have been observed in a semipurulent pericardial effusion associated with anaerobic septic haemothorax; but the gas was not abundant, and there was no reason to believe that it was not entirely a *post-mortem* production. No example of a large pyo-pneumopericardium has been found by us at autopsy.

The special physical signs on the side of the haemothorax are simply those caused by the *development of gas* within it. This gas may be loculated within the haemothorax, or it may collect freely above the fluid in the pleural sac. In the latter case the signs are indistinguishable from those of an ordinary exogenous or air pneumo-haemothorax; but the gas may be formed so abundantly that the heart suffers continually greater displacement, and the side of the chest may sometimes be bulged out under the internal pressure. (Cp. Case III.) In aspirating a traumatic air pneumothorax, we have never found a pressure greater than that of the atmosphere; but in these inflammatory gas collections the pressure may be as high as +15 or +20 cm. of water. The fluid below the gas is mobile, and its horizontal level of percussion dullness shifts when the patient is raised from the lying to a sitting posture. The anvil ("bell") sound is often yielded by the coin test.

The loculated collection of gas is almost in itself a diagnostic feature. Percussion reveals a resonant area, often with a low-pitched note that is almost "cracked-pot" in character; within the boundaries of the area of dullness that demarcate the haemothorax. The level of the latter does not change with posture, for the collection is not freely mobile. The gas producing the note is usually loculated at the back, somewhere near the angle of the scapula. It is extremely rare to meet with a similar collection of ordinary air that has escaped from a lacerated lung into a haemothorax and remained imprisoned so low down. Consequently, whenever this peculiar percussion note is met with in a haemothorax, where the cardiac displacement seems unusually great in proportion to the area of dullness and the physical signs are difficult to interpret, gas infection should be suspected, and tested for by exploration at the lower limit of the resonant area.

But there is one fallacy to be guarded against. The diaphragm on the wounded side often takes up an abnormally high position as an immediate result after the injury of some paralysis of the respiratory movement. It may be sealed up in this position by adhesions and remain elevated despite the increase of intrapleural pressure. Under such circumstances percussion over the base of the chest behind may elicit a tympanitic note from the raised abdominal viscera, on the right side as well as on the left. Therefore the preliminary diagnosis of gas should be accepted only when this abnormal note is found behind at a level above that of the ninth rib.

It is needless to discuss the differential diagnosis from pneumonia or other chest complications. The physical signs often fail to make the diagnosis secure. Safety for the patient is gained by the discarding of these dubious distinctions, by promptness to suspect infection, and by reliance on the exploring needle. In difficult cases an x-ray examination of the chest by fluoroscopic screen with the patient in a sitting posture will often lead to the solution of the problem. When mobile gas and fluid are present in the pleural cavity, the fluid will appear as a dark pool with an upper horizontal level. The surface of the free fluid shows oscillations caused by the heart-beat, and will be violently agitated if the patient coughs. Its level changes in relation to the chest wall when the patient is tilted first to one side and then to the other. Such an appearance is diagnostic of a collection of free fluid below gas or air.

REFERENCES.

¹ *Lancet*, January 6th, 1917, p. 1. ² *British Journal of Surgery*, vol. iv, July, 1916, p. 103.

(To be continued.)

A COMMITTEE of superintendents of public instruction and other officials concerned with education in the United States has recently been formed to further the passage by the legislatures throughout the country of a bill, drafted by Dr. Dudley A. Sargent, the physical education expert at Harvard, for the promotion of physical training in the public schools. The committee believes that "the time has come for the adoption of a definite plan for the preparation of American boys and girls for the pursuits of peace or the vicissitudes of war."

CLINICAL OBSERVATIONS ON DYSENTERY.

BY

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The clinical symptoms of dysentery vary greatly, and rarely do they actually conform with the usual textbook description.

The simple acute bacillary type and the simple acute amoebic type are clinical entities and no difficulty should arise in distinguishing between them clinically. It is impossible to distinguish between the various types of bacillary dysentery without the aid of the bacteriologist. Clinically they must remain in the common group.

Another type of dysentery that has come under my observation during the present war is what might be called an acute mixed type of dysentery. The clinical symptoms are at first those of the acute bacillary type, which after varying intervals merge into those of the acute or subacute amoebic type. This type of dysentery is most important from the point of view of treatment. It is to be regretted that in this note no mention can be made of the bacteriological and microscopical examination of the stools. This should be carried out as a routine measure in every case whenever possible, but the circumstances under which I have observed and treated the majority of my cases have rendered this impossible.

Incidence and Causation.

From several years' experience of active service conditions on the North-East Frontier of India, and during the present war in Egypt, Anzac, and Mesopotamia, I cannot help coming to the conclusion that in the bacillary type the main source of infection is the common house-fly.

It is a remarkable coincidence that during the first few weeks or months in any campaign in which I have taken part the prevailing type of dysentery has been the bacillary type.

During the Abor expedition on the North-East Frontier of India, while the troops were collecting at the base and were engaged in making roads for the advance, in fact were more or less stationary, and the climate was such that flies could live and breed, then the prevailing type was the bacillary type; but when the troops pushed on, had fatiguing marches to do day after day, as the season also advanced and the weather became colder and wetter and the heavy rains seriously damaged the quality of the rations, then the amoebic type of dysentery made its appearance.

Again, during the expedition into the Mishmi country on the North-East Frontier of Assam, as long as the weather was hot and flies were abundant, and as long as the troops were engaged in cutting roads through the dense jungle, and progress was necessarily slow, then the bacillary type prevailed; but as soon as the weather became colder and wetter, and the flies disappeared and the troops pushed on to the hills, then did amoebic dysentery make its appearance. Flies are by no means a heritage of modern civilization, for in this dense jungle area of over sixty square miles, which was practically devoid of any human habitations, flies were as abundant as in an Indian bazaar in the middle of the hot weather.

Deficient sanitary arrangements attract flies and also encourage their propagation, and all that is required with such conditions is a favourable climate, and dysentery is bound to make its appearance.

At the beginning of any campaign, when large bodies of men congregate in limited areas, and before the sanitary details have had time to become properly organized, it is then, as it were, that the seed for future dysentery becomes sown, and it is only with the greatest difficulty and with the most thorough measures that the coming outbreak can be arrested or checked.

Military exigencies must always in every campaign be the first consideration, and a typical example of this occurred during the landing at Anzac on April 25th, 1915, and the following few days. Fighting men had to be landed at all costs and as rapidly as possible. All other branches of the army were during this critical time of secondary importance, and it was only when the position had been captured and consolidated that sanitary and other details could be landed.

During these first few days, when every one was in

immediate danger from the enemy's fire, little consideration was or could be given to any sanitary arrangements. It was only when things had quietened down that steps could be taken. It was during this period that the seed was sown. The small area occupied by the troops had practically all become contaminated with human faecal matter, while the dead bodies of men and mules, which lay unburied for weeks in unapproachable areas, proved to be a perfect nidus for flies to breed in. The climate also was ideal, so that in the circumstances it was not surprising that a serious outbreak did occur. The limited water supply and the limited variety of the rations being also contributory causes.

Troops on service seem to be far more liable to intestinal troubles when the ration is day after day the same. The monotony in eating the same daily ration acts psychologically in that it brings about anorexia and indigestion, which lower the soldier's resistance.

With amoebic dysentery the conditions are different. It has now been shown that the *Entamoeba histolytica* frequently exists between the gums and teeth in cases of pyorrhoea alveolaris. The diphtheria bacillus can exist in the fauces of its host without causing him any inconvenience, while the presence of the cholera vibrio in the stools of an apparently healthy individual is nothing new. It is, to a large extent, the carrier problem once more. It would be an extremely interesting experiment to have the stools of, say, 100 healthy Indian soldiers carefully examined for the *Entamoeba histolytica*. Positive results would, in my opinion, be obtained in a surprising number of the stools examined.

Laboratory experiments go to prove that the common house-fly is the chief factor in conveying this form of dysentery also. However, I am convinced that in far the larger proportion of cases drinking water is the main source of infection. This form of dysentery rarely makes its appearance during the first few weeks, or possibly months, of a campaign. In my experience it only begins to show itself when the troops are beginning to become fatigued or exhausted. Amongst Indian troops on frontier expeditions long marches or hard fatigues, with continued exposure to cold and wet, are the main predisposing factors. It occurs far more frequently during the colder months than during the hotter, so that flies cannot have the same share in its propagation as they have in conveying the bacillary form. It frequently follows after an attack of bacillary dysentery; here again the soil is prepared for it.

The entamoeba is, in the greater proportion of cases, conveyed by means of drinking water. It may produce dysentery at the time, or it may lie dormant and only show its presence when its host has become debilitated, or his resistance lowered by any means.

Symptoms and Treatment.

The symptoms of dysentery vary according to the type of infection and according to the acuteness of the disease. In all forms the most important symptoms are the frequency and character of the stools and the degree of tenesmus. From these the severity and progress of each case must be judged. The temperature runs no special course, but as an aid to treatment it must not be overlooked. In severe acute cases it may run up to 104° or 105° F., while in others it may be subnormal. In the latter type of case there may be varying degrees of collapse, which should be treated accordingly.

The disease in some cases begins as simple diarrhoea; in others the onset is sudden, with frequent stools containing varying quantities of mucus and blood, with colicky pains in the abdomen. Tenderness over the descending and sigmoid colon is also a frequent sign.

In severe cases the faecal element in the stools soon disappears, and the patient passes large quantities of mucus tinged with varying proportions of blood. In some cases after a few days there may be no trace of blood to the naked eye, while the patient may pass frequent motions containing large quantities of purulent mucus.

Tenesmus as a rule is not very marked in the bacillary type, and may be absent altogether. This is the symptom which is almost characteristic of amoebic dysentery. In severe cases it may be so intense that the patient dare not leave the commode, while the pain and straining may bring on a certain degree of collapse. All the patient passes in

such a condition consists of very small quantities of blood-stained mucus.

It is extremely important amongst troops that every case of diarrhoea, however mild, should be promptly treated and checked. They should, if possible, be admitted to hospital and the stools rendered innocuous. Simple diarrhoea frequently goes on to dysentery unless treated in time, especially in localities where the disease is endemic.

All cases of dysentery should have absolute rest in the recumbent position. I have found that when cases are allowed to walk about recovery is greatly delayed.

The diet should be very sparing and should consist at first of nothing but barley water or rice water, later milk may be given, but, should the milk be passed undigested, whey should be given instead or a few grains of sodium citrate added to each pint, and the result watched in each stool. The less soups and broths given the better. Koumiss or sour milk is an excellent diet and can easily be made anywhere in the East. A few spoonfuls of dhali or leban are obtained from the nearest village and put into fresh or sterilized tinned milk. It is then kept at an equable temperature for a few hours, when it is ready for use. The time varies with the degree of activity of the culture of the lactic acid bacillus obtained and the temperature at which it is maintained.

As the patient progresses, rice thoroughly boiled in water is the best solid to begin feeding with. It is easily digested and does not contain too much starchy matter like sago, arrowroot, etc. Great care should be taken with the dieting, and the importance of personally examining every stool passed by the patient cannot be sufficiently impressed. From this inspection only can the diet be regulated.

Soldiers frequently, when they are progressing favourably, complain about the meagre diet they are getting, and to supplement this sympathizing friends from the lines may attempt to supply them secretly with all kinds of indigestible foods; a relapse is the usual consequence. The medical officer by examining each stool holds the master key, and can act accordingly. Malingerers can be caught out in this manner. Instances have occurred where the patient has deliberately kept up the symptoms by eating unauthorized foods so as to be sent back towards the base.

To prevent the spread of the disease from infected stools, each stool should be protected from flies and destroyed whenever possible by incineration; should this be impossible, then it should be rendered innocuous with one of the various disinfectants.

All cases of acute dysentery coming into hospital were given 2 drachms of magnesium sulphate every two hours until the stools became faeculent or until 2 oz. had been given. This was done as a routine measure unless the dysentery was of the amoebic type.

This method of treatment with rest and dieting has proved in my experience to be most satisfactory. If there were no improvement from this, the patient was then given bismuth salicylate and salol $\bar{a}\bar{a}$ 10 grains three times daily for three or four days, and at the end of this again went through a course of the magnesium sulphate treatment. This salt acts mechanically by ridding the patient of the bacterial and other debris in his intestinal canal, and possibly also by virtue of its lymphagogic action may draw into the intestinal canal any antitoxins that may have been formed in the patient's blood.

With this treatment in the field ambulance it was found possible to return to duty within fourteen days 90 per cent. of the cases of dysentery which occurred amongst the Indian troops at Anzac.

Should the patient have intense pain, hot fomentations applied to the lower part of the abdomen will frequently relieve it; otherwise 10 minims of camphorodine or 10 grains of Dover's powder will be found to act satisfactorily.

The promiscuous injecting of emetine in every case of dysentery is distinctly harmful. The results are very disappointing, and one's faith in its specific action in amoebic dysentery is apt to be shaken. It should only be used in those cases that are distinctly amoebic in type, or in which the entamoeba has been discovered in the stools. Emetine was found to have little effect in cases of mixed dysentery until the patient had gone through a course of the saline treatment first, when it had the same

marvellous action as one observes in India in cases of simple amoebic dysentery.

The injection of emetine should not be done indiscriminately, and the result of each injection should be carefully observed. In suitable cases a grain should be injected subcutaneously night and morning. If no good results occur after four injections, it should be stopped, on account of the depressing influence it exerts. It can be resumed after a few days' interval if thought necessary.

Chronic Dysentery.

Chronic dysentery is a far more difficult and intractable condition to treat. The results of medical treatment in bad cases that have persisted for several months have proved to be very unsatisfactory. The majority of chronic cases are by no means simple infections, other intestinal micro-organisms step in as soon as the bowel becomes seriously damaged, and a state of chronic toxæmia arises.

I am indebted to Major E. F. Sealy, I.M.S., for permission to observe a large number of cases among the Turkish prisoners of war that were in his charge. From *post-mortem* examination of the large intestine in a few cases that died, my conviction that medical treatment has very little influence on the progress of the disease was verified. In practically all cases examined the whole of the large intestine was an abscess cavity with extensive ulceration and in parts total destruction of the mucous membrane. Where an attempt had been made at repair the intestinal wall had become converted into dense fibrous tissue, which would in time have formed strictures and have been liable to break down on the slightest injury. The pus, which lined the whole mucous lining, was very foul, and it was evident that the *Bacillus coli* took an active part in helping to bring about the condition. The immediate results of appendicostomy and washing out the large intestine with ordinary eusol solution were excellent. Though all cases operated on by Major Sealy and myself were in an extremely debilitated condition, and some were actually scorbutic, the shock from the operation itself was *nil*. The lavage was done night and morning through a fine rubber catheter and fully two quarts of eusol allowed to pass. The patient experienced no pain or inconvenience, and the fluid was passed by the rectum within ten minutes or so. The fluid passed cleared away all the foul debris in the large intestine, and absorption was prevented, the stools that were passed were rendered far less foul, the septic appearance of the patient improved wonderfully, and the temperature came to normal. Difficulties arose later owing to the appendix contracting and to the skin wound closing up. This operation gives good results for a time, but they are not maintained. Relapse is almost certain to occur, the reason, in my opinion, being that it does not provide the necessary rest for the large intestine.

The ideal treatment in such cases would be an ileocolostomy with appendicostomy and lavage. It is only in this way that the bowel can have the required rest. The injection of emetine in cases in which the *Entamoeba histolytica* is proved to be present should be carried out; of its specific action on the entamoeba there is no doubt; still its action on the ulcerative and septic changes in which at this stage other organisms are taking part is *nil*.

TWO CASES OF HEART FAILURE IN THE OPERATING THEATRE TREATED BY HEART MASSAGE: RECOVERY.

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THE interest that has been taken of late in heart massage, applied to the heart through the diaphragm in cases of failure of the heart and respiration while a patient is undergoing an operation, has suggested to me that the following two cases are worth recording.

It has been advised that when a patient has collapsed on the operating table, and has failed to respond to the stimuli that are usually employed, after waiting a few minutes

the surgeon should start heart massage through the diaphragm. While success has crowned the operator's efforts after several minutes of waiting, it is advisable not to wait long before starting heart massage, because the patient is in desperate straits, and a delay of half a minute might mean all the difference between success and failure.

In Case II, reported below, heart massage was started as quickly as possible when the patient did not respond to artificial respiration, and as soon as it was found that he was pulseless; and even then the first period of heart massage failed to cause the heart to contract. Had heart massage not been started promptly it seems probable that it would have been too late to do any good.

When the operation under which the patient has collapsed is not an abdominal section, naturally a surgeon is anxious not to open the abdomen if it can be avoided, owing to the risks of peritonitis following an abdominal section when there has been no time to perfect the aseptic technique. For instance, in an operation for adenoids the surgeon's hands are not sterile, for they have been in the patient's mouth, and he may not have a sterilized scalpel at hand, nor any iodine solution to paint on the skin of the abdomen. Even then I would urge that delay may mean a life lost. Such cases as these test the judgement of the most expert. When the operation has already necessitated the opening a clean abdomen, there can surely be no reason for delay.

The most common causes of sudden collapse on the operating table are: (1) Idiosyncrasy to chloroform; (2) shock from operating while anaesthesia is incomplete; (3) any operation that causes a too sudden relief of increased intra-abdominal tension.

In nearly every case of death on the operating table that has come to my knowledge chloroform has been employed. Let me, at the risk of repeating what has been written many times, urge that unless there is some special contraindication, ether should always be employed as the anaesthetic. It is very rare to hear of a death on the table under ether.

CASE I.

Four years ago a lady, aged 63, was brought to consult me because her abdomen had been getting large, and she suspected that she might be going to be confined for the first time. On examination, an ovarian tumour was diagnosed. It was of great size, impeding respiration seriously—in fact, the patient appeared to be a shell surrounding an enormous tumour. The pulse was irregular, the arteries somewhat thickened, and there was a marked aortic systolic murmur and an accentuated aortic second sound. She was told that the condition would soon be incompatible with life, and at the same time that there was a grave risk in operating on any one in her condition. She elected to have an operation.

The abdomen was opened and the tumour removed after having been aspirated with a trocar. Immediately after removal the patient collapsed. Respiration and heart stopped. After a short attempt at artificial respiration had been tried and pituitary extract had been administered without effect, the right hand was introduced through the abdominal incision, the left hand was placed over the heart, and the heart massaged by a series of rhythmic squeezes at the rate of forty or fifty a minute; the right hand compressing the heart through the diaphragm against the chest wall was reinforced by pressure on the outside of the chest by the left hand. Meanwhile artificial breathing was continued. After a short time the heart commenced to beat, respiration was restored, and the patient made a rapid recovery. Ether was the anaesthetic employed. The collapse was due to sudden relief of intra-abdominal pressure. The ovarian tumour was so large that it took two people to lift it off the table.

CASE II.

On January 10th, 1917, I was operating on a man for appendicitis. The abdomen had just been opened, and the man suddenly collapsed. Respiration and pulse were negative. The incision was rapidly enlarged, and the right hand introduced. The heart felt absolutely flabby, not a sign of contraction. Massage was started as in Case I, and artificial respiration continued. After about one minute, massage was stopped to see if the heart would contract. It would not. Massage was commenced again, and after about another minute the heart commenced to beat feebly. Pituitary extract and strychnine were injected, and after about five minutes the patient's condition improved so much that it was decided to complete the operation, as the appendix was distended and contained pus. His colour remained rather bad most of the day, and the pulse was irregular, but after continuous salines and adrenalin by the rectum, his condition in the evening caused no anxiety, and he made a good recovery. The anaesthetic used was a mixture of chloroform and ether before the collapse, and ether subsequently.