hardly to be felt. The uterus very hard and tender on palpation; no fetal parts could be made out, no visible hæmorrhage, urine scanty, loaded with albumin, casts in large number, some pus and red blood cells.

It was decided to operate as soon as possible. When the abdomen was opened the uterus presented a remarkable appearance, dark, almost blue, in colour, with blood extravasation in patches over its surface, the peritoneal covering being in places raised in large blebs filled with blood, one of which upon the posterior surface had burst, the rent being about an inch in length; and there was free blood in the peritoneal cavity. When cut through the uterine wall showed blood extravasation throughout. The cavity was filled with blood and the placenta completely detached; the child, of course, was dead. After the uterus had been emptied and the wound closed in the usual manner it contracted well after a dose of pituitrin had been administered hypodermically. There was no post-partum hæmorrhage and she made a good recovery, the urine being free from albumin before she left the hospital.

CASE 3.—Patient, aged 39, 9-paræ, 36 weeks pregnant, was sent to the Rotunda Hospital by Dr. T. W. Rice, of Portlinton, and admitted on Dec. 7th, 1917. Twelve years previously her first pregnancy terminated prematurely at the eighth month owing to eclampsia, preceded by headaches and disordered vision, and since then the sight in her left eye had been impaired. She had convulsions and was unconscious for a week; the child was stillborn. The four succeeding pregnancies were normal and the children lived. But after the birth of the last child she did not make a satisfactory recovery, and had subsequently three abortions.

On admission the patient said that she had been ill for about three weeks, suffering from headaches and impaired vision. There was a large ecchymosis on the left buttock. Her urine was scanty and of a bright-red colour, and contained a large quantity of blood and tubercasts. The child could be easily palpated, its head presenting in the first position. The diagnosis was pre-eclamptic toxæmia, and she was treated in the manner formulated by Dr. Tweedy, and which has been adopted as a routine in the Rotunda Hospital for some years; nothing was given by the mouth but water and bicarbonate of soda. She got little sleep in spite of a hypodermic of morphia, and the total quantity of urine passed in the first 24 hours was 20 oz. and the blood pressure was 260 mm.

The following day there was no improvement, and some twitching in the muscles of her arms, for which she was given $\frac{1}{4}$ gr. morphia. During the following days there was little change in her condition until the sixth day, when she seemed to be rather better and had passed 31 oz. of urine during the previous 24 hours, but in quality it was the same, and the blood pressure was still 250 mm. Considering that she had been restricted to soda and water for five days since her admission to hospital and that she said that she had eaten nothing for two days before, I thought it advisable to give her some nourishment, so at 12.30 P.M. she took 4 oz. of milk with an equal quantity of barley-water. At 1.10 P.M. she complained of a violent pain in her abdomen and said that she could see nothing. She looked pale and collapsed. Her skin felt cold and clammy and was bathed in perspiration. The temperature was below normal and a little reddish discharge flowed from the vulva. Her abdomen was evidently larger, the uterus swollen, hard, and tender, and the fetus no longer palpable. Her condition appeared to be almost hopeless, but being persuaded that her life could be saved in no other way, I determined to operate immediately.

The abdomen having been opened, the uterus presented the same remarkable appearance which I have already described, being much distended, of a dark bluish-purple colour, with numerous patches of ecchymosis on its surface. The wall when cut through showed blood extravasated throughout its substance. The placenta was completely detached, the cavity full of blood and clots, and the fetus was dead. To save time, which appeared to be of vital importance, I closed the uterine wound with a running suture of chromicised gut; otherwise the operation was carried out in the usual manner. Towards its close the patient appeared to be dead, but with the aid of pituitrin and other restoratives she gradually came round and was removed to bed.

The patient made a good recovery, although in consequence of her toxæmic condition we thought it advisable for three days more to give her nothing but soda and water. After delivery the urine rapidly improved both in quantity and quality, so that on the fourth day it was normal in colour and free from albumin.

Comments on Cases.

I have not reported these cases as exceptional, but, on the contrary, as being such as are generally met with in cases of severe accidental hæmorrhage. I believe that the detachment of the placenta and the hæmorrhage in such cases are caused by thrombosis of the veins of the placental site, probably due to toxæmia, and that the disease is the same as that which causes puerperal convulsions.

Those are the chief points that I wish to emphasise, but there are two others to which I shall allude. One is that in none of the cases was it necessary to remove the uterus—indeed, had I done so in the third I am certain she could not have recovered; and the other as regards dietary. It is generally believed that a milk diet is necessary in these cases, and there is no doubt that it is better than any other kind of food. But Dr. Tweedy maintains—and I agree with him—that water only is much better even than milk, and the fact, which I have noted in the third case, that serious aggravation of the patient's condition has followed the ingestion of even a small quantity of milk has been observed by us on several occasions. In answer to the question as to how long a patient can be restricted to water alone I would call attention to the fact that this woman had nothing, with the exception of 8 ounces of barley-water and milk, but soda and water for eight and possibly for ten days, and yet she recovered.

Dublin.

THE DIFFERENTIAL DIAGNOSIS OF AMŒBIC AND BACILLARY DYSENTERY FROM THE BLOOD.

BY G. MARSHALL FINDLAY, M.B., CH.B. EDIN.,
TEMPORARY SURGEON, R.N.

THE early, and at the same time correct, differentiation of amœbic and bacillary dysentery is a matter of very considerable importance from the point of view of treatment; for whereas in amœbic dysentery it may be possible to withhold emetine for a few days without any dire result, in bacillary dysentery it is certainly inadmissible to delay the administration of serum. Unfortunately, the present diagnostic methods of dysentery are by no means simple; they take up a considerable time, require a certain amount of skill, and presuppose the existence of a well-equipped laboratory. On active service these conditions are not always obtainable.

In the present paper an attempt has been made to arrive at a simple method of differential diagnosis from an examination of the blood alone. It must in the first place be remembered that the underlying pathology of amœbic and bacillary dysentery is absolutely dissimilar. The former condition is produced by the action of a protozoon which by means of a proteolytic enzyme sets up a colliquative necrosis of the tissues in its immediate vicinity, the latter condition is of the nature of a well-marked bacillary toxæmia.

Description of Tests.

In the differentiation of amœbic and bacillary types of dysentery the two following reactions have been used: (1) the iodine reaction in the polymorphonuclear leucocytes; (2) the production of nuclear pseudopodia in the polymorphonuclear leucocytes.

1. It has long been known that in certain pathological conditions the polymorphs, when treated with dilute iodine in dry blood films, give a glycogen reaction, but it is only recently that Bond¹ and others have shown that even in health a large proportion of the white blood corpuscles normally give under certain conditions a reaction with iodine which is closely related to the glycogen reaction met with in certain diseases. When normal white blood cells are incubated for a quarter of an hour at 37° C. and are subsequently treated with a 1 per cent. solution of iodine in water and potassium iodide a certain number of the white cells show the presence of one or more mauve-coloured droplets. These droplets gradually coalesce to form one large drop, which eventually breaks the lining membrane of the cell and escapes into the surrounding medium. The particular cells which show the presence of this iodophile substance are certain of the polymorph leucocytes. The actual technique for the demonstration of the iodine reaction is as follows:—

A drop of blood from the finger is placed in a Ponder's plasticine cell² and incubated for one hour at 37° C. During incubation the white blood corpuscles pass out from the clot and adhere to the cover-glass above and the slide beneath. The cover-glass and cell are then removed and the clot is washed away with normal saline. Two films of leucocytes are thus obtained, which are mounted in the 1 per cent. solution of iodine in potassium iodide. All the cells in contact with the iodine take on a yellowish tint, but, as before mentioned, certain of them show the presence of mauve globules in the protoplasm. In the normal individual the number of cells giving the reaction is roughly 50-60 per cent. Bond, however, has pointed out that in conditions associated with the presence of bacillary toxins in the blood the amount of iodophile substance is increased, as there is a large increase not only in the number of cells actually giving the reaction, but also in the amount of iodophile substance present in the individual cells. This increased iodine reaction persists in the blood for a fortnight or three weeks after the disappearance of the active symptoms of the disease. Applying the above reaction to the case of bacillary dysentery, it is found that the number of white cells giving the iodine reaction is 60-80 per cent., while the increase in the amount of iodophile substance is also well brought out. By this means, therefore, we have a method, with certain reservations, of determining whether the dysenteric infection is due to a bacillus or not. It is necessary, however, to exclude any recent septic infection, such as a sore-throat or whitlow, since such a condition produces a similar iodophile condition in the blood.

In one of the earliest cases examined—an amœbic infection—the blood gave a well-marked iodine reaction, a

phenomenon only explained when it was found that the patient had a suppurating venereal bubo in the groin.

In addition, in long-standing amoebic infections where there is secondary bacillary infection the blood may also give a well-marked iodine reaction.

2. The formation of nuclear pseudopodia. An examination of a large number of polymorph leucocytes derived from healthy individuals reveals the fact that in a very small percentage of cells the nuclei are furnished with finger-like processes, or pseudopodia. These processes are usually classified into three types: (1) pyriform; (2) blunt or sessile; (3) spiculated. The cause of the formation of these pseudopodia is at present unknown, except in so far as they appear to be due to active nitrogenous metabolism.

Gruner,³ who has studied their production, has found that they are produced by a purin-containing diet, while they are also numerous in carcinoma, except in those cases where the tumour is so circumscribed that the cancerous excreta cannot enter the blood stream. An examination of the blood films from cases of amoebic dysentery reveals the fact that in this condition also there is a large increase in the production of nuclear pseudopodia. This increase is noticeable on the second or third day of the disease. Thus in amoebic dysentery the percentage of polymorphs with pseudopodia was found to vary from 12.5 per cent. to 52 per cent., the average being 18 per cent., while in bacillary dysentery the percentage obtained varied from 0 to 11. Out of 50 cases of bacillary dysentery examined the percentage of polymorphs with nuclear pseudopodia was in no instance above 12. It is interesting to note that in two cases of liver abscess without any dysenteric symptoms the number of cells with nuclear pseudopodia was 25 per cent. and 27 per cent. respectively.

A very large number of blood films from various pathological conditions have been examined for the production of nuclear pseudopodia, with the result that the only other condition in which the change could be found was chronic tuberculosis of the lungs. Provided, therefore, that the patient is living on a purin-free diet and that it is possible to exclude cancer and pulmonary tuberculosis, the formation of nuclear pseudopodia in a case of dysentery is highly suggestive of an amoebic infection.

Conclusion.

Taken in conjunction, the two tests above described enable an accurate diagnosis of the type of dysentery to be given at an early stage of the disease in at least 90 per cent. of cases. The occurrence of a well-marked iodine reaction without the formation of nuclear pseudopodia is suggestive of a bacillary infection, while the absence of the iodine reaction and the presence of nuclear pseudopodia naturally point to an amoebic origin. Should a well-marked iodine reaction occur in conjunction with the formation of nuclear pseudopodia the possibility of a mixed infection should not be overlooked.

References.—1. Bond: The Influence of Antiseptics on the Activities of Leucocytes and on the Healing of Wounds, Part III., Brit. Med. Jour., Feb. 3rd, 1917. 2. Ponder: THE LANCET, Dec. 12th, 1908. 3. Gruner: The Leucocytes in Malignant Disease, British Journal of Surgery, vol. iii., No. 2.

NASAL OBSTRUCTION IN AVIATORS.

BY DOUGLAS GUTHRIE, M.D. EDIN., F.R.C.S. EDIN.,

CAPTAIN, ROYAL AIR FORCE; INTERIM SURGEON TO THE EAR AND THROAT DEPARTMENT, ROYAL HOSPITAL FOR SICK CHILDREN, EDINBURGH.

THE science of aeronautical medicine is still in its infancy. Researches pursued in various directions have proved that the successful pilot must possess a sound heart and sound lungs, a stable nervous system and a healthy "mentality."

Scarcely less important is the possession of good binocular vision and of normal ears. The ear-mechanism obviously becomes a more essential factor in flying when we remember to regard the ear not only as the organ of hearing but as an accessory organ of equilibration. Although the aviator depends mainly on his sense of vision it is, perhaps, a matter of regret that the sense of equilibration, a sense so highly developed in birds, and so readily accurately estimated in man by the Bárány tests, has received so little attention from those who have, in this country, studied the medical aspects of aviation. Into the rationale of those tests and their relationship to aviation I do not propose to enter in this short paper, but would merely refer to one aspect of the subject which is well worthy of notice—i.e., the question of nasal obstruction.

To the flying man free nasal respiration is an important asset. The statement will meet with general acceptance, though the reasoning on which it is based may not be so

widely understood. During the past few months I have had occasion to examine and operate upon a considerable number of officers and cadets suffering from nasal obstruction, and although I have followed the subsequent flying history in only a few instances certain interesting facts have come to light.

Results of Nasal Obstruction.

The main conclusions regarding the baneful effects of nasal obstruction on the aviator may be summarised as follows:—

1. *Effect on the lungs.*—The mouth-breather cannot satisfactorily expand his chest, and his lungs are never sufficiently aerated. Mendel has demonstrated experimentally the inferiority of respiration by the mouth and has shown that the amount of air which the mouth-breather inhales with each breath is less by one-fifth than the amount inhaled in normal nasal respiration. It follows, then, that if the subject be an aviator he will readily suffer from symptoms of "oxygen-want." This aspect of "oxygen-want" probably deserves further investigation.

2. *Effect of equilibration.*—The Eustachian tubes, the function of which is to adjust the pressure of air within the middle ear to the changes produced by sound-waves, atmospheric pressure, &c., and which come into use so largely during flying, are impaired in their function if any nasal obstruction is present. During a rapid descent the tympanic membranes are driven inwards by atmospheric pressure, causing deafness and earache. Normally those symptoms disappear if the ears are "inflated" by swallowing or by movement of the jaw. But if the nasal passages be blocked so that air does not freely reach the Eustachian tubes the alteration of pressure within the middle ear cannot be compensated and the symptoms persist, perhaps with the addition of giddiness caused by altered labyrinthine tension, communicated from middle to inner ear through the round and oval windows. Under such circumstances the risk of a crash is, naturally, considerable.

3. *"Reflex" effects.*—A third possible result of nasal obstruction is headache coming on in the air or after landing. This is in many cases due to the pressure of a deflected nasal septum against the middle turbinal, the so-called reflex nasal headache. Headache of this type is, of course, not peculiar to aviators, but is aggravated by flying for reasons to be presently described.

Causes of Nasal Obstruction.

The commoner causes of nasal obstruction are adenoids, hypertrophic rhinitis, and septal deviations.

Polypi were encountered on only one occasion in the present series. Adenoids were present in many cases, accompanied, as a rule, by enlarged and septic tonsils, but in few cases were the postnasal growths so large as to cause much nasal obstruction. They were, however, liable to attacks of inflammation, and then the Eustachian tube became blocked, not by adenoid tissue, but by the mucus and pus which that tissue secreted.

Hypertrophic rhinitis, affecting the anterior or posterior ends of the lower turbinal, was fairly common and was readily cured by partial turbinectomy.

Deformities of the nasal septum were the cause of the obstruction in the majority of cases. As a rule the patient gave a history of former injury at boxing or football. Some of those definitely traumatic cases had almost complete obstruction of both nostrils. In others the symptoms were nil, and the patient was unaware of any nasal trouble until he came before the examining board.

Aggravated cases of septal deformity naturally call for treatment before the subject can be passed as fit for flying, but the wisdom of operating on minor degrees of septal deviation in cadets is questionable. Absolute symmetry of the septum nasi is a rarity among civilised races, and an examination of over 2000 skulls has revealed deformity of the bony septum in 75 per cent. (Morell Mackenzie). At the same time it is to be noted that a degree of nasal obstruction which would cause little trouble on the ground may be very troublesome in the air. At heights over 7000 to 10,000 feet the mucous membrane of the nose becomes swollen and engorged, and any existing obstruction is thus greatly aggravated.

This is borne out by the following typical reply to an inquiry addressed to one of the patients: "Before the operation," he writes, "I was compelled, when flying, to breathe through my mouth; this was difficult to do and was irritating to the throat, especially when I flew a fast scout at heights over 8000 feet and in cold weather. The operation has cured