NOTE ON SOME CELLULAR BODIES FOUND IN A CASE OF MEDITERRANEAN LEISHMANIASIS.

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In the May, 1913, number of the Journal of the Royal Army Medical Corps, under the title of "An Interesting Case of Kala-azar," Captain Archibald gave particulars of a case which the present writer believes to be similar to the one he is about to describe.

The patient in this case was a child aged 2, who had been invalided from Malta as suffering from kala-azar. The history was that in March of the present year the child was taken ill with an attack of enteritis, but quickly recovered under treatment in hospital. Not long after leaving hospital, however, he again became ill, and again went to hospital, being on this occasion diagnosed as kala-azar, which was confirmed by spleen puncture and the finding of the parasites. The child was sent to England about the end of July, arriving in Aldershot about August 9. At this time he was suffering from an attack of cancrum oris, which had started very soon after embarkation. The lower lip and soft tissues of the chin were affected, and, as their condition was rather foul, it was thought better to treat the child in the Isolation Hospital.

During his stay in this hospital liver puncture was performed on October 2 by Major McNaught, R.A.M.C. Smears were made, and in addition some of the material so obtained was put into citrate solution. Novy-McNeal-Nicolle medium was not available at this time. In the smears no Leishmania infantum could be detected, but certain "bodies," which will be referred to later, were found in small numbers.

The father being now stationed at Woolwich, the child was transferred at the wish of its parents, and was admitted to the Families Hospital there on October 4. Consequently, it has been somewhat difficult to keep in touch with the case, but the kindness of Captain Pascoe, under whose care the child then came, has made it possible to obtain on one occasion some more material, the result of a splenic puncture, for examination.

During the stay of the child in the Isolation Hospital, Aldershot, his temperature fell gradually to normal for a time, probably due to the clearing up of the cancrum oris sore, which became quite healthy
in appearance. The general condition also improved. At this time a blood count showed 15,000 white blood corpuscles per cubic centimetre, a slight leucocytosis probably also due to the cancrum oris. A few days before removal to Woolwich, however, the temperature began to rise again. During October there was steady improvement in the general condition, together with some increase of weight, but at the present time, the beginning of November, the spleen is still enlarged to the level of the umbilicus and the temperature rises in the evenings to 100° or 101° F. There is also still some yellow discoloration of parts of the skin. The cancrum oris sore is healing rapidly. The case, therefore, furnishes another example of improvement taking place after the establishment of a leucocytosis consequent upon a septic condition.

Referring now to the "bodies" found in the smears made from the results of liver puncture, there can be little question that these are strikingly similar, if not identical, with those described by Captain Archibald in the Sudan case.

The points of similarity and difference may be tabulated as below, first premising that when "bodies" are mentioned the term includes the whole cell, if it be a cell, together with its contained "coccal bodies," which will be referred to as "granules." The reason for the use of this term will appear later.

**Resemblance.**

(1) **Bodies.**—Their size, and also the variation in size, is about the same in both cases.

The staining reaction of the cytoplasm appears to be identical. Vacuolation of the cytoplasm is a marked feature in both cases.

(2) **Granules.**—The size and general appearance of the granules are practically identical.

The staining reaction is the same in both, showing every gradation from a definite pink, through ruby red to purple, and on to a bluish-violet shade.

**Difference.**

(1) **Bodies.**—In the Sudan case the shape of the bodies is more circular or oval. In the Malta case they are more often quite irregular.

Vacuolation of the cytoplasm is frequently multiple in the present case. Reticulation of the cytoplasm is often seen, a feature not noted in the Sudan case. The above points are probably correlated; for the protoplasmic structure appears to be exceedingly
delicate, and it is probable that several were damaged in the
process of making the smear.

(2) Granules.—Though many of these are perfectly circular
or oval, much more irregularity of form is seen than in the Sudan
case, the appearance being sometimes that of a rod or line, some-
times a prolongation in the form of a very fine streak or “tail”
from a spherical granule, and in one case at least, a delicate band
appeared to join two granules, one of which was stained a ruby
red colour while the other had a bluish tinge. In some cases
the chromatin-stained granule was extended along a vacuole,
and in exact apposition with it, while in others the vacuole
surrounded the granule. In addition, the proportion of very small
granules was greater in this case, and the majority of the granules
seen were stained a definite chromatin tint. The diplococcal
arrangement was seen a few times and nearly always in respect of
the darker, bluish granules. Free granules have not been recog-
nized in the smears.

Some of these points of resemblance and difference will be seen
in the plate, but many of them are not very easy to bring out.

It will be noted that the points of difference are in the main
small and probably unimportant. The case is a little different
when one endeavours to arrive at an interpretation of the “bodies.”
Captain Archibald speaks of the “coccal bodies” as cell inclusions.
To do so is to postulate the existence of a cell in which the “coccal
bodies” are included. Such would not appear to be the case,
for one of the essential elements of a cell, viz., the nucleus, is not
present. Apart from the cytoplasm of the cell and the contained
granules there is no visible structure.

An alternative view therefore is that the “body” is a cell
of which the “granules” form the nuclear apparatus which is
undergoing a process of multiple fission of one form or another.
Such a process is common, if not constant, among the protozoa
during maturation of the gamete and as a preparation for the
process of conjugation. And as in this process the vegetative
chromatin degenerates to be either absorbed or eliminated we should
have here an explanation of the division of the granules into
two varieties, one, the pale-staining representing the degenerating
vegetative chromatin, the other of approximately the same staining
reaction as the nuclei of the liver cells and white blood corpuscles
and representing the generative chromatin. This view would also
account for the presence of minute particles of chromatin of a
pinkish hue, representing the latest visible stages of absorption,
and also for the diplococcal arrangement of some of the granules being confined to the darker blue-staining ones consequent upon recent division. In this connexion it may also be well to recall the difference in the staining reactions of the tropho-nuclei and kineto-nuclei of the pre-flagellate stage of *Leishmania infantum*.

Adopting the above view, the "bodies" probably represent a stage in the life-history of a protozoal organism and as in both the recorded cases the patients were suffering from one form of Leishmaniasis, the natural assumption would be that the parasites under discussion represent a stage in the life-history of a Leishman organism.

The apparent disappearance of the ordinary form of the parasite, and the appearance of the forms above described coinciding with the improvement in the general condition of the patient, suggest an analogy with what occurs in another parasitic protozoon, e.g., the malaria parasite, and may indicate the preparation for a sexual cycle outside the body of the human host consequent upon the establishment in the host of conditions unfavourable to the parasite.

Captain Archibald also mentions having met with "bodies" apparently of the same nature in a similar case some twelve months previously, thus adding a third case to the series.

The speculation just entered into is an interesting one, though the evidence in its support may not be considered very strong.

In this case the "bodies" have not so far been seen in smears made from the spleen, not at least in the form found in the liver, which is contrary to the experience of Captain Archibald.

Some other points noticed in the examination of the smears may be mentioned here. Although a very large number of fields have now been carefully examined, not a single eosinophile corpuscle has yet been met with, and the same applies to the mast cells. The majority of the white corpuscles are lymphocytes. Polychromatophilia is common in the red cells as also is basophilia of the punctate type, the granules being often of relatively large size as shown in the plate. Nucleated red cells are also present in excess of the normal.

Many of the liver cells show dotted about in their cytoplasm a large number of dark-staining granules, but whether these are due to a pathological degeneration of the cytoplasm or are of the nature of inclusions it is very difficult to say. A specimen showing this appearance will be seen in the plate.

This note is admittedly very incomplete, partly from loss of contact with the case, partly from difficulty in obtaining the
records, and also from lack of time for complete examination of all the material so far at command; but it is considered advisable to put it on record at once, both in order to confirm the findings of Captain Archibald in the Sudan case, and also to obtain if possible further research and confirmation by officers stationed in Malta, who have greater opportunities for investigation. It at least appears to afford some further evidence of the similarity of the Sudanese and Maltese forms of the disease, a point on which some doubt has been thrown.

All the direct smears and the films made from the cultures in citrate solution and on the Novy-McNeal-Nicolle medium have not yet been completely examined. Should these furnish other points of interest they will form the subject of a further note.

My thanks are due, not only to the officers above mentioned for their kindness in providing the material (and clinical notes) in this case, but also to Major Fowler, R.A.M.C., for assistance in obtaining the specimens.
To illustrate "Note on some cellular bodies found in a Case of Mediterranean Leishmaniasis." By Major A. B. Smallman.

Fig. I.

Fig. II.

Fig. 1.—Nos. 1, 2, 3, 4, 5 and 6. Cellular bodies described in the text.
No. 7. Liver cell showing dark granulation of the cytoplasm.
No. 8. Red blood corpuscle, showing basophilia.
No. 9. Nucleated red cell.

Fig. 2.—Nos. 1, 2, 3, 4 and 5. Cellular bodies.
No. 6. Vacuolated polymorphonuclear.