from infection of the base upwards over the cortex, the pus fills up the sulci between the convolutions and soaks into the grey matter of the cortex along the sheaths of the pial vessels. This is exactly the course which it is desired that salvarsanised serum should take when mingled with the cerebro-spinal fluid. In this way the serum must inevitably reach the peri-neuronic spaces of the cortex, especially in the neighbourhood of the Sylvian and Rolandic rivulets. Thus it appears clear to us that the serum introduced into the ventricles does reach the anchorage of the spirochæte.

Optic Nerve Atrophy in Tabes.

We suggest that the same method might be employed to arrest tabetic nerve atrophy. The optic nerve has a sheath derived from the dura mater, another derived from the arachnoid, and another from the pia. The space underneath each of these sheaths can be separately injected, as was shown and figured by Key and Retzius. The injection beneath the arachnoid sheath passes into the substance of the optic nerve, and if made into the subpial space passes into the optic nerve and extends as far as the papilla, and this, it is suggested, should be the path which the curative serum should voyage so as to save the essential elements of the papilla and retina from destruction. Whether the injection should be made into the lateral ventricle or through the outer angle of the sphenoidal fissure into the subarachnoid space at the base of the brain remains to be determined.

The demobilisation of the British Army and the probable increase of syphilis in this country make it highly desirable that any means which may have a remedial influence on syphilitic infections of the nervous system should receive careful study.

MALARIA AND TRENCH FEVER.

BY GORDON WARD, M.D. LOND.,

MAJOR, R.A.M.C. (S.R.)

THE close resemblance between these two diseases does not seem to be generally appreciated. It is proposed to compare them under headings from predisposing causes to termination. [Owing to lack of space observations on predisposing causes, parasites of the diseases, and insect hosts are omitted.] As to the development of the parasites in man, the similarity of the two processes in man can only be inferred from the similarity of their effects. In both diseases the onset usually seems abrupt, but indefinite prodromal symptoms are almost certain in each case.

The Acute Attack.

In malaria this is ushered in with a rigor, in trench fever a rigor is uncommon, but it does occur. Also, when malaria is "toned down" by continual administration of quinine rigor is unusual, although pyrexia and all the other symptoms may be present. A hot stage and sweating are not uncommon in trench fever. Headache, nausea, and pain are common to the acute attacks of each disease. Enlargement of the spleen, usual in both, is perhaps more obvious in malaria.

In malaria we assume, undoubtedly wrongly, that the symptoms of the relapse are due to the sudden multiplication of parasites in the peripheral blood. When patients are under the influence of quinine they very often continue to have undoubted relapses, but the parasite is very seldom found in the peripheral blood. Sporulation may be proceeding only in the internal organs—and it is also possible that the relapses of trench fever are due to the sporulation of its parasite in the same places. Moreover, these minor relapses of malaria in patients taking quinine are not affected by increasing the dose of quinine. Thus the failure of quinine to affect the trench fever parasite is less surprising and the similarity of the two diseases more apparent in this particular than would have been thought. If we assume that quinine merely makes it impossible for the parasite to reach the peripheral circulation we have a complete explanation of the course taken by malaria in persons under the influence of quinine and of the relatively small part played by anæmia in such persons. It is precisely these persons who most resemble cases of trench fever, in which also anæmia is a small factor. It may be noted that in both diseases extreme pallor is much more common

than extreme anæmia, and as will presently be shown there are other similarities in the vaso-motor symptoms of the two diseases.

The acute attack of malaria is usually considered to consist of a single rise of temperature, while in trench fever we find daily rises for three or more days. But Chart 1

CHART 1.

From a case of malaria taking 10 gr. of quinine daily during the period shown. *Plasmodium vivax* found. Showing tendency to grouped rigors at several days' interval.

CHART 2.

From a case of malaria taking quinine throughout the period of observation. *Plasmodium vivax* found. Showing three five day intervals and one fifteen day interval.

shows that even malaria (under the influence of quinine in this case) has a tendency to groups of rises of temperature. Charts 2 and 3 are suggestive of the same grouping and are very similar to many trench fever charts.

CHART 3.

From a case of trench fever developing while patient was in hospital for diarrhoea. For comparison with Chart 2.

In trench fever the unknown parasite seems to be in the blood stream, and it is possible that it could be confined to the internal organs by the use of quinine.

Shin Pains and Other Pains.

If the pains of malaria and trench fever be analysed it will be found that certain of them, and in particular those felt in the legs and back, are dependent on cutaneous hyperalgesia which can be detected by the finch following a slight pin-prick. The hyperalgesia covers definite areas corresponding to the distribution of nerves from particular segments of the spine. For these two diseases the hyperalgesic areas, and therefore the spinal segments in connexion with them, are the same. In neither case is it known what causal condition stands further back than the spinal segments, but there is a strong presumption that it is a disorder of viscera connected with the same segments—the whole phenomenon being comparable to any simple reflex. This aspect of the problem has recently been worked at by Carmalt Jones,¹ who dealt chiefly with trench fever, and the writer has not only seen some of his cases, but has since verified his findings in many cases of malaria and a certain number of trench fever.

The writer is not prepared without further evidence to accept any absolute diagnostic criterion based on hyperalgesias, but as showing the affinity of the two diseases these researches of Carmalt Jones are of undoubted importance. All three areas (C. 8 and D. 1, D. 7, and L. 1 to 5) are usually found in any individual case. The second area is associated in the writer's experience with two or more lower dorsal segments. They are much better set forth in the article referred to.

Of the three groups the first seldom gives rise to clinical symptoms other than pain across the shoulders, and this is more frequent in trench fever; indeed, all the pains are more frequent or more severe in trench fever, although occasionally the maximum of severity is met with in malaria. The second group accounts for a good deal of the pain in the side, usually considered due to the spleen, perhaps quite rightly, although the mechanism is not usually recognised. The third group accounts for the pain in the small of the back and for the shin pains. All these matters anyone may test and verify for himself. It is probable that

¹ THE LANCET, Oct. 5th, 1918.

the explanation will be provided by a more searching study of the autopsy findings in malaria.

The effect of exercise, &c.—The effect of allowing a trench fever patient out of bed too soon is usually to precipitate a recurrence of the pains and a rise of temperature and pulse-rate. The writer has over and over again observed the same in a particular type of malaria—viz., the type that shows continual minor relapses in spite of quinine. It would be interesting to know whether a relapse of spirochætosis icterohæmorrhagica or of relapsing fever can be thus hastened. It is extremely interesting that so small a cause should lead the malarial parasite to sporulate within a few hours.

Other Symptoms.

Headache and eye changes.—In both diseases the headache is usually frontal, less often temporal, and rarely occipital. In malaria the writer has frequently been able to map out a hyperalgesic area corresponding to the distribution of the supra-orbital nerve. In trench fever the same area is affected. So far these fevers probably do not differ from many others. In both, however, there is, in addition, a great tendency to involvement of that part of the supra-orbital nerve within the orbit. This gives rise to "pain behind the eyes" and also to pain on moving the eyes. These are common in both diseases, as are also photophobia and some degree of conjunctivitis. Nystagmus or, more correctly, nystagmoid jerking, is frequent in trench fever. It is not usually mentioned as a symptom of malaria, but the writer found it quite frequently present. His impression is that photophobia is more frequent in trench fever and headache more chronic and persistent in malaria.

Vaso-motor symptoms.—The term "vaso-motor" is sometimes held to imply that those who use it imagine that the suprarenal glands are necessarily involved. The writer does not accept this implication—the term is a convenient one and the sort of symptom to which it applies is generally understood. The most startling of these symptoms is the transient hemiplegia sometimes seen in malaria, but more often observed in aged persons the subjects of arteriosclerosis. The writer is not aware of a similar happening in trench fever, but it may be expected to occur, and should not cause alarm.

Symptoms reminiscent of Raynaud's disease are moderately common in chronic malaria. Dead fingers and dead feet will often be found if looked for. In one case inhalation of amyl nitrate seemed to definitely reduce the area affected. These symptoms are recorded by American observers in trench fever, but have attracted little notice.

A condition more nearly allied to erythromelalgia is also met with in malaria, the legs becoming more red and painful when allowed to hang down. This has also been seen by the writer in trench fever. In view of the fact that the lesion in erythromelalgia has been shown to be an arteriolitis, it is probable that the same is true of malaria, a supposition which the writer feels may derive support from the fact that he has frequently found groups of two or three endothelial cells in the peripheral blood in malaria, but very seldom in any other disease.

A further vaso-motor phenomenon is local œdema of the shins, the calves, the dorsum of the foot, &c. Several cases of this sort have been watched by the writer. They were usually of three to five days' duration and in no case was there any albuminuria.

The vaso-motor symptoms of trench fever seem to have had very little attention, and it is hoped that those who have to do with this disease will be on the look out for symptoms such as those detailed above.

Duration of the Disease.

The duration of malaria after return to a country in which reinfection could be excluded is, in the writer's experience, 3 months to 15 years. Several cases have been noted in which the parasite was still present 5 to 10 years after return from India.

With regard to trench fever, Major H. F. Marris informs the writer that he knows of at least one case which remained febrile for two years. There has not been time to follow cases longer. It is important to realise that trench fever may prove to be a very lasting infection in some cases and to know what sort of symptoms such cases may be likely to show. The writer believes that these will be very similar to those exhibited by malaria in similar

circumstances—viz., wasting, intermittent pyrexial attacks, headache, various vaso-motor abnormalities, and serious debility.

Differential Diagnosis.

A few lines may be devoted to differential diagnosis without the assistance of the laboratory, for there is yet no sign that laboratory facilities will be more easily available for the poor than they were before the war.

Rigor is usual in malaria provided the patient is not taking quinine. It occurs but is unusual in trench fever.

Quinine controls the temperature in malaria in most cases—i.e., prevents more than one or two further rises to 103° or 104° F. This, of course, applies to temperate climate malaria. Quinine has no effect in trench fever.

A rash is absent in malaria, but may be seen in trench fever.

Leg pains are more frequent in trench fever, but may be of equal intensity in malaria.

Some cases of malaria show a general pigmentation (often well seen in the lips) which increases with attacks and diminishes between them. This is not seen in trench fever.

Finally, it is to be remembered that now trench fever and malaria may be contracted *de novo* in England and that the fact that a patient has suffered from one of them will not necessarily enable him to distinguish between a relapse of that one and the onset of the other.

Medical Societies.

ROYAL SOCIETY OF MEDICINE.

SECTION OF OBSTETRICS AND GYNÆCOLOGY.

A MEETING of this section was held on April 3rd, Mr. J. D. MALCOLM, the President, being in the chair.

Specimen showing Fœtus during Spontaneous Evolution.

MR. CLIFFORD WHITE described a case in which the fœtus was undergoing spontaneous evolution and was removed by laparotomy during labour. When first seen at hospital the uterus was in continuous contraction, the vulva was œdematous, and there was an offensive vaginal discharge. The pelvis was not contracted. Both arms, the right leg, and the cord were prolapsed into the vagina and the cord was not pulsating. The arms were amputated, and weight traction was attempted by attaching a 7 lb. weight to the foot. This had little effect, and the abdomen was opened, when it was found that the pouch of Douglas contained blood-stained fluid, the lower uterine segment was tense and thinned, and the uterus as a whole would not come out of the pelvis. The gravid uterus was then excised, but just before this operation was completed it slowly underwent the process of rupture, which occurred as follows: the peritoneum covering the right side of the lower segment cracked into pieces about 2 cm. across, a little blood appeared at the cracks, and then the muscular tissue yielded gradually and allowed portions of the fœtus to be seen. The vagina was cut across and the uterus with contents removed without delay. The patient died suddenly three hours after the termination of the operation. The specimen was shown, and was of the usual size of a child at term. The cervical spine was flexed to the fullest extent, so that the child's head was embedded in the abdomen and the right parietal eminence was in contact with the pubis. Both arms were prolapsed and forced together. The right leg was extended, the toes being on a level with the humerus of the prolapsed arm. The left foot was in contact with the left ear. The specimen showed the condition of the fœtus during spontaneous evolution, the efforts of the uterus to overcome a transverse presentation by this process failing probably because of the increased difficulties occasioned by the prolapsed extended right leg and the fact that both arms were in the vagina.

DR. EARDLEY HOLLAND suggested that it was not always wise to remove the uterus; the woman was already in a state of shock, which the extended operation of removal of the uterus would increase. It was better to leave the uterus and run the risk of sepsis.

DR. G. DRUMMOND ROBINSON and Dr. G. F. BLACKER also spoke.