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Spleen.—Much enlarged; extends from seventh rib in mid-axillary line to three inches below the level of the umbilicus; is firm and solid, tender on pressure over the outer part, not towards the middle line.

Diarrhoea.—Is present; light yellow, semi-formed motions.

Urine.—Normal.

Blood-count.—Red blood corpuscles, 4,000,000; white blood corpuscles, 2,200.

May 20th.—Splenic puncture performed to-day, strict precautions being observed against sepsis and haemorrhage. An all-glass syringe was used, and the long platino-iridium needle inserted just below the costal margin and well to the outer side, at a point where there was tenderness on pressure. Thirty minims of blood, &c., were obtained. In smears prepared from this, numerous oval and circular Leishman bodies were found, some apparently free (but often with cell protoplasm adhering), others included in a matrix substance, others in the interior of large cells; one large cell contained thirty-eight bodies. A few were found lying singly in the interior of polymorphonuclear leucocytes. A few bodies were found in process of division.

This concluded the diagnosis of "Dum-Dum fever," or, as it is now officially styled in India: "40. Diseases of Animal Parasites (kala-azar)."

The administration of red bone marrow was commenced, with a view to increasing the leucocytes. Quinine was given in large doses, both intra-muscularly (the soluble bi-hydro-chloride) and by the mouth, but was found to cause severe headache and discomfort without affecting the temperature, and was discontinued after a few days.

Splenic puncture was repeated on June 8th, with the same result as on the first occasion.

Culture experiments were carried out in collaboration with Lieutenant Smallman, R.A.M.C. Several tubes of sterile sodium citrate (4 per cent.) were inoculated with the products of splenic puncture on both occasions, and kept at a temperature ranging from 20° to 25° C. The development of the parasites was watched through all the stages of enlargement, vacuolation, fission and flagellation, already described and illustrated by Rogers¹; and by Leishman and Statham². Fully developed motile flagellates were obtained on the third day.

DISORDERED ACTION OF THE HEART IN SOLDIERS.

By CAPTAIN J. Mc. D. McCARTHY.

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The prevalence of palpitation of the heart in soldiers of the British Army was attributed in former days to constriction of the chest produced by the cross-belts supporting the old form of knapsack. In many cases,

¹ Quarterly Journal of Microscopical Science, November, 1904.
² Journal of the Royal Army Medical Corps, March, 1905.
the first effects soon developed in the recruit, that is, between the ages of 18 and 20; at this period of life the epiphyses of the ribs have not commenced to ossify, and there is little ossific union between the bones of the sternum at that age. The rib cartilages are very soft and yielding, consequently constriction of the chest is bound to be very prejudicial, especially if the recruit is a delicate, slenderly-built boy. The heart, too, at this period of life has not attained its full strength, and is therefore unable to meet the sudden and prolonged strain which is put upon it, and so assumes an irritability and excitability of action which increases as the cause continues. The old form of knapsack, used many years ago, was supported on the back by cross-belts passing across the chest. The constriction produced by these belts was considered the main cause of the disease. At the present day, however, the knapsack has been replaced by the valise equipment, which is supported by straps passing over the shoulders and under the armpits. They do not, therefore, cross the chest at all, thus avoiding all constriction. Nevertheless, in spite of this change, disordered action of the heart (as it is now called) is still a very common disease amongst soldiers, especially those serving in tropical countries. It therefore appears that constriction of the chest is not the main cause of the disease, whatever effect it may have had in predisposing to or aggravating this affection.

It is frequently noticed that young soldiers suffering from palpitation find, after a time, that the trouble passes off and they are again able to perform their duties satisfactorily; but in these cases, in all probability, the heart has undergone some hypertrophy, and with this there is almost certainly some dilatation also; in fact, dilatation seems to be one of the main factors in this disease, and it is this condition which eventually leads to the soldiers' discharge from the Service. Soldiers suffering from this affection state, as a rule, that while not exerting themselves they feel quite well and free from any shortness of breath, or pain of any kind, but as soon as they commence marching or doing gymnastic exercises they are at once troubled by a throbbing sensation in the chest, or actual pain there, or even giddiness and faintness. Rest may remedy this for a time, but in most cases all the trouble returns shortly after resuming duty. There are many men who have the disease, and yet state that it has never been of any inconvenience to them whatever; in fact, many cases of disordered action of the heart have been detected quite by accident, when one is making the usual routine examination of soldiers who come into the hospital for other reasons, especially for malarial fever. These fevers, malarial and others, appear to be the most frequent predisposing cause of the heart affection. They probably cause a granular and fatty degeneration of the muscular fibres of the heart. It is therefore fair to assume that when a soldier, who has had several attacks of fever, becomes subject to disordered action of the heart, it is probably due to degenerative changes in the heart muscle, and although palpitation
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is the outward and visible sign, dilatation of the heart is the real underlying lesion. These facts indicate that soldiers who are recovering from attacks of fever should be exempted from drills and other manual work, especially gymnasium, for several weeks after they have been discharged from hospital.

The next question that presents itself is, what part does alcohol play in producing this condition of the heart? Excessive consumption of alcohol may produce changes in the heart muscle secondary to degenerative changes in the stomach, liver and kidneys. The changes in these latter organs lead to various disorders of digestion and excretion, and so to impaired nutrition of all tissues, including the heart muscle, and so we again have a cause for the production of dilatation of the heart.

Next comes the question of excessive smoking as a probable cause of this condition. I think this must act in a different manner on the heart, producing a neurosal form of the disease, rather than a degenerative change in the muscular tissue of the heart. In this case, therefore, the palpitation is probably not preceded by dilatation, but, in the majority of cases, other than those due to smoking, dilatation is undoubtedly present and remains undetected in many men, either because it is too slight to be elicited by percussion, or the medical officer in charge of such a case is not skilled enough in percussion, or is too careless in his examination, to recognise the change.

There are many other conditions which appear to aid in producing this disease; one of these is residence in the Tropics, another is over-exertion during campaigns, combined with exposure to sudden and extensive changes in temperature, and with this it often happens that soldiers have to subsist for the time on very scanty rations. Men who have served for any length of time in the Tropics become anemic, the amount of haemoglobin in the red blood corpuscles is diminished, and so less oxygen is carried to the tissues, which therefore waste; the muscles become soft and flabby, and of course the heart-muscle shares in this condition; it becomes enfeebled, leading to a general diminution of arterial tension, and at the same time, the constant high temperature to which the men are exposed causes fulness of the veins and capillaries and an overloaded condition of the right ventricle. If now the men are called upon to do hard and prolonged muscular work, as occurs on active service, and they are at the same time badly fed, the soft, flabby heart-muscle yields, dilatation occurs, and disordered action of the heart makes its appearance. The conclusion arrived at concerning the disease is, that it is a condition of great excitability and irritability of the heart’s action, with some dilatation and a little hypertrophy, and that the dilatation precedes the palpitation in most of the cases.

Treatment.—The fact that dilatation of the heart is, in most cases, the underlying lesion, points to rest as the chief remedy. As stated before, soldiers recovering from attacks of fever should not be sent back to
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their ordinary duties too hastily. They should attend hospital for a time, and then be placed on light duty until the heart has regained its healthy state once more. Smoking and drinking should be curtailed as much as possible, and food should be substantial and nourishing.

Prognosis.—Many recover under the above treatment, but the prognosis is not on the whole good; the majority of apparently cured cases return to hospital suffering from the same thing, and are finally invalided from the Service.

Sequelæ.—It is difficult to say what the ultimate effect of the disease is in most cases, because so many of them are discharged from the Service before any sequelæ have had time to develop, but after examining a large number of Medical History Sheets, one notices that valvular disease of the heart is, in some cases, preceded by one or more entries for disordered action of the heart, and I have no doubt that if the latter affection is not properly treated it will, in many cases, eventually end in valvular disease. It seems to me that disordered action of the heart is more common in civil life than is generally supposed, but owing to the fact that civilians are not subjected to so many medical inspections as the soldier, the disease is overlooked until it has reached the more serious stage of valvular incompetency. I have had several cases in recruits for the Line and Militia; they are generally men whose work necessitated severe muscular efforts, such as lifting heavy weights. These men are useless in the Service, and great care should be taken when examining them to discriminate between real disordered action and the tumultuous beating due only to nervousness while under examination. It is my usual custom, when I get a case of this sort, to give the recruit a quarter of an hour’s rest while I examine another man and then try him again. If his heart is still thumping and the pulse between 90 and 100 per minute I reject him, or if in doubt as to how much of it is due to nervousness, I send him away and let him come up again next day. If these men are enlisted they are certain to become regular attendants at the hospital, until eventually they have to be invalided, having in the meantime done little or no work, but have cost the Government a good deal of money.

A NOTE ON THE SYSTEMATIC TREATMENT OF MALARIA AMONGST EUROPEAN TROOPS.

By Captain W. E. HUDELESTON.
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For the past few months I have been endeavouring to elaborate a systematic method of treating malarial fevers amongst soldiers in the units in Kampti, Central Provinces, India.

I think it is sufficiently obvious to Medical Officers serving in malarious districts, that preventative measures, such as drainage, and the