

good results, which seemed almost too good to be true, so that I wrote to some of my friends in other jails to ask them to try it, and corroborate my results. However, on again reading the extract, quoted by Major Maynard, I find that Dr. Trantas of Constantinople has had exactly similar immediate good results. He gave 200 grammes of liver per diem, which is about the same quantity as my patients received. The remarkably sudden and prompt effect of the ingestion of liver in these cases almost resembles the effects of thyroid feeding in myxoedema and the cretinoid states, and consequently I have been on the watch for relapses of night-blindness as soon as the liver feeding was stopped, but so far none of the patients have relapsed, and I have every hope that their cure is, for this year at least, a permanent one. I have been informed that the treatment is not unknown in India among the Natives, though I had never heard of it before. Trantas, in the article quoted, tells us that the treatment was used by Hippocrates, but it has not found its way into any text-book that I have been able to consult.

It may be worth while mentioning that Trantas mentions (without describing) what he calls "liver fumigations;" this I do not understand, but I am told that the people of India often heat the liver over a hot iron and smear the eye with the fat which bubbles up on heating it. This may be something like the "fumigations" of Trantas.

I have since heard from Captain R. H. Maddox I.M.S. at Chapra, and Captain J. T. Calvert, I.M.S. at Durbhunga, and both have found the liver treatment equally effective and immediate in its results. A treatment so pleasant as liver fried with spices will naturally attract many old jail-birds to hospital; therefore at the suggestion of Major Andrew Buchanan, I.M.S., of Nagpur, I am trying the effect of cod-liver oil instead.

RESEARCHES INTO THE INTRA-CORPUSCULAR PARASITES FOUND IN THE BLOOD OF LIZARDS.

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FOR those desirous of getting an insight into parasites affecting the blood there is no animal so handy or so easy to manipulate as the lizard.

To examine the blood an incision is made in the skin over the carotid artery which being pricked exudes a drop of blood. The blood does not coagulate so quickly as that of warm blooded animals, and the droplet on the cover-glass spreads as a fine film on the slide. Ross'

fresh method (*viz.*, a few grains of methylene blue having been previously put on the slide) may be employed for rapid work, or Romanowski's method for preservation and mounting.

The object of this paper is to describe these endoglobular parasites found in the lizards that inhabit our bungalows and at the same time to discuss their evolution. It will be noticed that I speak of more than one parasite affecting the red cells which depends entirely on the manner in which the development is viewed. There frequently exists in the blood of cold-blooded animals certain sporozoa called hæmosporidia or hæmogregarines which have a cycle of development different from the gymnosporidia which are found in the blood of man and birds. The hæmosporidia are characterised by living at one time free in the serum of the host and by a true encystment which ends their period of growth. They are usually found in the blood of frogs, lizards, &c., and their cycles of growth are the same. The specific name given by Labbé to that found in the lizards is the *karolysus*, a parasite similar to the *dreparidium* of infected frogs (*Rana Esculentu*). Having no other work than that of LeDantec, I shall make extracts from it for general information. In afterwards contesting the evolution described by this writer, it will have to be assumed that the researches made on the lizards here disclose a parasite identical with the *dreparidium*. The description given resembles so closely the parasites found by me that I feel certain I am working with the same organism. The *dreparidium*, according to this writer, is at first a small elongated body, hyaline or finely granular, and furnished at its centre with a chromatic granule or nucleole, being at the same time narrower towards the centre and seemingly divided into two segments, the one hyaline containing the nucleole, the other granular containing chromatic granules. This sporozoite now enters a red corpuscle to develop into the hæmogregarine. The first segment, still hyaline, grows as it were to one side and forms a fine point at its anterior extremity, while the other increases and exceeds the former in point of size. When the development is complete, it is no longer divided into two distinct parts, but acquires a uniform texture. The body has now all the appearance of a monocystic gregarine. In this condition the *dreparidium* is able to quit the host cell and live a free life in the serum, and being pointed at its anterior extremity, it is able to move easily amongst the erythrocytes. It is proved beyond doubt that fusion often takes place; a veritable conjugation of two individuals. According to Labbé, there follows a fusion of the protoplasm vacuoles and nuclei with the result that the new individual only differs in size from the original two which went to form it. After

a certain time of free existence in the serum whether conjugation takes place or not, the dreparidium re-enters a fresh corpuscle or leucocyte, &c., and curving on itself, the ends meet, fuse, and a round or oval organism is formed in which the vacuoles quickly disappear. This new formation gradually increases and fills the greater part of the nucleated red corpuscle and takes on an ellipsoidal shape. In a later stage a distinct membrane makes its appearance surrounded by the hæmoglobin of the erythrocyte. Labbé calls this the cytocyst which contains both plastic and chromatic granules. Spores are now formed which are liberated by the dissolution of the cyst wall, and these give rise to microsporozoites or macrosporozoites (depending on the number of spores formed) which float in the serum of the animal ready to inoculate fresh cells.

There are, therefore, three phases in the endogenous cycle of this parasite.

- I. A phase of growth in a host cell.
- II. A phase where the organism is free in the serum.
- III. A coccidium phase characterised by encystment inside a red cell and subsequent sporulation with a "reliquat de segmentation."

It is these three phases of the endogenous cycle which I propose to review and to give the results, in as clear a way as possible, of a large number of blood examinations.

For easy reference I shall name phase I as hyaline crescents; phase II as the free crescents; phase III as the pigmental oval. If nature has deemed it necessary that the organism should quit the red corpuscle, in which it has grown to a certain size, and to live free in the serum, it must be for some definite purpose. According to Labbé, whether conjugation of two individuals takes place or not, the free crescent re-enters a red cell to complete its encystment phase as a pigmented oval. One can conceive that a definite purpose in its exit from the cell would be fertilization by some male element (a chromatoid) or conjugation. Only in one instance have I seen the union of two individuals which probably occurred inside the red cell prior to escape from that cell. Reference will be made to this solitary instance at a future time. I have also seen in one badly infected lizard two crescents in the same red corpuscle; but one cannot assume this as a case of conjugation. It is merely a red cell infected by two parasites starting from two separate sporozoites. If the free crescent stage is not for fertilization, it cannot be for the purpose of increasing in volume, because the organism re-enters another corpuscle of the same size to complete as final phase of encystment. There is as far as I see no reason why the parasite should quit the

red cell which it originally occupied, nor why it cannot complete its final phase without the free intermediate stage. The question at once arises, is there a free phase in the serum and does the crescent become an oval? The malarial crescent and the spring tertian parasite show no flagellation while in the blood of the host as proved by Ross. It is only the altered conditions on the microscopic slide or in the mosquito's stomach that this extra corporeal phase takes place. The hyaline cell (male element) of the proteosoma shows no flagellation till the blood is drawn from the infected bird. I shall endeavour later on to show that the free crescent or phase II is really the result of extra corporeal conditions, and that the hyaline crescent and the pigmented oval exist independently of one another, and that the hyaline crescent does not become a pigmented oval because I had failed to meet with this conversion of the hyaline crescent into a pigmented oval (encysted phase III).

THE PERCHLORIDE TREATMENT IN PLAGUE.

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IN redemption of a pledge made some time ago the following analysis of the results of perchloride of mercury in plague are published for the benefit of the profession. The statistics may be regarded as fairly accurate and as nearly impartial as possible; as they were firstly compiled by the respective hospital assistants in subordinate charge of the two hospitals and without any idea of the purpose for which they are now used. Apparently they were only to show the relative rates of mortality for buboes in different situations.

The two hospitals were under different medical officers. Dr. Walton for a short time, and subsequently Dr. Beach had charge of the Budhwar Plague Hospital in which the ordinary tonic, stimulant, expectant treatment of symptoms was carried out exclusively. The figures are taken from bubonic cases only in order to exclude those of doubtful diagnosis; those of malignant primary pneumonic plague in which all treatment is useless, and those admitted moribund. As both hospitals were open simultaneously during the first Satara plague epidemic, and daily received as nearly as possible half the cases discovered by the search parties working morning and evening, there can scarcely be any appreciable chance differences on the severity of the cases admitted for treatment.