ON TWO NEW GREGARINES, *ALLANTOCYSTIS DASYHELEI* N.G., N.SP., AND *DENDRORHYNCHUS SYSTENI* N.G., N.SP., PARASITIC IN THE ALIMENTARY CANAL OF THE DIPTEROUS LARVAE, *DASYHELEA OBSCURA* WINN. AND *SYSTENUS* SP.

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(With Plate X and 2 Text-figures.)

1. *ALLANTOCYSTIS DASYHELEI* n.g., n.sp.

The host of this gregarine is the larva of a Ceratopogonid: *Dasyhelea obscura* Winnertz, which, as I have previously mentioned[1], lives in the decomposed sap filling the infected wounds of the Elm and Horse-chestnut trees in Cambridge (at Newnham and along the Queen's Road). The parasitised larvae were found late in the season, about the end of September, they were all young and never heavily infected, containing from three to eight and exceptionally twelve parasites in different developmental stages. The gregarine seems to be rare as among several hundred of these larvae examined only twelve yielded this interesting parasite.

All the stages of *Allantocystis dasyhelei* occur in the midgut of its host, in the space between the intestinal epithelium and the peritrophic tube, and they always lie with their main axis parallel to that of the larva.

The full-grown sporont is elongated, 65–75 μ long and 20–22 μ across its widest portion (Pl. X, fig. 3). The sporont moves slowly and its body easily bends on meeting an obstacle. The ectoplasmic layer is very thin except anteriorly. The endoplasm is very granular and completely masks the nucleus, which can be detected, however, by compressing or staining the parasite; the nucleus then shows a structure typical of gregarines, *i.e.* a large vesicle with a distinct karyosome. The youngest stages of the parasite observed were the sporonts, 25–35 μ in length, differing from the full-grown forms only in having their endoplasm less granular and in containing several patches of very small yellowish granules (Pl. X, figs. 1 and 2). In sexual association the gregarines attach themselves to one another by their anterior extremities.

[1] See D. Keilin, *Parasitology*, this volume, p. 85.

So far, the characters of this gregarine agree with all we know of the general structure of the group. The peculiar character of the species is confined to the structure of its cyst. It is well known that in gregarines two full-grown sporonts (or gametocytes), when associated for reproduction, contract their body and form a more or less spherical mass which is surrounded by a common cyst.

In the case of *Allantocystis dasyhelei*, on the contrary, the two sporonts associated for reproduction, without changing their form, secrete a very elongated sausage-like cyst[1], measuring 140–150 μ in length and only 20 μ in width (Pl. X, fig. 4).

Once the cyst is formed, the protoplasm slightly retracts, the septum which previously separated the two gametocytes disappears, and the interior of the cyst forms a fused mass consisting of dark granular protoplasm with irregular contours. The gametes and the sporoblasts seem to be formed by the ordinary process common to almost all gregarines. In a few cases I could follow *in vitro* the formation of the sporoblasts; a freshly formed cyst (similar to that represented in Pl. X, fig. 4) left in normal salt solution at 7.15 p.m. one day, was found at 10 o'clock the next morning with completely formed sporoblasts as represented in Pl. X, fig. 5.

The sporocysts (Pl. X, figs. 6 and 7) are spindle-shaped, with one side slightly more prominent than the other; they are 18 μ long and 6·5 μ wide.

It is important to note here that the only gregarine known, where sporonts do not contract their body before sporulation, is the very interesting form found by Léger (1892, pp. 159–160) in the coelom of the Polychaete worm *Glycera*, and described by him under the name *Ceratospora mirabiles* Léger. This gregarine, however, differs from *Allantocystis* and all other known gregarines in a very important character, namely, the associated sporonts remain always separated from each other by a septum, and the gametes of each sporont develop parthenogenetically into spores. It would be of great interest to study cytologically the development of these spores, but unfortunately, as Léger mentioned, this gregarine is rare. The peculiar shape of the cysts of *Allantocystis* makes it difficult to define the systematic position of this genus.

DENDRORHYNCHUS SYSTENI n.g., n.sp.

This gregarine was found in a larva of a Dolichopodid fly: *Systenus* sp., probably *Systenus scholtzii* Loew[2], which occurs with the larva of *Dasyhelea obscura* Winn. in the decomposed sap of the Elm tree; but, while the latter larva is saprophagous and feeds upon decomposed sap, the larvae of *Systenus*

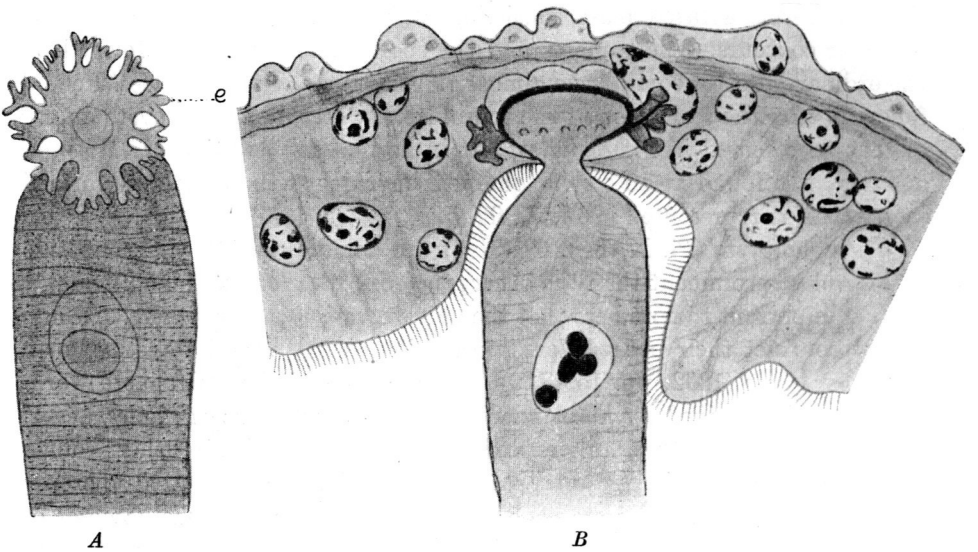
[1] Whence the generic name *Allantocystis*.

[2] The host was kindly identified by Mr C. G. Lamb as belonging to the genus *Systenus* being probably *S. scholtzii* Loew, but for the exact identification of the species it is important to examine the ♂♂, which unfortunately I failed to obtain. The ♀ of this species is difficult to distinguish from that of *S. adpropinquans* Loew whose larvae were found by Laboulbène (1873) in the sap of the Elm tree.

is carnivorous and lives upon *Dasyhelea* and several other dipterous larvae which are always found associated.

The gregarine, in different stages of its development, occurs only in the midgut of its host, where it can remain for a long time as a trophozoite, attaining, at this stage, the size of a full-grown sporont, *i.e.* being 255 μ long and 18·5–20 μ wide.

In all the stages the gregarine moves very slowly and easily bends and contracts its body (Pl. X, figs. 11 and 12), which looks often as if it were composed of numerous rings; these curved specimens can frequently be seen performing a continual rotating movement. The epimerite of the cephalont

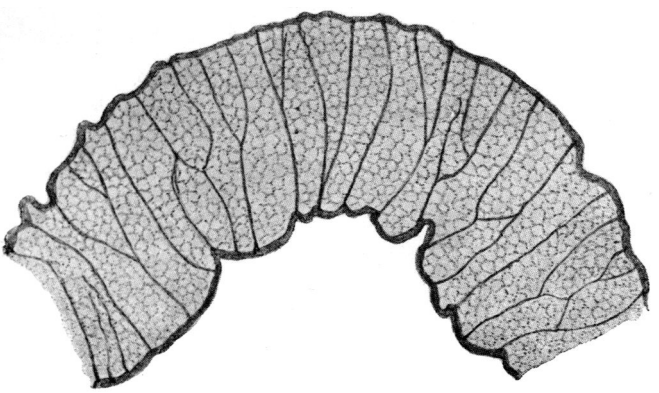


Text-fig. 1. *Dendrorhynchus systeni*: *A*, the anterior portion of a trophozoite showing the epimerite (*e*). *B*, section of a trophozoite with its epimerite fixed in the epithelium of the host's midgut.

(Text-fig. 1, *A* and *B*) has the form of a disc surrounded by numerous more or less ramified papillae.

At various stages, the cephalont, shedding off the epimerite, can separate itself from the host's epithelial cell and become a free moving sporont (Pl. X, figs. 8, 9 and 10). The body of the sporont is elongated with the posterior end slightly curved and of irregular contour; it does not seem to be divided into two segments, pro- and deutomerite, as is usual in cephaline gregarines. The ectoplasm is not very thick and shows well the longitudinally striated epicyte. The living, and especially the fixed and stained specimens, show, under the epicyte, a network of very well defined circular fibrils with oblique anastomoses which surround the whole body of the gregarine (Text-fig. 2). They undoubtedly correspond to the myocyte fibrils of *Gregarina munieri* described by Schneider (1875), although in this case the network is much

denser than that of *Dendrorhynchus*. In some specimens of *Dendrorhynchus* it was rather difficult to ascertain that the transverse fibrils were only superficial and did not penetrate deeper in the endoplasm and form a series of septae similar to those of *Taeniocystis mira* described by Léger (1906). The endoplasm is very granular, the granules being disposed in transverse parallel planes. The vesicular nucleus, with usually several karyosomes, is situated in the anterior portion of the gregarine. I have not yet been able to find the sexually associated forms, though several times I found the subspherical cysts, 60 to 80 μ in diameter, but unfortunately none of these cysts showed the spores. On the other hand in several young *Systenus* larvae, containing the trophozoites of *Dendrorhynchus*, I found the cysts of elongated shape, about 100 μ long, measuring 40 μ across their widest portion and having one side prominent and the other flattened (Pl. X, fig. 13). These cysts, which probably belong to the same gregarine, contained ripe spindle-shaped spores 18–19 μ long and 7 μ wide (Pl. X, figs. 14 and 15).



Text-fig. 2. *Dendrorhynchus systeni*: a portion of a trophozoite fixed and stained, showing myocyte fibrils.

The shape of the epimerite of this gregarine recalls that of *Rhopalonia stella* Léger and *Echinomera hispida* (Schneider) Labbé, and I am inclined to think that the genus *Dendrorhynchus* can be placed near the latter two genera in the family of DACTYLOPHORIDAE Léger (1892).

It is interesting to note that the *Systenus* larva, the host of *Dendrorhynchus*, often contains a Schizogregarine bearing much resemblance to *Schizocystis gregarinoides* Léger (1910), which, with *Taeniocystis mira* Léger (1906), live in the larvae of *Ceratopogon soltitialis*.

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EXPLANATION OF PLATE X.

All the figures were drawn from living specimens.

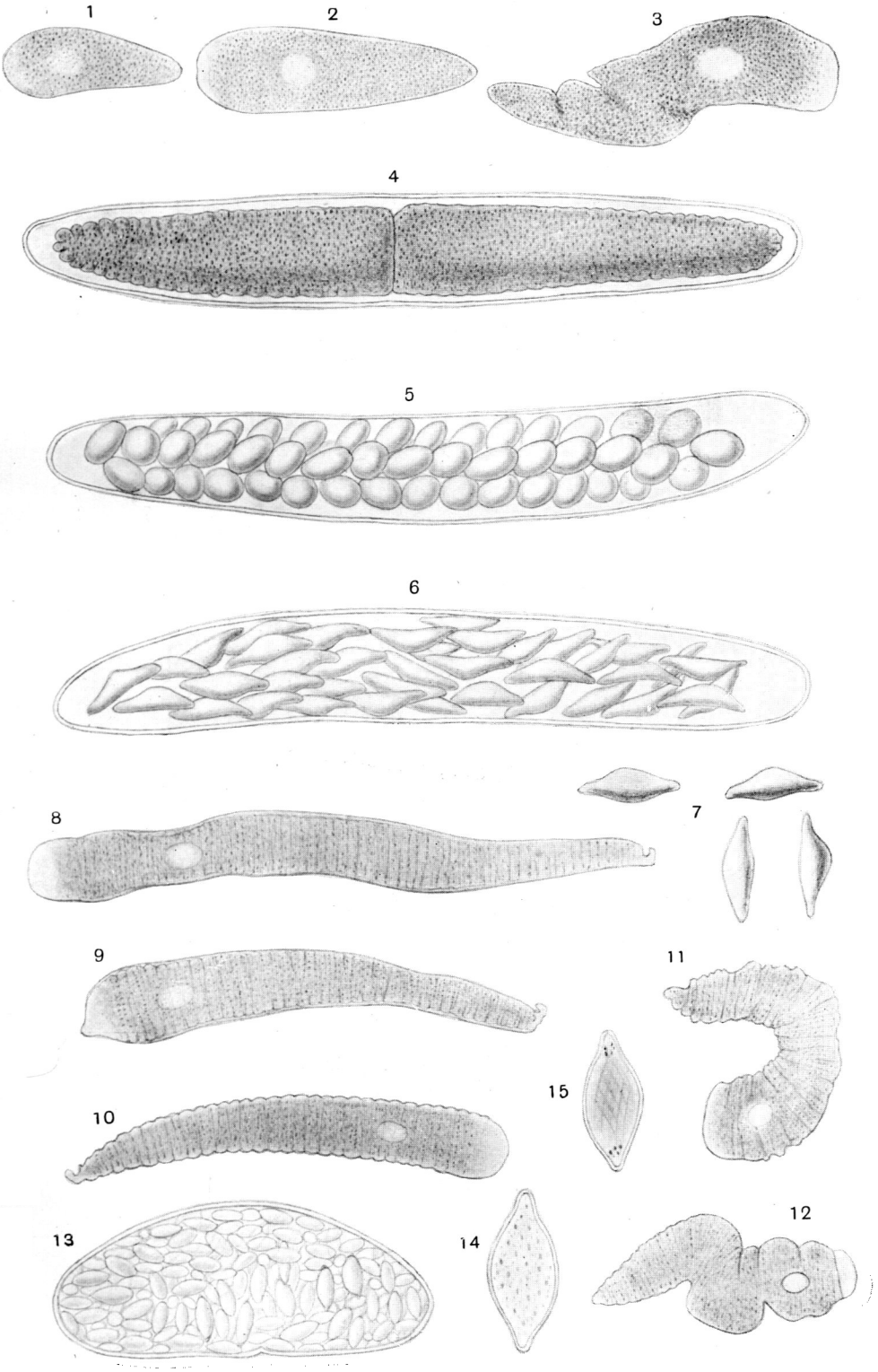
Allantocystis dasyhelei. ×800.

Figs. 1 and 2. Young sporonts.
Fig. 3. Full grown sporont.
Fig. 4. Cyst freshly secreted by a copula; the thickness of the cyst-wall is exaggerated.
Fig. 5. Cyst with formed sporoblasts.
Fig. 6. Cyst with spores.
Fig. 7. Spores seen from different sides.

Dendrorhynchus systeni. Figs. 8–12. × 490.

Figs. 8, 9 and 10. Different stages of sporonts.
Figs. 11 and 12. Contracted sporonts.

Fig. 13. Cyst with spores, probably belonging to *D. systeni.* ×490.
Figs. 14 and 15. Spores of the same cyst. ×1000.



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