HERPETOMONIDAE FOUND IN SCATOPHAGA HOTTENTOTA
AND CHAMAELEON PUMILUS.

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In December, 1912, I noticed numerous flagellate micro-organisms in a smear taken from the hind-gut of a specimen of *Scatophaga hottentota* caught on Robben Island. The slide was dried, fixed in absolute alcohol and stained with Eosine-azur. The flagellates were then seen to belong to the genus *Herpetomonas*. They presented the usual elongated shape, with a flagellum attached to the protozoon by a short, intra-cellular portion. The short, rod-like kintonucleus was usually found half-way between the trophonucleus and the flagellar ("anterior") end of the parasite. The kintonucleus was separated from the flagellum by an interval of about 2 μ . No undulating membrane could be detected.

Biflagellate forms (Prowazeks *Herpetomonas* type) were also observed, apparently as a stage of commencing division. Moreover single, non-flagellate, rounded individuals, with a trophonucleus and kintonucleus (blepharoplast), in addition to all the morphologically intermediate conditions between the latter and the usual elongated, flagellate *Herpetomonas*; such transitory forms corresponding to the three stages described by Patton as preflagellate, flagellate, and post-flagellate.

The length of the body of the flagellate stages varies between 25 and 45 μ . The width is not usually less than 2 or more than 5 μ . In specimens which were fixed in a straight line the flagellum could be seen to be about one and a half times the length of the body proper.

Rounded, non-flagellate stages varied from 5 to 8 μ in diameter. The size of the trophonucleus was relatively constant in all specimens observed, irrespective of their stage and can be stated to correspond to 4 μ .

All measurements were taken on the fixed and stained slide. This protozoon corresponds in type to the genus *Herpetomonas* (*Leptomonas*) especially the species *H. muscae domesticae* Burnett. Its host in this case is the common "blind-fly" on Robben Island.

A year later, in December, 1913, I found in the cloaca of a *Chamaeleon pumilus*,* also on Robben Island, numerous flagellate parasites belonging to the same genus, and possibly of an identical or allied species. Several smears were taken, fixed for ten seconds in Osmic acid fumes, then thirty minutes in absolute alcohol and stained according to Giemsa.

These specimens appear to be broader, blunter, and somewhat shorter than the *Herpetomonas* found in *Scatophaga hottentota*. The trophonucleus stains a clear, light purple hue, the kinetonucleus is sharply defined as a compact, short rod, generally placed transversely to the length of the protozoon. Its position is generally half-way between trophonucleus and the flagellar end. In some instances, especially in pear-shaped stumpy flagellate forms, the kinetonucleus has moved up so as to separate from the trophonucleus only by a space not superior to 3μ . In single specimens the kinetonucleus appears to be slightly curved with its concavity facing the flagellum and a faint, vacuole-like clear space can be detected between this structure and the basal granule of the flagellum. Some of the flagella appear, moreover, to be covered by a sheath or slight membrane which encloses them to the point where they enter the cytoplasm.

Dividing and biflagellar forms are not rare in the specimens examined. Multiplication takes place by binary fission of the long flagellate stages. When the process of fission is very active, the resulting flagellates are long and very thin, so that in an unfixed specimen they dart about in the fluid like spirilla; the nucleus appears also to be reduced in size and is hardly distinguishable.

Development of non-flagellate rounded forms appears to take place by the production of a thin, short flagellum, which increases in length and thickness, whilst the body of the protozoon gets longer and thinner, the kinetonucleus moving towards the flagellar end in the process, till it reaches its usual midway position.

Though in single instances rounded forms were noticed which appeared to be devoid of a blepharoplast, still no *Leishmania*-like stages could be detected in the cells of the epithelial lining of the cloaca. Smears from the liver and spleen also gave a negative result from this point of view.

Measurements: Length of flagellate bodies, 25 to 75μ ; breadth, 2 to 10μ ; diameter of trophonucleus, 2.5 to 4μ .

Though slight differences in size and appearance are noticeable in these *Herpetomonads* from different sources, still they certainly are not more marked than those found in samples taken from the same artificial culture of *Leishmania* at a few days' interval, therefore it does not seem advisable at the present stage of our knowledge to postulate two distinct species of protozoa. It does not seem excluded that a *chamaeleon* can

* Kindly identified by Dr. Péringuey, of the South African Museum, Capetown.

get infected through swallowing a fly containing *Herpetomonidae* in its gut. It is usually admitted that flies infect each other by the contaminative or "casual" method, *i.e.* by ingesting faeces containing encysted protozoa of the *Herpetomonas* group. The same is considered to hold good for similar parasites found in fleas and lice.

Herpetomonidae have so far only been known to occur as harmless parasites in arthropods, and as pathogenic micro-organisms in mammals. Therefore the presence of these protozoa in *Chamaeleon pumilus* deserves some attention, for it may yet prove to be a biological transitional stage or condition. Cultural tests and animal experiments appear to show that the *Leishmania* bodies found in human beings suffering from kala-azar and Oriental sore and also in naturally infected dogs in Mediterranean countries are but resting stages or encysted forms of *Herpetomonidae*.

In the present instance we may have been able to observe a more or less permanent stage in the cycle of evolution from the saprozoic existence in arthropods such as the fly and true parasitism in a warm-blooded animal, by adaptation to an apparently harmless residence in the cloaca of a cold-blooded vertebrate.

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