments of the muscle subcutaneously without risk of wounding some important structure, notably a vein. 4. A vertical incision between the two attachments is useful in operating, first because it is less likely to leave a noticeable scar than a transverse cut and, secondly, because we can through this one opening divide both the clavicular and sternal portions of the muscle. When other bands of contraction occur they must be dealt with according to their peculiarities. 5. The incision should be about one and three-quarter inches in length from the level of the clavicle upwards and should expose the edge of the clavicular portion of the sterno-mastoid. A director should then be worked closely under the muscle just above the clavicle until it projects at the outer border of the muscle. The vertical wound will allow the skin to be drawn to the outer side sufficiently to permit of the escape of the end of the director. Then the muscle can be carefully cut through from without downwards, the surgeon observing as he proceeds that no important vein, nerve, or artery is involved. The same method can then be applied to the sternal attachment. Oozing of blood having ceased the wound must be stitched up and treated in the ordinary manner, a large pad of gamgee tissue or other soft dressing being applied to effect gentle pressure. The dressing should be fixed with adhesive strapping and a bandage. The patient's head should then be placed in a perfectly straight position or even a little bent towards the side opposite to the affected muscle and fixed in position by sandbags placed on each side of the head, the patient lying supine. No other method of retention is necessary unless the child should be very unmanageable. The divided muscle usually reunites rapidly and about from a week to 10 days in bed in the one position suffices usually to allow a fairly firm union to take place. After this it is generally permissible for the patient to sit up in bed and in the course of a few days to get up and move about cautiously. At the end of three weeks the patient should have recovered from the operation. 6. The subsequent treatment depends upon the condition of the patient previously to operation. In the case of a young child, say five or six years of age or even older, it is probable that the structural changes in the spine from the previous malposition of the head will not be severe and that when the contraction is relieved the patient will have little or no difficulty in keeping the head straight. If there should be an inclination on the part of the patient to drop the head towards its former malposition a course of massage and special exercises will suffice to correct this tendency. In proportion to the length of time which has elapsed before operation has been performed, or, in other words, in proportion to the age of the individual and also in proportion to the degree of the contraction, so will be the tendency to deformity of the neck. It is in the older patients, and especially in adults, that the spine and other structures will have changed their shape, so that a very decided inclination for the head to assume the old position will exist. But even in these cases massage and exercises will generally suffice in a few weeks or months to overcome the evil. We may, of course, meet with severe lateral curvature as a result of the deformity and then such a complication will require to be separately dealt with, but these cases are comparatively rare and hardly come under consideration in a paper dealing with uncomplicated congenital torticollis. Of course, patients ought never to be allowed to continue to adult age unrelieved but such cases certainly exist. It is probable that a fear of bad results from operation—a fear which with antiseptic surgery and care in operation ought not to be entertained—explains the fact that this affection is sometimes allowed to continue beyond childhood. In some cases other muscles besides the sterno-mastoid are contracted, but these do not come into the category of uncomplicated congenital torticollis. Nor, I may as well add, am I considering those instances of contraction due to tonic spasm caused by caries of the cervical vertebræ and other causes.

CASE 1.—The patient, a girl, aged three years and three months, was sent to me by Dr. F. A. Purcell on June 11th, 1895. The right sterno-mastoid was contracted, drawing the head down on that side, as shown in Fig. 1. It is possible that in this case the contraction was due to

injury to the muscle from the force which was necessarily employed in delivering the head at birth, the case being a breech-presentation although, of course, this may not be the explanation of the contraction. In the treatment of the torticollis it was necessary to divide both the sternal and clavicular attachments of the contracted muscle. The head was

FIG. 1.



The patient in Case 1. The lines show the amount of deformity, one line being at the level of the shoulders and the other at the level of the lobes of the ears.

immediately placed in a straight position and perfect union took place rapidly, so that in three weeks the child was well and about again. Four months after operation the head remained perfectly straight and the father took the second photograph.

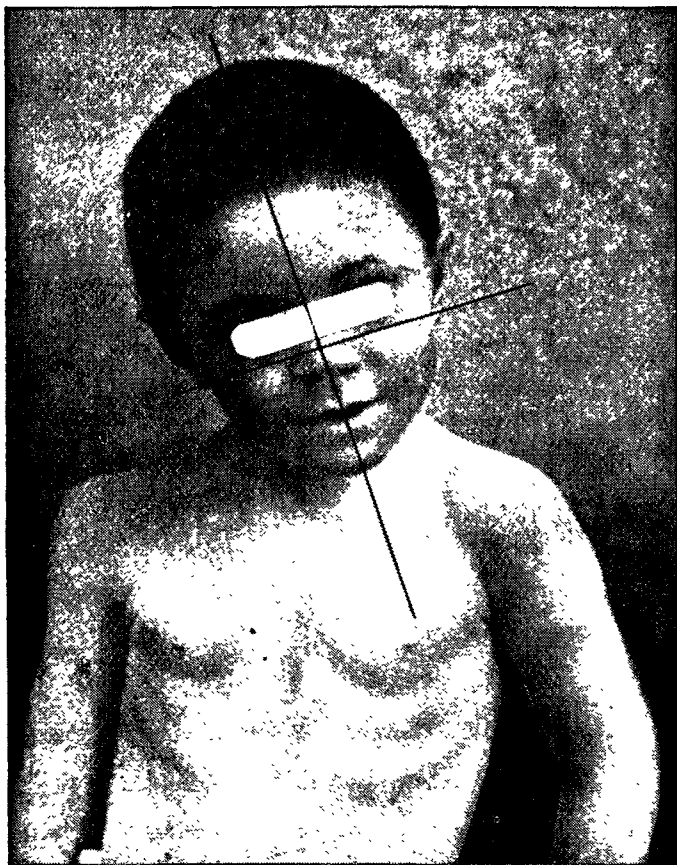
FIG. 2.



The same patient four months after operation.

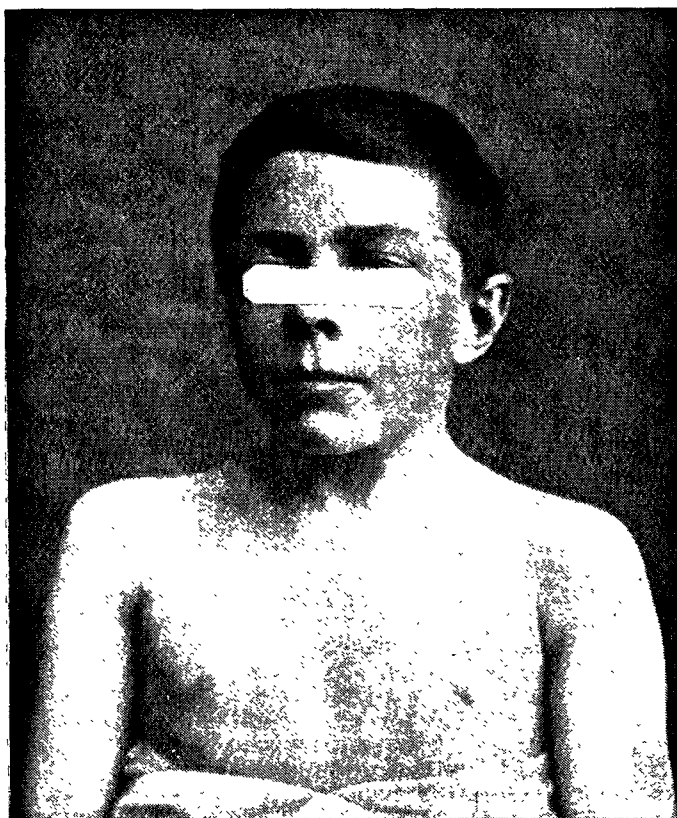
CASE 2.—The patient, a boy, aged five and a half years, was sent to me by Mr. J. Keay of Stockport in April, 1896. This patient is shown in Fig. 3 and it will be observed that

FIG. 3.



The patient in Case 2 before operation in April, 1896. The whole trunk was curved in accordance with the bend in the neck. The lines show the amount of distortion of the head.

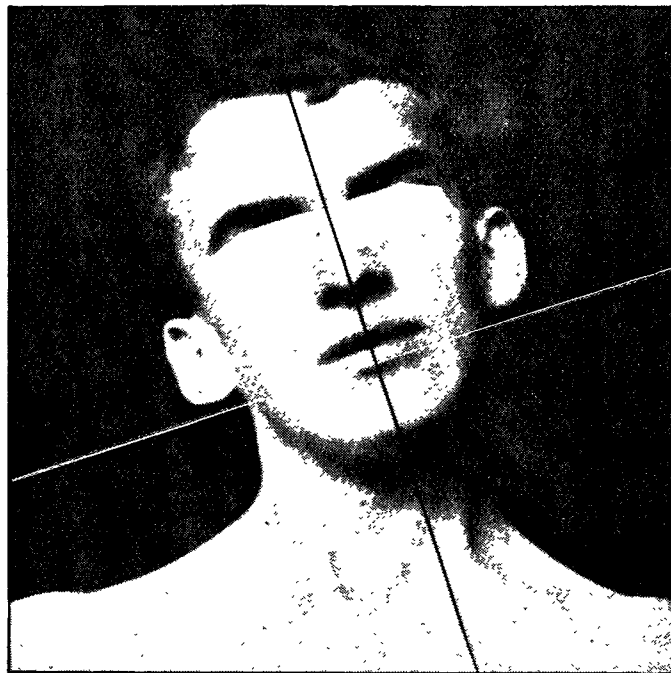
FIG. 4.



The same patient in April, 1901, five years after operation, showing that he was absolutely cured of the deformity and remained sound.

the whole body is curved in correspondence with the deflection of the head—that is to say, from the vertex of the head to the pelvis is one continuous curve. In this instance the spine had become involved as a result of the torticollis and I found it necessary to use an apparatus for a time for the spine itself. I therefore took the opportunity to extend this apparatus to the head. Had the spine not been thus affected

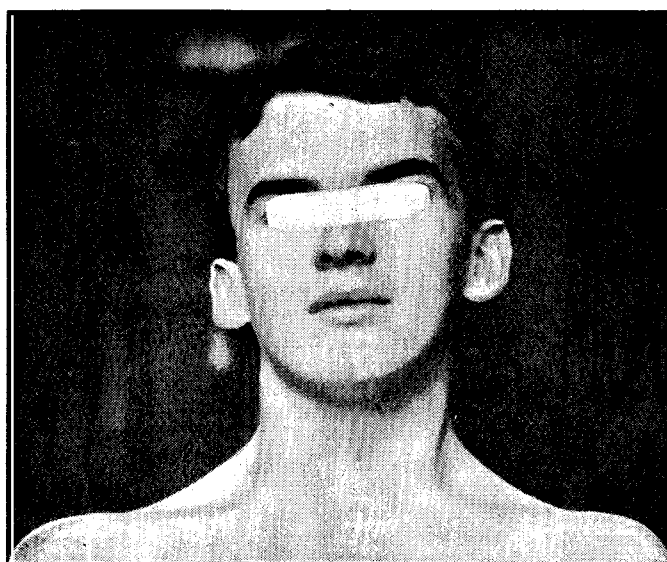
FIG. 5.



The patient in Case 3 before operation. The lines show the deflected position of the head.

I should not have used any apparatus and from more recent experience I believe that the case would have done very well without the head-piece. On April 10th, 1896, I divided both the attachments of the sterno-mastoid. The patient made a rapid recovery and a few weeks after operation the head was retained in a perfectly straight position. I had the opportunity of seeing this patient in April, 1901, five

FIG. 6.



The same patient a few weeks after operation.

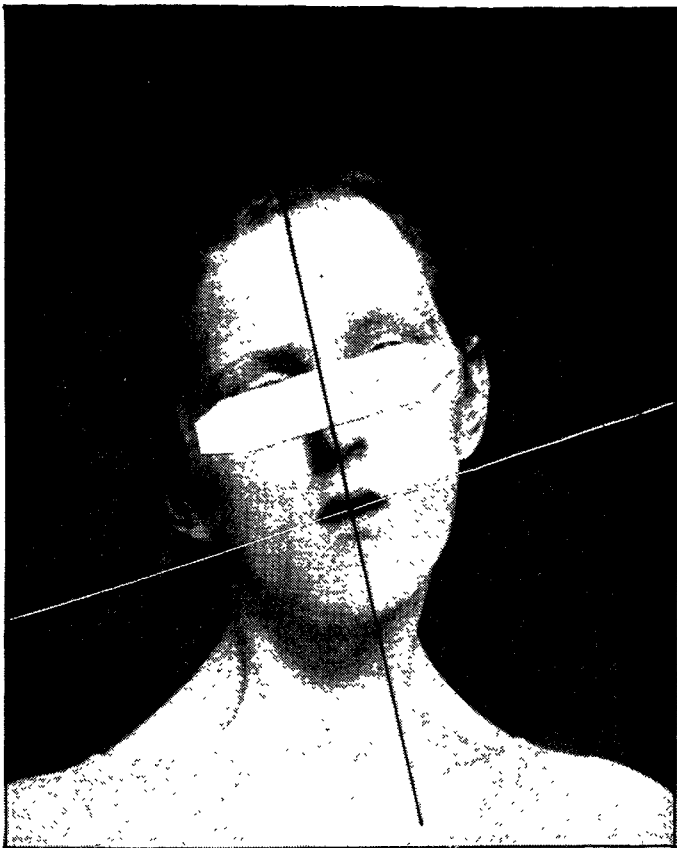
years after operation, and I found the cure to be absolutely perfect and I therefore took the photograph which is represented in Fig. 4.

CASE 3.—The next case is instructive as showing the effect of torticollis being allowed to continue without treatment until adult age. In such instances it is almost certain that structural changes will have occurred in the spine and other

parts requiring longer after-treatment, but yet, even under such circumstances, it is not necessary, as a rule, to use apparatus. The patient, who was 21 years of age, was sent to me by Dr. M. H. Gardiner of Richmond, on Dec. 8th, 1900. The right sterno-mastoid was contracted as shown in Fig. 5. There was also some contraction of the left sterno-mastoid, which seemed to be of a temporary nature and had probably been brought about by the continued efforts of the patient to counteract the contraction on the right side. Operation was necessary on both attachments of the right sterno-mastoid and the result was perfectly satisfactory. In a few weeks after operation the patient was able to hold his head almost perfectly straight as shown in Fig. 6. There was, however, a great tendency for the head to drop to the former position in consequence of the altered shape of the cervical vertebræ and other tissue changes, and a course of exercises and massage was necessary to overcome this. The patient made rapid improvement, so that at the end of three months he had complete control over the head. I considered, however, that it would take several more months before he could safely give up the exercises. After the first three weeks he had been able to carry out these exercises by himself. At the age of 14 years this patient wished to enter the navy, but he was refused in consequence of his wry-neck.

CASE 4.—A girl, aged 14 years, was sent to me on March 5th, 1901, by Miss Rigby, a member of the Ling Association, who had been treating her with exercises for curvature of the spine. As seen in Fig. 7, the contraction was chiefly on the right side, but partly also on the left.

FIG. 7.



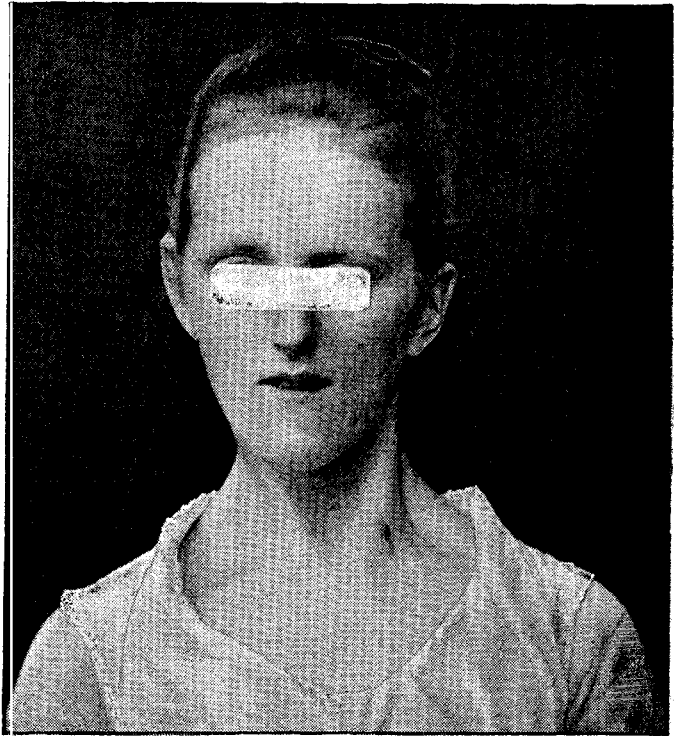
The patient in Case 4. Before operation the lines show the deflected position of the head.

It had been thought that the position of the head was due to the curvature of the spine, but it is more probable that the spine trouble was the result of the wry-neck. By exercises Miss Rigby had been able to overcome the curvatures in the dorsal and lumbar regions, but she failed to produce any effect on the cervical curve. This failure was not surprising as the neck was kept bent by the contracted muscle. Both attachments of the sterno-mastoid had to be divided and the patient made a good recovery (Fig. 8). It was, of course, necessary in this case to carry out a course of massage and exercises to overcome the curvature in the cervical part of the spine and the consequent tendency to drop the head towards the old position.

The whole subject of torticollis is a large one and I have

purposely limited the above remarks to the simplest form which presents itself. Those surgeons who wish to study torticollis in all its forms cannot do better than consult the

FIG. 8.



The same patient three weeks after operation.

work of Dr. P. Redard, published in Paris in 1898, which is not only complete in itself but which gives a long list of the bibliography of the subject.

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### BRIEF NOTES ON THREE CASES OF AUTO-INTOXICATION: ONE FATAL.

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IN Grenada and the Grenadines, where corn and peas form chiefly the staple article of food of the people, constipation is a very troublesome condition among them, so also it is with the inhabitants of the other islands where the same diet prevails. Various fruits as well which the poor indulge in, such for example as the mango, the sugar apple, and the apricot (mammy apple), are all fibrous and as such are calculated to render the bowels most obstinately constipated. It is well known that whereas the well-to-do indulge in foods that are much too rich the diets of the poorer classes are not sufficiently stimulating. Be that as it may, cases of obstinate constipation frequently present themselves, and it is a very difficult matter to persuade such patients that their diet should be altered for a more stimulating one; indeed, in very many instances there is no alternative, seeing that the parties are too poor to afford a frequent change of diet. My attention has for some years been drawn to a series of cases presenting symptoms not unlike those following upon a condition of uræmic poisoning and it has always been remarkable to me that there is not the slightest sign indicative of any Bright's disease. The urine has usually been free from the slightest trace of albumin or sugar and the patients, except for a state of stupor gradually deepening into coma, are otherwise physically healthy. Malaria cannot account for this condition, for usually in malarial coma there is always to be found a history of intermittent fever, and, moreover, the treatment adopted in the cases under discussion is sufficient to do away with any idea of malarial infection. Alcoholism is also excluded by virtue of the history and the state of the patient when he comes under observation. The only other state which might be allied to this condition is that of hysterical coma, which, in