PARASITES OF THE GENUS BERTARELLIA IN THE BLOOD OF THE TORTOISES OF INDIA AND BRAZIL.

BY CAETANO CORREIA DE MEYRELLES.
(Medical College, Nova-Goa.)

Received January 5, 1938.
(Communicated by Colonel I. Froilano de Mello.)

In a previous paper presented to the Indian Academy of Sciences we have described a parasite of the genus Bertarellia and pointed out the reason why this designation should be maintained in the protozoological nomenclature.

The present note deals with a similar parasite found in the blood of the Indian tortoise Emulya granosa. Almost identical to Bertarellia calotis with some slight differences which will be stated in the course of this description, it is seen, in blood films stained by Leishmann or May-Grunwald-Giemsa, taking always a violet chromatic coloration in its different forms, which may be roundish (62%), elliptical (37%), and seldom oval, piriform, ring-like, etc.

The violet tone is noticed only in the part which we consider to be the chromatic part of the parasite. Rarely such chromatic point, of an anaplasmoid nature, is the only structure inside the cytoplasm of the red cell; but, in general, such chromatic point is surrounded by a clear halo, often very difficult to be distinguished, and extremely polymorphous; roundish or elliptic, complete or incomplete, narrow or fairly large. The situation of the parasite in the interior of the red cell varies differently, being sometimes central, sometimes polar and rarely peripheric, this one suggesting a beginning of the invasion of the erythrocyte.

The red cell may contain more than one parasite and often one of these haloes may show more than one chromatic point suggesting a binary division of the parasite. We have been able to see even three chromatic granules closely attached to one another. Such binary division is not always equal as the buds have not always the same size nor stain with the same intensity: generally, the larger buds are more siderophyl than the small ones.

Forms entirely similar to those invading the red cells have also been found free in the plasma.
The *Bertarellia* of this tortoise has never shown the blue coloration of the protoplasm which was figured by us in *Bertarellia calotis*: this is the only difference between the two.

The staining by the iron hematoxylin of Heidenhain did not give any further detail.

Our Fig. 1 shows the different forms of the parasite.

* * * * *

In our previous paper we have made reference to a statement of Prof. A. Carini from S. Paulo, Brazil, on this genus of parasites. The same professor having sent to us two blood films of Brazilian tortoises, one from 1933, the other from 1937, both coloured by Romanowsky stain, we had opportunity of examining them with greatest care. That of 1933 belongs to the tortoise *Chelonea midas* and shows two kinds of parasites: (a) one *Tunetella*, in great quantity, (b) one *Bertarellia*. That of 1937 belongs to
the tortoise *Caretta-caretta* and shows both *Tunetella* an *Bertarellia* in almost equal number.

The forms of *Bertarellia* observed in these films are entirely similar, as well in structure as in size and stain to those found in *Emyda granosa* and we are convinced that there is no difference between the *Bertarellia* of the Indian and the Brazilian tortoises of Prof. Carini.

![Image of *Bertarellia* forms](image)

**FIG. 2.**

*Bertarellia* of Brazilian tortoises.

Fig. 2 represents the forms found in the films of Prof. Carini.

The genus *Tunetella* has been created by Brumpt and Lavier for a kind of piroplasmide described by the French authors in the blood of Tunisian tortoise, *Emys leprosa*, brought at Paris.

They state that "les petites formes de cette dernière évoquent ce qu’a décrit Carini (1930) pour sa *Bertarellia leptodactyli*, parasites de globules rouges de l’Amphibien, *Leptodactylus ocellatus*". They state also their affinities with the *Dactylosoma* of Amphibians whose schizogony, easily
observed in peripheral blood, and tinctorial reactions seem to us enough differential characters between both these genera.

The parasite of Brumpt and Lavier which was named *Tunetella Emydis* n. g. n. sp. shows in its largest form the aspect of a more or less regular ring of 2 to 5 microns of diam.; cytoplasm violet bluish, containing 1 to 3 purple chromatic granules, surrounding a clear centre. The parasite may show oval, elongated, piriform, lobulated (amœboid) appearance; often 1 or 2 little expansions suggest a kind of pseudopods (their Figs. 15 and 16). Small parasites of less than one micron of diam., isolated or in groups simulating rosettes or in a rather linear disposition, are to be found, some with a distinct chromatic point, others without such granules and appearing as basophyl spots of a grey bluish coloration. The authors believe that such spots belong certainly to the same parasite "caril est fréquent de les voir associées à des petites formes d'aspect caractéristique; leur signification cependant ne nous apparaît pas très clairement: il peut s'agir d'un aspect artificiel dû à une
Parasites of Genus Bertarellia in the Blood of Tortoises

fragilité toute spéciale du cytoplasme parasitaire que la pression du frottis aurait fragmenté en plusieurs éléments ; mais il peut s’agir aussi d’un stade de multiplication active aboutissant à de toutes petites formes susceptibles de porter l’infection dans d’autres globules ; en faveur de cette vue parle le fait qu’on peut rencontrer certains de ces éléments isolés ; contre elle, leur chromophilie, beaucoup plus faible que celles des formes anaplasmoides dont l’existence est connue dans le cycle évolutif de divers hématozoaires.”

The forms of Tunetella which we have found in the films of Prof. Carini may be differentiated from Bertarellia first of all because they are never surrounded by the clear halo which we found generally in Bertarellia; secondly, because their nucleus is much darker than those of Bertarellia even when it is divided and the bud of the division is quite separated from the mother nucleus. This nucleus is generally followed by a protoplasmic expansion under the form of a rod, or coma, staining light greyish. Often such expansions are completely separated of the main body and do not show any chromatic point, corresponding thus to the basophyl spot described by the French authors. Sometimes the nucleus is situated in the middle of a protoplasmic band curved under the form of a U, sometimes at the vertex of a Y. In some forms the nuclear buds are separated by a clear zone of protoplasm.

Fig. 3 shows the different aspects of these Tunetellas which we are not able to classify specifically; however they seem to us somewhat different from Tunetella Emydis Brumpt and Lavier, 1935.

* * * * *

The three specimens of Bertarellia found in Emyda granosa, Chelonia midas and Caretta-caretta seem to us to belong to the same species which, as it has already been stated, is different from Bertarellia calotis.

As the parasite has been found in three different genera of tortoises, we will name it Bertarellia carinii n. sp.

BIBLIOGRAPHY.

1 de Mello, I. Froilano, and de Meyrelles, Caetano Corrêa, “On the nature and identification of some roundish bodies found either free or as endoglobular parasites in the blood of Calotes versicolor Daud, subspecies major Blyth,” Proc. Ind. Acad. Sci., 1937, 6, 2.