which his bowels receive during the period of convalescence. When the erect attitude again is assumed the patient soon becomes affected with the troubles from which he suffered before his appendix was removed. This condition of the large bowel is almost the only cause for the pain which the patient experiences after these unsuccessful appendicular operations excepting such conditions as are due to an incorrect diagnosis in the first instance. This is exactly what one would expect from a knowledge of the causation of appendical disease.

That the operation of removal of the appendix not infrequently fails to relieve patients of their painful symptoms is well known to all of us, and no amount of statistics pointing to a contrary conclusion to this can be relied upon. It is possible at the time of the operation to gauge fairly accurately the amount of success that will follow upon the removal of the appendix, and, if necessary, upon the division of such bands as may be constricting the lumen of the caecum and ascending colon, or hitching up and obstructing the hepatic flexure.

I think that the failure to permanently relieve patients of their symptoms in a number of so-called cases of appendicitis is forcing itself daily more and more convincingly upon the profession, and is calling for a more thorough study of the physical conditions which produce appendical inflammation or which are associated with it. It seems to me that the consulting physician and the general practitioner can help the surgeons most materially by recounting their experiences of the subsequent history of these cases after operation.

In certain cases the patient refers all the pain to the epigastrium or to the umbilical region, and the many symptoms comprised under the term indigestion may be present in an aggravated form, and these I do not think it necessary to describe in detail. In such cases of advanced constipation in which the small intestine has become affected to such an extent that it is pinned down at intervals severe pain is complained of, and certain loops become so palpable during attacks and the pain so severe as to suggest obstruction.

The symptoms due to the absorption of toxins all tend to produce an appearance in the patient of premature senility. The patient wakes up with a feeling of weakness and rises unrefreshed from his sleep. There is an utter lack of tone and an inability to perform the ordinary routine duties. Consequent upon this weakness the respiratory function is carried out in an unsatisfactory manner, and attitudes of rest are habitually assumed, any active exercise being quite impossible, and the patient acquires resting deformities which I have described elsewhere. The consequent diminution in respiratory capacity becomes an added factor in the progressive loss of energy, and diminishes the resisting power of the individual. The diminution of the power of resistance, which is brought about by the presence of the toxins and their consequences, frequently cause a condition of oral sepsis, the teeth becoming carious and the gums inflamed from the invasion of organisms. This naturally adds to the depression of the vitality of the patient. The skin of the patient becomes dry, thin, and loose, and in the flexures, such as the axilla and groin, the secretions acquire a nasty offensive smell. This smell is also perceptible in advanced cases, when the abdomen is opened and the viscera are exposed. The colour of the skin is altered; it becomes a dirty brown colour. This pigmentation is exaggerated in certain parts, as, for instance, about the lower eyelids, at the inner angles of the eyelids, in the temporal region, in the neck, in the folds of the axilla, near the nipple, round the umbilicus, round the anus and about the generative organs. In some cases isolated well-defined pigmented areas exist on the body.

In infancy the nidus afforded by the irritated lymphatic glands in the mesentery and by the presence of fluid in the peritoneal cavity serve as excellent media for the development of tubercle. The loss of resisting power brought about by the presence of toxins renders the child liable first to the entry of the organisms in the form of an eczema, and later to the entry of tubercle into areas whose vitality is still further depreciated by traumatism. Later in life tubercle, gout, gastric ulcer, rheumatoid arthritis, and many other similar diseases attack this class of patient with what might almost be called selective action.

Perhaps one of the most conspicuous consequences is the loss of fat that the patients undergo after a certain period of time. How long they are able to hold out against the influence of the ptomaines without losing fat varies greatly in different subjects. Once, however, that it commences, this

loss of fat increases with marked activity, and it affords the best indication one can have that the patient is going repeatedly downhill. I particularly call your attention to the importance of this symptom, as I believe it is one that should lead us to take very active measures.

Associated with this symptom of loss of fat there are the symptoms arising from the dropping of such organs as are largely dependent upon the presence of fat for their retention in their normal position; I refer particularly to the kidney and the uterus. The toxin would appear to exert a special degenerating influence upon the sexual apparatus which is particularly marked in women.

There is often also a considerable amount of mental depression, and this is notably the case among the insane, in whom the presence or absence of a small quantity of toxin makes the difference between a manageable and an unmanageable patient.

In considering the question of treatment I do not propose to deal with any form other than operative, since I assume that everything short of operative interference has been tried. When it becomes apparent that something must be done beyond drug and other such treatment, the question resolves itself into whether an attempt should not be made to liberate the constriction by the division of bands or adhesions, or whether it would not be better to establish direct continuity between the lower end of the ileum and the termination of the large bowel. One's general experience is that while in men very considerable alleviation of symptoms may frequently be obtained by the division of bands and adhesions, nevertheless, in women, as a rule, it is better to proceed at once to the deflection of the faecal contents from the greater part of the large bowel.

In regard to the operative procedure itself I divide the ileum at about 6 in. to 8 in. from the caecum and connect the proximal end with the sigmoid, or should the rectum, which in these cases is dilated, afford a more suitable site for implantation I establish continuity with that part of the intestinal tract. The operation is extremely simple and its results are excellent, providing that the case has not been allowed to drift on till adhesions of the small intestine and considerable dilatation of the stomach have taken place. I cannot urge too strongly the importance of operative interference being carried out at an early period since the benefits to be gained vary inversely with the length of time during which the constipation has existed and with the mechanical changes resulting from such constipation.

Many have objected to the operation on the ground that the patient will be affected by persistent chronic diarrhoea. Such is certainly not the case. In a large proportion of the cases the patient has still for some considerable time to take drugs, or by preference use glycerine enemata, which latter are advisable in that they obviate any possible back-flow of faeces along the large bowel and their accumulation in the caecum. In a small proportion of careless feeders a certain number of fluid motions may follow upon an inordinately large vegetable meal such as not uncommonly occurs in the diet of the poor. The question of age appears to be a matter of no moment, but, on the other hand, the duration of the colonic obstruction is one of the most vital importance.

REFERENCE.

- ¹ *The Causation and Treatment of Hydrocele and Hernia in Young Infants.*

NEW METHODS OF STUDYING AFFECTIONS OF THE HEART.

By JAMES MACKENZIE, M.D.,
Burnley.

III.—THE ACTION OF DIGITALIS ON THE HUMAN HEART—(Continued).

THE EFFECT ON STIMULUS PRODUCTION (CHRONOTROPIC EFFECT) AND EXCITABILITY (BATHMOTROPIC EFFECT).

At the end of systole all the functions of the heart are for the time being abolished. The starting of the contraction is due to the power possessed by the muscle fibres of the heart to create within themselves material capable of stimulating the fibres to contract. Though all the fibres of the heart possess the power, those fibres at the mouth of the great veins possess this power in a greater degree, and hence the stimulus to contraction normally proceeds from this part over the whole heart. In addition, these fibres possess the power of creating

the stimulus matter in a remarkably regular manner, with the result that the heart normally beats with great regularity—in striking contrast to what happens when other parts of the heart take on the inception of the rhythm. The power to receive the stimulus—that is, excitability—is a distinct and definite function of the heart-muscle fibre. As this function may vary, the rate of the heart may depend on the susceptibility of the heart to stimulation. The stimulus material continues to be created until sufficient is formed to overcome the excitability of the muscle fibres.

When the heart's action becomes slower under the influence of digitalis, is it due to the slower formation of stimulus material (chronotropic effect) or to diminished excitability of the heart muscle (bathmotropic effect)? I know of no means by which we can distinguish whether the slowing is due to one effect or the other.

The fact that digitalis slows the heart is so well known that I need not dwell at any length on this part of the subject. I quote the following case, however, to demonstrate that the digitalis in materially affecting either the chronotropic and bathmotropic functions, does not affect the dromotropic (conductivity). In this respect this case is typical of most cases when the pulse becomes slow and regular under the influence of digitalis.

CASE I.

Male, aged 34, schoolmaster, has been rather short of breath for two years. During December, 1902, he was troubled with violent beating of his heart and shortness of breath. He rested a week in bed and felt better. In the beginning of March, 1903, he again became very short of breath and his legs began to swell. I examined him on March 15th, and found him propped up in bed. He complained of shortness of breath and pain over the region of the liver. The respiration was short and shallow, thirty per minute. Both legs were greatly swollen and the abdomen was distended, but no fluid could be detected. The skin and muscles over the upper part of the right side of the abdomen were very tender to pressure. The liver was enlarged, extending 3 in. below the ribs. There was marked pulsation of the veins of the neck of the auricular type (see Fig. 1). The pulse was small, soft and rapid, 95 beats

Fig. 1.—Simultaneous tracing of the radial and jugular pulses during failure of compensation. Note the slight increased *a-c* interval (space A).

per minute. There was a diffuse ill-defined cardiac impulse, the heart's dullness extended transversely from 2 in. to the right of the sternum across to 1 in. outside the left nipple line. There was a slight systolic murmur at all the areas. The urine was scanty and free from albumen. He was a steady man, but a heavy smoker. (He has subsequently suffered from an attack of rheumatic fever.) The patient was restricted to a milk diet and prescribed a pill containing pulv. digitalis, pulv. scill., pil. hydrag., ext. hyoscyam.; of each one grain, one to be taken three times a day. Gradual improvement took place. After March 21st the urine became more abundant, the liver dullness diminished, and the tenderness of the covering tissues became less marked, though the pulse rate at times continued as rapid as ever. By April 1st the liver was normal in size, all tenderness of the superficial tissues had gone, the heart's dullness had diminished by 2 in. and only a slight systolic murmur was heard at the mitral orifice, and the urine was abundant and all dropsy had disappeared. The pulse rate had fallen to 65, and the venous pulse was not so large (Fig. 2). By April 10th the patient had quite recovered, and the venous pulse had almost disappeared (Fig. 3).

Fig. 2.—Shows the effect of digitalis in slowing the pulse, and the longer rest permits the restoration of conductivity (compare space A here with space A in Fig. 1).

The points to which I wish to draw attention are the marked slowing of the pulse and the information shown by the venous pulse in these tracings. It might be said that the

slowing was due to other agencies employed besides the digitalis, but the same results as are here shown have happened with the prescription of the tincture of digitalis and of digitalin, so that one can reasonably attribute the slowing of the digitalis. This slowing is shown to be unaccompanied with any depressing effect on the conductivity. Rather we can say that the conductivity has improved, inasmuch as the *a-c* interval, space A, in Fig. 1, is greater than the same interval in Figs. 2 and 3. The increase in the length of the *a-c* interval in Fig. 1 is due to the exhaustion consequent on the long-continued rapid action of the heart, and the shortening of the period in Figs. 2 and 3 is due to the beneficial result of the rest obtained by the slowing of the heart—a result to be expected from what was shown in the two previous papers of this series. We can therefore conclude that while the digitalis then depressed the function of excitability and stimulus production, it did not depress the function of conductivity.

Fig. 3.—With continued improvement the jugular pulse has almost disappeared, the tracing only showing a small wave (a) due to the auricle before the carotid pulse (c).

Fig. 3 is instructive as showing the disappearance of the venous pulse, except for a small wave *a*, due to the auricular systole. The subsidence of the jugular distension and the greater fullness of the carotid alters the character of the tracing, for all these tracings were taken at the same place, immediately above the inner end of the right clavicle.

EFFECT ON CONTRACTILITY (INOTROPIC EFFECT).

The function of contractility is the most essential and the most notable function of the heart muscle. The more vigorous this function the more forcible will be the contraction of the heart. Certain circumstances materially affect this function, none more beneficially than rest. Within certain limits, the longer the pause the more vigorous will be the contraction, and the contraction will also last longer. It is a matter of everyday experience that a heart beating at a certain rate which is normal to the individual results in the circulation being efficiently carried on. An excessive slowing is no more conducive to an efficient circulation than an excessive quickening. The rate most compatible seems to be that which permits the heart muscle just enough time to recover its full power of contraction. As this function, like all the other functions of the heart, is abolished during systole, its recovery is gradual. If stimulated to contract too soon after systole the contraction is weaker and shorter in duration than if time were given it to recover fully. We have already seen how short a time is sufficient to make a great difference in the rate of conductivity, and we shall see how short a time is sufficient to make a great difference in the vigour of contractility.

The good effect of digitalis on contractility may be due simply to the fact that in slowing the rate (chronotropic or bathmotropic effect) it gives time for the function of contractility to be restored; but that digitalis under certain circumstances may affect the function of contractility directly can be demonstrated in a most striking and convincing manner. It is again to Wenckebach that we are indebted for the manner in which depression of conductivity can be recognized. From among the groups of arrhythmias, where every second beat rhythmically varies, Wenckebach distinguished one where a small beat regularly followed a large beat, while the rate of the heart may be perfectly regular. He, most appropriately, desires to limit the name *pulsus alternans* to this form of arrhythmia (see Figs. 5 and 8). Hitherto the name has been applied very loosely to arrhythmias that we now recognize as due to extra systoles. Wenckebach's explanation of the cause of *pulsus alternans* is as follows: When contractility is depressed, if time be allowed for a full and strong contraction, the longer duration of contraction encroaches upon the period of rest, so that by the time the next stimulus arrives the contractility has not sufficiently recovered, and a smaller and shorter contraction results. As this contraction is shorter in duration, the period

of rest is thereby lengthened before the next stimulus arrives, so that the contraction will be stronger and longer; being longer it will again encroach upon the period of rest, and so the process of alternation goes on. For the interesting and convincing manner in which Wenckebach demonstrates the real nature of this allorhythmia I would refer the reader to his book.

CASE II.

Female, aged 54, enjoyed good health till 1900, when she began to be short of breath. Towards the end of 1901 the difficulty in breathing increased and her legs began to swell. I saw her first in November, 1902, and she was then very weak and had to be propped up in bed, her legs and abdomen being swollen and urine scanty. The pulse was small and weak, and there was a large pulsation in the veins of the neck. The heart's dullness extended 2 in. to the right of the sternum and 1 in. to the left of the nipple line. The sounds were clear and free from murmur. I prescribed the pill of digitalis, calomel, and squill, and it speedily increased the flow of urine, diminished the dropsy, and slowed the pulse, though the jugular pulse continued large (Fig. 1).

Fig. 4.—Jugular and radial pulses after partial recovery from an attack of failure of compensation in November, 1902. The jugular pulse is of the auricular type. Compare space E (period of ventricular systole) with space E in Fig. 7.

Unfortunately she was seized with severe salivation and ulceration of the gums, and the pills had to be stopped. She became worse after the pills were stopped, and though I tried digitalin and tincture of digitalis, no effect was produced. She again tried the pills, but soon began to salivate and had to stop them. After trying other remedies unavailingly she hit upon the plan of taking the pills with her food. She suffered no more from the salivation and benefited greatly by the pills. By February, 1903, she had made a fair recovery. I did not see her again till the beginning of November, 1903, when she was again suffering from shortness of breath, persistent cough, and unable to lie down. There was no dropsy. She had been occasionally taking the digitalis, calomel, and squill pills, and I advised her to take them regularly, three daily. They seemed to relieve her, and on November 14th the pulse tracing showed a rhythmical variation of the kind described as the pulsus alternans (Fig. 5).

Fig. 5.—Typical pulsus alternans due to digitalis. Each pulse period is of the same duration, while the size of the beat varies rhythmically.

Fig. 6.—Taken at the same visit as Fig. 5, to show that there is no affection of conductivity during the alternating action, and apparently no alternating action of the auricle corresponding to the alternating action of the ventricle (November, 1903).

This arrhythmia had disappeared by the 17th, and I have never found it to recur. The patient gradually recovered from this attack, and I did not see her again until November, 1904. She was then very ill, her legs and abdomen being enormously swollen, and her left pleural cavity contained a large quantity of fluid. Her pulse was now continuously irregular, and the venous pulse had completely changed its character from one of the auricular type (Figs. 4 and 6) to one of the ventricular type (Fig. 7).

Digitalis in its various forms and strophanthus was pushed, but without result, and the patient died on December 11th, 1904. At the post-mortem examination there was found slight stenosis of the mitral orifice.

Fig. 7.—Simultaneous tracings of the radial and jugular pulses taken on November 9th, 1904. The jugular pulse is now of the ventricular type, and the rise in the jugular during the ventricular systole (space E) is in marked contrast to the fall during this period in Figs. 4 and 6. There is no wave due to the auricle; the inception of the rhythm is here taken up by the ventricle, and in consequence the rhythm is continuously irregular.

The point to which I wish to direct attention in this case is the occurrence of the pulse-beats in Fig. 5 at perfectly regular intervals, showing that the arrhythmia is entirely due to variations in the size and duration of the ventricular systole. Fig. 6 gives the jugular pulse at the same time, and shows that here there is no effect on the conductivity, the *a-c* interval corresponding to that in Fig. 4. It also shows that the alternating action of the heart has no appreciable effect on the auricular systole, as the waves *a* are apparently of the same size. The space *x* in all these tracings represents the time of ventricular systole during which the semilunar valves are open, and it will be noted that in the jugular pulse in Figs. 4 and 6 this period is occupied mainly by a great fall, while in Fig. 7 it is occupied by a great rise. Furthermore, there is no sign of a wave due to the auricle in Fig. 7, implying that here the ventricle has taken on the inception of the rhythm. Note that, with the inception of the rhythm by the ventricle, the rhythm of the pulse is continuously irregular. It might be suggested that in this case the alternating action was due to one of the other drugs accompanying the digitalis, but the fact that the same result followed the administration of the tincture in Case III, and of digitalin in a case I shall record later, and agrees closely with experimental production of the pulsus alternans in Fig. 12, points fairly conclusively to digitalis being the potent agent in producing the pulsus alternans in this case.

CASE III.

Female, aged 44, has suffered since 18 years of age from several attacks of rheumatic fever. Seen first on November 10th, 1903, complaining of shortness of breath and palpitation on the slightest effort. The pulse was small, quick, and regular, 100 per minute. There was great distension of and pulsation in the jugular veins. The apex beat was

Fig. 8.—Typical pulsus alternans due to digitalis.

Fig. 9.—Shows the same things as Fig. 6.

Fig. 10.—A slight alternating action occurs in the first five beats, then the heart-rate quickens, producing the beats 1-4, which are regular in size. The prolonged pause after 4 is followed by a large and longer beat, which so exhausts contractility that the next beat is smaller and shorter, and the alternating rhythm is evidently again started.

large and forcible in the fifth interspace $1\frac{1}{2}$ in. outside the nipple line. The heart's dullness extended 2 in. to the right of the middle line. There was a loud, long systolic murmur—heard at all the areas, loudest at the mitral. She was prescribed a mixture containing tincture of digitalis and tincture of iron, 5 minims of each, three times a day. On November 31st her pulse was observed to be irregular, and a tracing showed a good example of the pulsus alternans (Figs. 8 and 9).

Fig. 11.—Shows the persistence of the alternating action in the radial pulse with marked slowing of the rate, and with no apparent effect on the auricle or on conductivity.

From this date the patient steadily improved. On November 3rd the tracing, Fig. 10, was taken. By November 8th she felt very well, the pulse being slower and fuller, and the jugular pulse much smaller, though a slight alternating rhythm is still observable in the radial pulse (Fig. 11). By the 14th all signs of the jugular pulse and of the pulsus alternans had disappeared, the heart's dullness being greatly diminished and the patient felt much better. Since that date she has had several slight relapses, and though the digitalis has been pushed I never got so marked an alternating rhythm as in these tracings, though after long use of the drug I occasionally detected a slight form of this arrhythmia.

In the jugular tracing of Figs. 9 and 11 there is, again, no sign of conductivity being affected, and it should be noted that, so far as one can judge, the arrhythmia did not appear to affect the auricle. Fig. 10 is of interest. The first part of the tracing shows a slight alternating action with the pulse beats occurring at regular intervals till the beats marked 1-4 occur at slightly more rapid rate, and these beats correspond in size to the smaller beats in the first part of the tracing. This diminution in size is manifestly due to the fact that contractility has not had time to recover. After the fourth small beat there is a pause longer than usual, followed by the largest beat in the tracing. This large beat is manifestly due to the fact that the contractility has had more time for recovery by reason of the long pause after the preceding small beat. The exhaustion after the large wave results in a small wave followed by a larger, and here is apparently the beginning of a period of alternating pulse beats (unfortunately the tracing was stopped here). Hoffmann and Wenckebach have particularly referred to this manner of starting the alternation.

I am inclined to think that there may be found a means of estimating the condition of the function of contractility by noting what effect a change in the period of rest has upon the size and character of the succeeding pulse beat. In a future paper I shall demonstrate this method with more fullness.

This depression of contractility is not common in cases where the auricle is active. From among a large number of observations I have only found three or four instances, and I might have had some doubt in attributing the effect to digitalis were it not that in cases of ventricular rhythm the effect is much more pronounced, and I hope to demonstrate how a depressed condition of contractility in cases with ventricular rhythm can be connected with a similar depression in cases with the auricular or normal rhythm. Furthermore, the following experimental observations demonstrate the justness of the interpretation given above.

Since I wrote this description of the effects of digitalis in contractility, Professor H. E. Hering has sent me the results of some experimental work done in his laboratory at Prague. In one paper Pleinew describes the effect of electric stimulation on the hearts of rabbits under the influence of medicinal doses of digitalis. The drug was carefully pushed, and in two instances, of which he gives tracings, the digitalis produced an alternating effect on the contraction of the heart. It will be seen in

Fig. 12.

Fig. 12 that the arrhythmia is a good example of the alternating action of the ventricle and is in perfect agreement with the results I have just described in the human heart. These tracings also confirm in a most striking manner Wenckebach's description of the nature of the pulsus alternans. By careful measurement of the events in Fig. 12 it will be seen that the starting of the V_s is perfectly regular, but that systole of the lesser beat is distinctly shorter in duration, so that the period of rest after the short beat is distinctly longer than after the large beat. Wenckebach has further pointed out that a beat may drop out from exhaustion of the function of contractility, and the missed beat at x Fig. 12, is due to this cause. The preceding beat is very small and shows the exhaustion is increasing. There is no beat following the auricular systole a' . It might be said that the missing of a beat was due to the depression of conductivity, so that the stimulus failed to reach the ventricle from the auricle; but I have already shown that when digitalis affects conductivity so as to produce a ventricular intermission, that the time between A_s and V_s gradually lengthens, and that the V_s succeeding the pause occurs at a shorter interval after the A_s . By careful measurement it will be noted that conductivity is not in the least affected at any period here, the interval between A_s and V_s being a constant one. The V_s after the pause is the longest and largest in the series, and confirms the explanation I gave for the large beat in Fig. 10. These tracings also confirm the facts shown in my tracings that it is only the contractility of the ventricular fibres that are affected by medicinal doses, for the auricle manifests no corresponding arrhythmia.

Another striking fact brought out by these experiments of Pleinew is that in no instance is there shown any affection of conductivity, affording therefore a support to the statement I have made that digitalis only affects conductivity when this function has been previously damaged. The fact that contractility was affected in the two instances cited suggests the possibility that that function was previously damaged, it might have been during the performance of the experiments. (In another of Pleinew's tracings, Fig. 17, he produced artificially an extra systole, after which there was a prolonged pause followed by a large and prolonged systole, and this started the alternating action in the manner referred to in describing Fig. 10.)

THE DIAGNOSTIC AND PROGNOSTIC VALUE OF THE LEUCOPENIA OF CACHEXIAL FEVER AND KALA-AZAR,

AND ITS TREATMENT BY QUININE AND BONE MARROW.

By LEONARD ROGERS, M.D., M.R.C.P., I.M.S.,
Acting Professor of Pathology, Medical College, Calcutta.

In a paper read before the Oxford meeting of the British Medical Association I drew special attention to the marked degree of leucopenia in cachexial fever and kala-azar, and suggested that it might prove to be of diagnostic value. Further experience has convinced me that this is the case, and I propose to set forth the evidence in favour of this view in the present paper, as it is clearly a matter of the greatest practical importance if even a large proportion of cases of this disease can be correctly inferred from a simple examination of the finger blood, instead of the much more serious operation of spleen puncture; for although the latter method can, with due precautions, be safely performed in the great majority of cases, yet not infrequently the coagulability of the blood is so reduced in cachexial fever as to render it highly inadvisable to puncture the spleen. This is the case mainly in very anaemic subjects, and those who have suffered from various forms of haemorrhage, petechial or otherwise, in some of whom I have found the coagulability of the blood to be considerably reduced, and in such cases I estimate the coagulability first by means of Wright's instrument, and only puncture the spleen if the blood clots within five minutes or less. A fine hypodermic needle should be used.

NOMENCLATURE.

I have retained the name of "cachexial" fever for the endemic form of the disease, so common in Bengal and Madras, until the precise nature of the flagellated protozoal parasite, whose development from the Leishman bodies I have described and figured elsewhere,¹ is exactly determined and named, as it appears to me to be less objectionable than the other names so far suggested. Thus, "tropical splenomegaly" does not cover all cases, as Donovan mentions three in which the spleen was not enlarged, and I have obtained the parasite in several cases in which the organ only extended an inch or so below the costal margin, and have watched a typical case of the disease, showing both the double remittent type of fever described in my last paper, and also the blood changes about to be described, in very marked degree, and during several months before his death the spleen was never large enough to be safely punctured below the ribs. The term "malarial cachexia of India" recently suggested is open to the still