

**TWO NEW SPECIES OF CEPHALINE GREGARINES FROM
ODONATA OF WEST BENGAL, INDIA (PROTOZOA, APICOMPLEXA,
EUGREGARINIDA: ACTINOCEPHALIDAE)**

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The trophozoite and sporadin stages of *Hoplorhynchus carusi* sp.n. and *Odonaticola brachydiplaxi* sp.n., recovered from the midguts of adult *Pseudagrion decorum* (Ramb.) (Zygoptera: Coenagrionidae) and *Brachydiplax farinosa* Kruger (Anisoptera: Libellulidae) resp. (Mahananda Reserve Forest, West Bengal), are described and illustrated. The holotypes are in the Rishi Bankim Chandra College collection, Naihati, India. The possible pathogenic effects of the two gregarines on dragonflies are briefly discussed, and the bibliography on the taxonomy of the cephaline gregarines so far recorded in Odonata is provided.

INTRODUCTION

Since DUFOUR's (1828) description of cephaline gregarines from insects, a number of species have been reported from odonates by SCHNEIDER (1875), LÉGER (1892), ELLIS (1914), HOS[H]IDE (1953, 1959), OBATA (1953), STEIN (1960) and SARKAR & CHAKRAVARTY (1969), under the genera *Acanthospora*, *Actinocephalus*, *Geniorhynchus*, *Hoplorhynchus*, *Menospora* and *Prismatospora*. In recent years a few more cephaline gregarines were recovered from dragonflies by HOSHIDE (1977), NAZEER AHAMED & NARASIMHAMURTI (1979), NARASIMHAMURTI & NAZEER AHAMED (1980), SARKAR & HALDAR (1980, 1981a, 1981b, 1981c, 1981d, 1981e, 1983) and SARKAR (1981a), referable to the genera *Ancyrophora*, *Dendrorhynchus*, *Mukundaella*, *Odonaticola*, *Ramicephalus* and *Tetractinospora*.

In this paper, two new species are described from the midguts of dragonflies collected in the Mahananda Reserve Forest, West Bengal, India. It is unfortunate

that only the trophozoite and sporadin stages were available. The holotypes are deposited in the Department of Zoology, Rishi Bankim Chandra Collège, Naihati, India.

MATERIAL AND METHODS

Dragonflies were collected from bushes and taken to the camp, where the alimentary canals were dissected in 0.5 % saline solution. Smears of the parasitized midgut-content were made on glass slides and fixed in Schaudin's and Bouin's fixatives. Subsequently, the slides were stored in 70 % alcohol, brought back to the laboratory and stained with iron-alum haematoxylin. Line drawings were made with the aid of a camera lucida.

Abbreviations used are: DE = diameter of epimerite, LE = length of epimerite, WE = width of epimerite, LNc = length of neck, LP = length of protomerite, WP = width of protomerite, LD = length of deutomerite, WD = width of deutomerite, DN = diameter of nucleus, LN = length of nucleus, WN = width of nucleus, and TL = total length. The ratios used are LP:TL and WP:WD.

DESCRIPTION OF THE NEW SPECIES

HOPLORHYNCHUS CARUSI SP.N.

Figures 1-4

Trophozoite — The early stages are small and almost fusiform (Fig. 1). The epimerite is a tuft of small pyriform papillae, placed on a short broad neck. The protomerite is almost rectangular in shape, while its deutomerite is cylindroconical, having an ovoidal nucleus at its centre. When fully grown (Fig. 2), the trophozoites are large, elongate bodies. The epimerite is transformed into a discoid form with 10 radially-arranged digitiform processes (slightly recurved) and is placed on the summit of a long narrow neck (Fig. 3). The protomerite is tomb-shaped, while the deutomerite is very long and cylindroconical with an ovoidal nucleus towards its anterior end. It has a distinct nuclear membrane and many small karyosomes in the nucleoplasm. On the average, the trophozoite is 778.3 x 64.0 μ m in dimensions.

Measurements (μ m):

TL	DE	LNc	LP	LD	LN	WP	WD	WN
805.0	40.0	80.0	80.0	630.0	50.0	60.0	60.0	40.0
800.0	35.0	65.0	80.0	640.0	48.0	58.0	65.0	39.0
730.0	38.0	50.0	55.0	610.0	43.0	55.0	67.0	35.0

Sporadin — These are very long and elongated bodies consisting of small dome-shaped protomerite and very long cylindroconical deutomerite, having an anteriorly-placed ovoidal nucleus with many small karyosomes in it (Fig. 4). The sporadin, on the average, is 480 x 74.3 μ m in dimensions.

Measurements (μm):

TL	LP	LD	LN	WP	WD	WN	LP: TL	WP: WD
500.0	50.0	450.0	35.0	56.0	69.0	28.0	1: 10.0	1: 1.2
650.0	55.0	595.0	45.0	80.0	92.0	40.0	1: 11.8	1: 1.1
290.0	40.0	250.0	28.0	55.0	62.0	20.0	1: 7.25	1: 1.1

Gametocyst and spore — not seen.

Remarks — Of the eight *Hoplorhynchus* CARUS, 1863 species reported from the odonates (SCHNEIDER, 1875; OBATA, 1953; HOSIDE, 1953; HOSHIDE, 1977; SARKAR & HALDAR, 1980), the present form closely resembles *H. hexacanthus* OBATA, 1953 in having a discoid, digitiform epimerite on a long slender neck. However it is distinct from *H. hexacanthus* by possessing an epimerite with 10 digitiform processes (6 in *H. hexacanthus*). Moreover, in addition to its other mensural differences, the diameter of its epimerite (av. 37.0 μm) is larger than that of *H. hexacanthus* (av. 20.0 μm). The gregarine is, therefore, considered to be a new species for which the name *Hoplorhynchus carusi* sp.n. is proposed after Professor J.V. Carus, who has instituted the genus.

Host: *Pseudagrion decorum* (Rambur)

Infection locus: Midgut.

Incidence: 2 infected, out of 7 specimens examined.

Locality: Mahananda Reserve Forest, West Bengal, India.

Material: Holotype on slide No. MH-5, deposited as stated above.

ODONATICOLA BRACHYDIPLAXI SP.N.

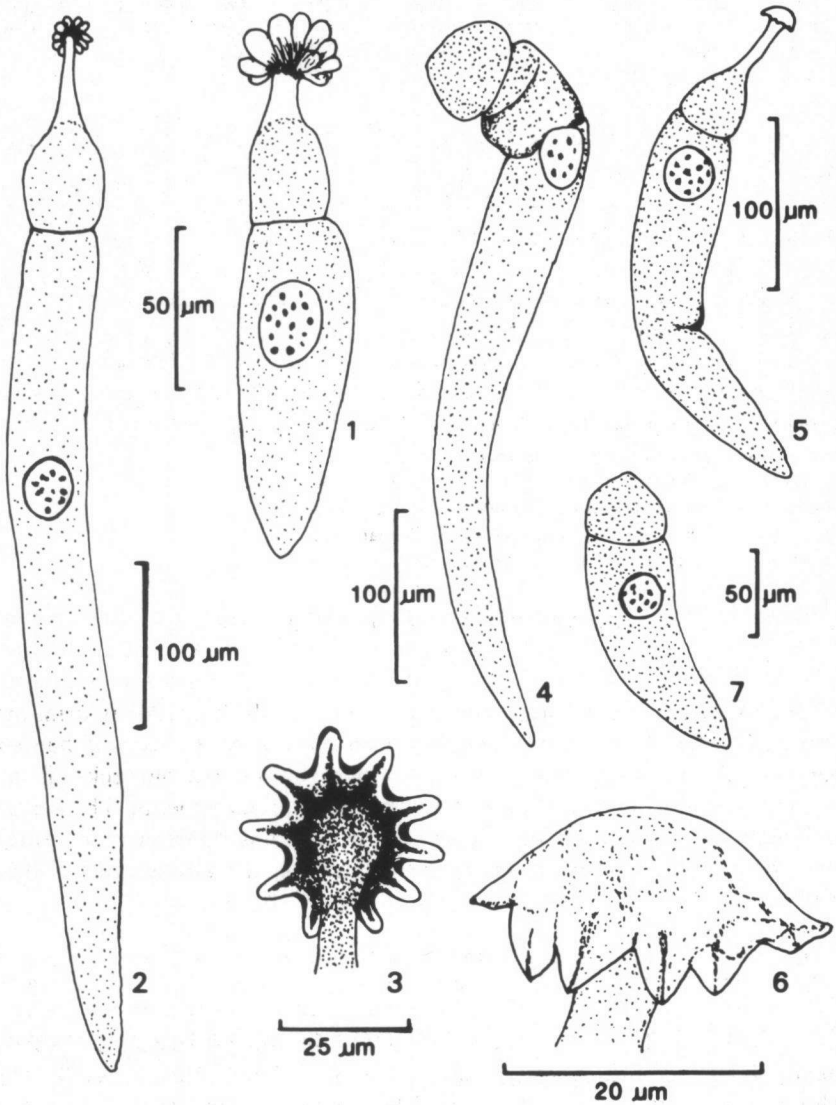
Figures 5-7

Trophozoite — The early stages were not seen. The fully grown forms are elongated bodies (Fig. 5), consisting of an umbrella-shaped epimerite with many marginal petaloid spines, placed on the summit of a long narrow neck (Fig. 6), an almost conical protomerite and a cylindroconical deutomerite. There is an ovoidal nucleus at the anterior part of the deutomerite with many small karyosomes in it. The dimension of the trophozoites, on the average, is 376.0 x 45.0 μm .

Measurements (μm):

TL	LE	LP	LD	LN	WE	WP	WD	WN	LNc
370.0	12.0	50.0	270.0	31.0	21.0	40.0	45.0	30.0	38.0
382.0	13.0	50.0	280.0	31.0	24.0	40.0	45.0	30.0	39.0

Sporadin — These forms, obtained from the midgut smears, are small, solitary bodies consisting of a small, dome-shaped protomerite and a long cylindroconical deutomerite (Fig. 7). The nucleus is spherical, with a few karyosomes and was always found in the anterior part of the deutomerite. On the average, the dimension of the sporadins is 237.5 x 60.0 μm .



Figs 1-7. Various stages of *Hoplorhynchus carusi* (Figs 1-4) and *Odonaticola brachydiplaxi* sp.n. (Figs 5-7): (1) Trophozoite, early stage; — (2,5) Trophozoite, fully grown; — (3,6) Enlarged epimerite of the fully grown trophozoite; — (7) Young sporadin. — (Figs 1-2, 4-5, 7: Schaudin-haematoxylin).

Measurements (μm):

TL	LP	LD	LN	WP	WD	WN	LP : TL	WP : WD
210.0	50.0	160.0	28.0	55.0	60.0	28.0	1 : 4.2	1 : 1.09
265.0	45.0	220.0	30.0	50.0	60.0	30.0	1 : 5.89	1 : 1.2

Gametocyst and spore — not seen.

Remarks — At present, six species of *Odonaticola* SARKAR & HALDAR 1981a are known (SARKAR & HALDAR, 1981a; SARKAR, 1981a). The present species differs from the other members of the genus by possessing a convex arch on the ex-umbrellar surface of its epimerite in place of the conical or hat-shaped ex-umbrellar surface found on the epimerite of all other species. Moreover, besides its various mensural peculiarities, the gregarine is described from the midgut of a new odonate, of a new locality. We, therefore, consider it a new species for which the name *Odonaticola brachydiplaxi* sp.n. is proposed after the name of its host.

Host: *Brachydiplax farinosa* Kruger.

Infection locus: Midgut.

Incidence: 2 infected, out of 9 specimens examined.

Locality: Mahananda Reserve Forest, West Bengal, India.

Material: Holotype on slide No. MO-3, deposited ad stated above.

PATHOGENICITY

The pathogenic effects of these two gregarines on their respective hosts could not be studied because of the non-availability of sufficient material during the survey work. The infected dragonflies did not bear any abnormal mark on the body surface. However, from the previous report (SARKAR, 1981b), it might be suggested that the complex epimerite of these gregarines may destroy the region of the midgut epithelium at which it is anchored. The heavy infection, leading to the complete blockage of the dragonfly midgut lumen, may disturb the process of digestion of the host. In this view, we hope that in near future some progress could be made on the qualitative and quantitative study of the damages inflicted by the gregarines on their odonate hosts.

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