

Trichodina haldari n. sp. and *Paratrichodina bassonae* n. sp. (Ciliophora: Peritrichida) from Indian Fresh Water Fishes

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Summary. One new species of the genus *Trichodina* Ehrenberg, 1838 was obtained from the Churni River system of Nadia district and one new species of the genus *Paratrichodina* Lom, 1963 was obtained from the Ichamati river system of North 24 Parganas. These are *T. haldari* n. sp. from *Glossogobius giuris* (Hamilton-Buchanan) and *P. bassonae* n. sp. from *Mystus cavasius* (Hamilton-Buchanan). *T. haldari* n. sp. is characterized by large and dark central area, broad blade, robust central part, well developed and straight rays without any ray apophysis. *P. bassonae* n. sp. is unique in its class in having granular central area, crooked blades and delicate rays. This paper deals with taxonomic descriptions of the two new species based on Klein's dry silver nitrate technique along with prevalence and morphometric comparisons with closely related species.

Key words: Ciliophora, fish parasite, India, *Paratrichodina bassonae* n. sp., *Trichodina haldari* n. sp., Trichodinidae.

INTRODUCTION

Trichodinid ciliophorans parasitize or are symbionts of aquatic invertebrate and vertebrate hosts (Van As and Basson 1989). Work on this particular group in India gained momentum since 1980 although Annandale (1912) was the first who reported the occurrence of *Trichodina pediculus* Ehrenberg, 1838 from the lymnocnidid medusa, *Lymnocnida indica* in Bombay Presidency of British India. In India, the main focus has always been on describing new species, and as a result

twelve new species belonging to the genus *Trichodina* Ehrenberg, 1838 and *Paratrichodina* Lom, 1963 have been described so far (Asmat and Haldar 1998; Asmat 2000, 2001a, b, c; 2002a, b; Mitra and Haldar 2004, 2005). As part of an attempt to explore the biodiversity of trichodinid ciliophorans in West Bengal, an ichthyoparasitological survey was conducted in the river Churni and Ichamati and two new species of trichodinid ciliophorans belonging to the genus *Trichodina* and *Paratrichodina* were obtained. These are *T. haldari* n. sp. obtained from the gills of *Glossogobius giuris* (Hamilton-Buchanan) and *P. bassonae* n. sp. found to be associated with the gills of *Mystus cavasius* (Hamilton-Buchanan). The present paper deals with descriptions of these two new species based on Klein's dry silver nitrate

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impregnation technique along with taxonomy, prevalence and comparisons with closely related species.

MATERIALS AND METHODS

Churni is one of the many tributaries of the river Ganges and flows through the district of Nadia in West Bengal (23°E, 88.5°W). It is a small and docile river and provides a complete fresh water environment. River Ichamati flows through the district of North 24 Parganas (22.1°N, 89.5°E) and also provides a freshwater habitat to the host fishes. Samplings were carried out to collect host fishes from both the rivers and adjacent water bodies. Live fishes were brought to the laboratory and gill and skin smears were made on grease free slides. Slides containing trichodinid ciliophorans were impregnated using Klein's dry silver impregnation technique (Klein 1958). Examinations of preparations were made under an Olympus phase contrast microscope at $\times 100$ magnifications with an oil immersion lens and photographs were taken with an Olympus camera. All measurements are in micrometers (μm) and follow the uniform specific characteristics as proposed by Lom (1958), Wellborn (1967) and Arthur and Lom (1984). In each case minimum and maximum values are given, followed in parentheses by the arithmetic mean and standard deviation. In the case of denticles and radial pins, the mode is given instead of the arithmetic mean. The span of the denticle is measured from the tip of the blade to the tip of the ray. Body diameter is measured as the adhesive disc plus border membrane. The description of denticle elements follows the guidelines of Van As and Basson (1989). The sequence and method of the description of denticle elements follows the recommendations of Van As and Basson (1992).

RESULTS AND DISCUSSION

Trichodina haldari n. sp. (Figs 1-4, 9; Table 1)

Medium sized trichodinid. Denticle consisting of broad blade. Distal surface of blade rounded. Tangent point flat, like small line rather than point and situated lower than distal surface. Anterior surface sloping down backward to form distinct apex, never reaches or extends beyond $y+1$ axis. Blade apophysis not visible. Anterior and posterior surfaces of blade almost parallel. Deepest point of curve formed by posterior margin of blade remains at same level as apex. Blade connection thick. Central part robust, elongated, tapering to a rounded end, fitting tightly into preceding denticle and extends almost halfway to $y-1$ axis. Sections of central part above and below x axis similar. Indentation in lower half of central part not visible. Ray well developed. Ray apophysis absent. Width of ray almost same along entire length, that tapers to rounded end. Rays directed towards geometric centre of adhesive disc. Macronucleus horse-

shoe shaped but micronucleus could not be detected. Adoral ciliary spiral makes a turn of 390-400°.

Taxonomic summary

Type host: *Glossogobius giuris* (Hamilton-Buchanan)

Fish family: Gobiidae

Type locality: Ranaghat, W. Bengal, India

Location: Gills

Prevalence: 05/17 (29.4 %)

Etymology: The specific epithet "*haldari*" is given after the name of Prof. Durga P. Haldar, Retired Professor of Department of Zoology, University of Kalyani, Kalyani 741235, West Bengal, India for his outstanding contribution in the taxonomy and systematics of trichodinid ciliophorans.

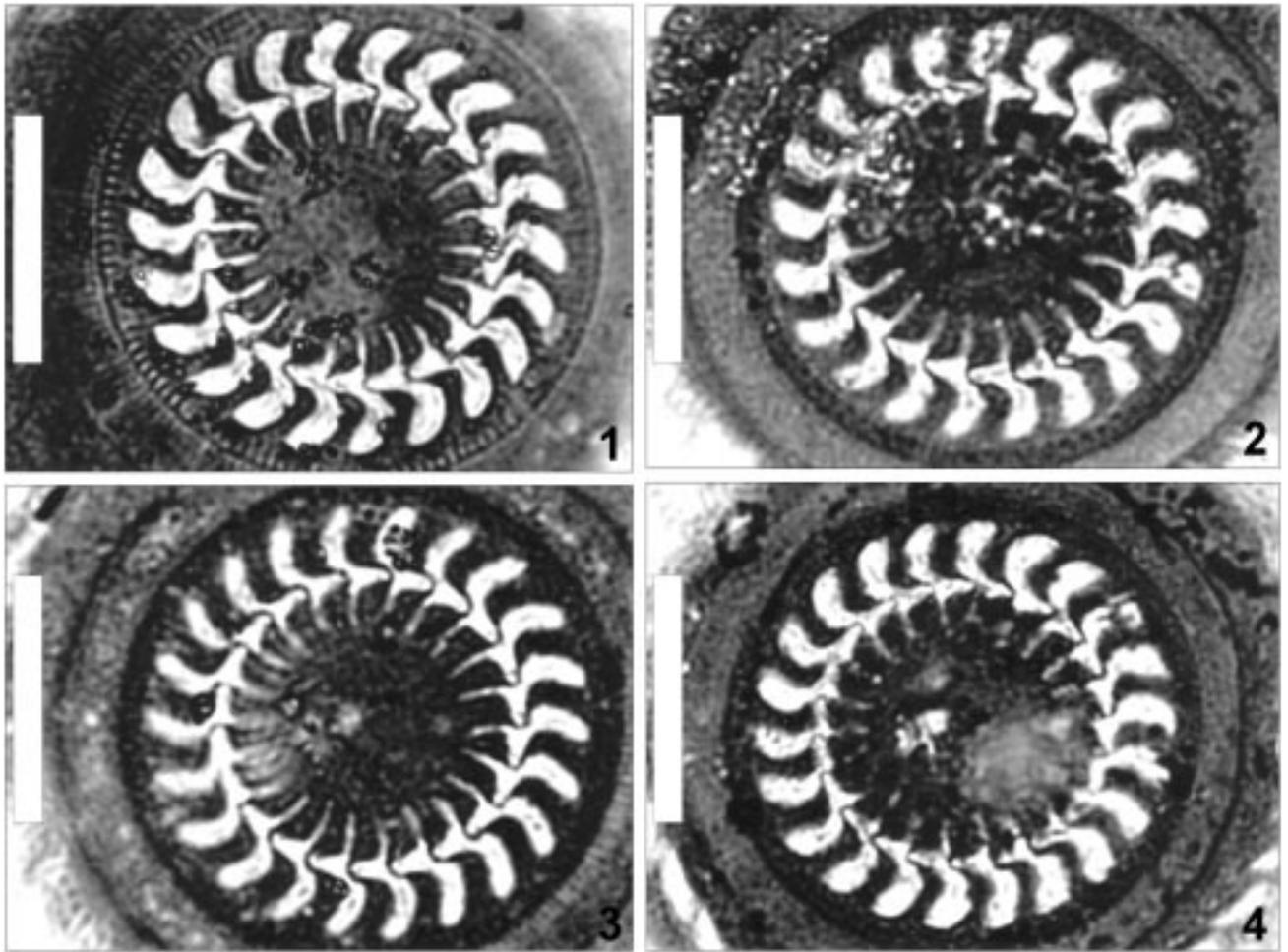
Reference material: Holotype, slide GG-1/2004, and paratype slides GG-2/2004, GG-4/2004, GG- 5/2004 are deposited in the Museum of the Department of Zoology, University of Kalyani, Kalyani 741235, West Bengal, India

Remarks

The present trichodinid species resembles a freshwater *Trichodina*, *T. porocephalusi* Asmat, 2001. Asmat (2001c) reported *T. porocephalusi* from an Indian flathead sleeper, *Ophiocara porocephalus* (Valenciennes) (Eleotrididae). The new species mainly differs from the *T. porocephalusi* in not having a clear central area. The shape of the denticle is also different in the two species. In *T. porocephalusi* a notch is present just below the apical cone in the anterior margin. Any type of notch is absent in the anterior margin of the blade of *T. haldari*. The central part of the denticle of *T. porocephalusi* is sharply triangular, which is almost conical in case of the new species. A ray apophysis is present in *T. porocephalusi*, which is completely absent in the new species. The ray of *T. porocephalusi* is stumpy, and slightly bent backward, while the ray of the new species is straight and the width is the same along the entire length. The rays of *T. porocephalusi* is directed slightly posteriorly, but the rays are directed towards the geometric centre of the adhesive disc in *T. haldari*.

Paratrachodina bassonae n. sp. (Figs 5-8, 10; Table 2)

Small sized trichodinid. Central area granular, consisting of several small whitish spots, slightly elevated off from rest of central area. The denticulate ring consists



Figs 1-4. Photomicrographs of silver nitrate impregnated adhesive discs of *Trichodina haldari* n. sp. obtained from the gills of *Glossogobius giuris* (Hamilton-Buchanan). Scale bars: 20 μ m.

of loosely arranged denticles. Blade broad, crooked. Distal margin of blade rounded, remains in close proximity and almost parallel to border membrane. Tangent point like a point, situated almost at same level or slightly lower than distal point of distal surface. Anterior margin slopes down gradually to form conspicuous apex, which in most cases extends beyond y+1 axis. Deepest point of curve formed by posterior margin of blade is lower than the apex. Blade connection thick. Central part delicate, triangular, tip of which bluntly rounded, fits loosely into preceding denticle. Sections above and below x axis similar in shape. Ray apophysis absent. Ray connection broad. Rays short after tapering rapidly to bluntly rounded end. Rays directed slightly towards y-1 axis. Macro-

nucleus horseshoe-shaped. Micronucleus could not be detected. Adoral ciliary spiral makes a turn of about 230°.

Taxonomic summary

Type host: *Mystus cavasius* (Hamilton-Buchanan)

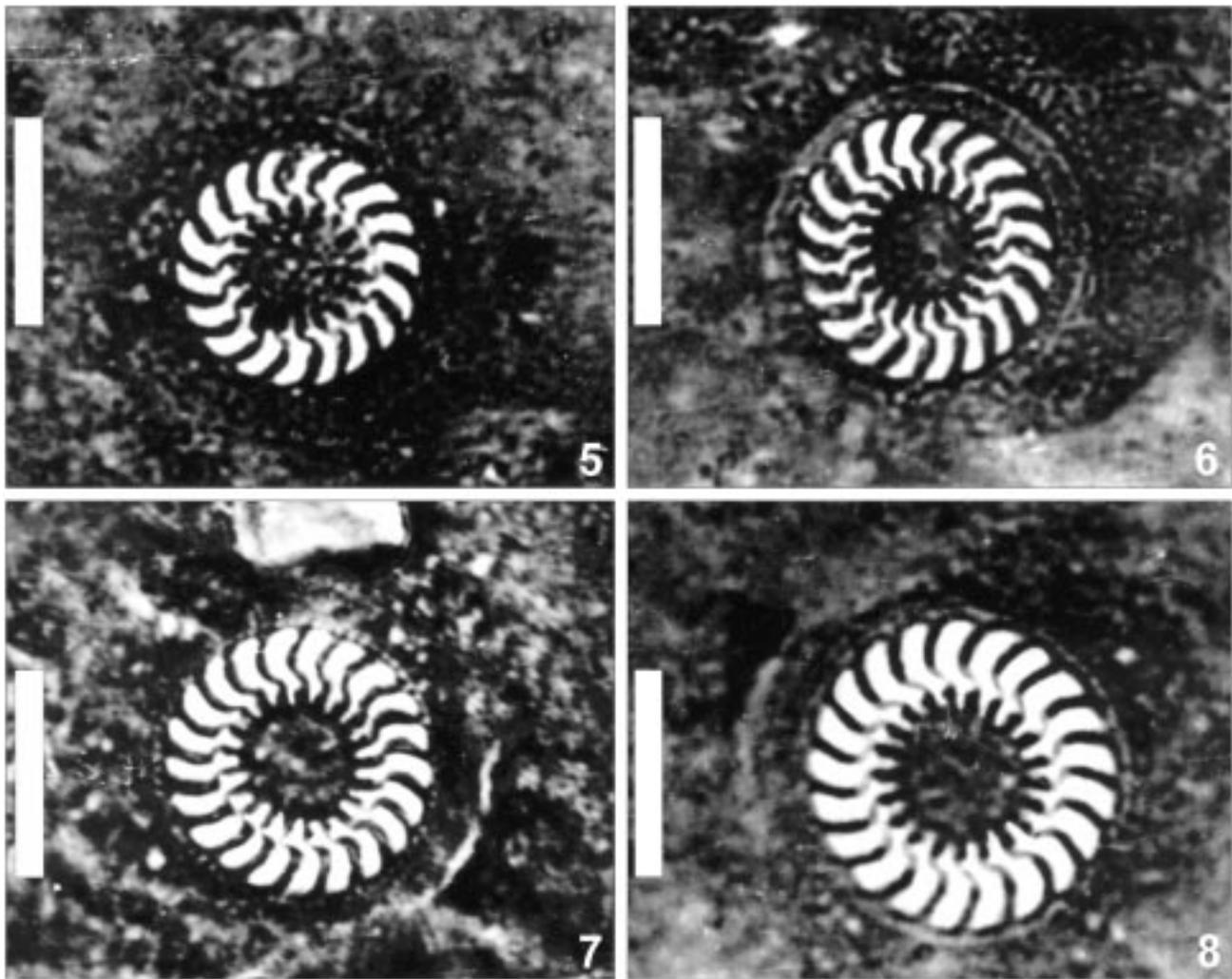
Fish family: Bagridae

Type locality: North 24 Parganas (22.1°N, 89.5°E), W. Bengal, India

Location: Gills

Prevalence: 14/26 (53.8 %)

Etymology: The specific epithet "*bassonae*" is given after the name of Prof. Linda Basson, Department of Zoology and Entomology, University of Free State, South



Figs 5-8. Photomicrographs of silver nitrate impregnated adhesive discs of *Paratrichodina bassonae* n. sp. obtained from the gills of *Mystus cavasius* (Hamilton-Buchanan). Scale bars: 10 μ m.

Africa in recognition for her outstanding contribution in the field of taxonomy and systematics of trichodinid ciliophorans.

Reference material: Holotype, slide MC-6/2003, and paratype slide MC-2/2003, MC-5/2003, MC-8/2003 are deposited in the Museum of the Department of Zoology, University of Kalyani, Kalyani 741235, West Bengal, India.

Remarks

The *Paratrichodina* species, obtained in the present study from the gills of *Mystus cavasius* (Hamilton-Buchanan) in the river Ichamati only resembles a fresh-

water species, *P. corlissi* Lom *et* Haldar, 1977 when denticle morphology is taken into consideration. The new species under discussion resembles *P. corlissi* (Lom and Haldar 1977) in not having a distinct blade apophysis, otherwise the shape of the denticles and morphometric data are different. The central area of the adhesive disc of *P. corlissi* does not have any granules, but the central area of the new *Paratrichodina* species consists of several small, whitish granules scattered throughout the area. In *P. corlissi* the blade becomes slightly wider towards the distal margin. But in the new species, the width is almost the same along the entire length and somewhat crooked. In *P. corlissi* the tangent point is like

Table 1. Morphometric comparison of *Trichodina haldari* n. sp. with *T. porocephalusi* Asmat, 2001. Measurements in μm .

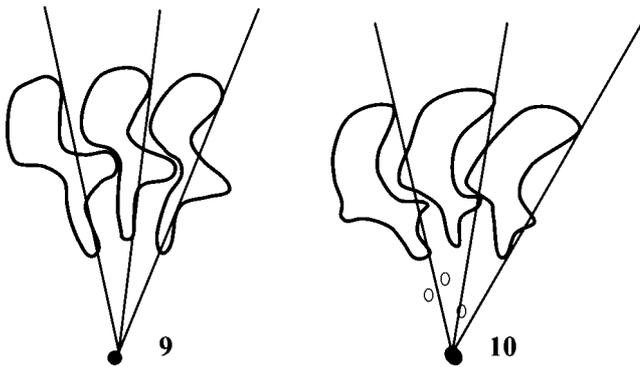
Species	<i>T. haldari</i> n. sp. (n = 17)	<i>T. porocephalusi</i> (n = 20)
Host fish	<i>Glossogobius giuris</i>	<i>Ophiocara porocephalus</i>
Locality	India	India
Location	gills	gills
Reference	present study	Asmat (2001c)
Diameter of		
body	40.0-55.0 (51.2 \pm 5.3)	32.5-50.5 (42.3 \pm 5.2)
adhesive disc	34.5-45.0 (40.1 \pm 1.9)	27.0-42.3 (35.2 \pm 35.2-4.8)
Dimension of body		
denticulate ring	18.0-24.3 (20.2 \pm 1.7)	16.3-26.0 (20.9 \pm 2.8)
central area	6.9-18.9 (15.4 \pm 1.3)	7.1-17.4 (12.4 \pm 2.6)
clear area	-	6.1-15.3 (10.4 \pm 2.5)
Width of border membrane	2.6-3.5 (2.8 \pm 0.5)	2.0-4.8 (3.5 \pm 0.7)
Number of		
denticles	20-22 (21)	20-27 (24.3 \pm 1.5)
radial pins/denticle	5-7 (6)	6-9 (7.4 \pm 1.0)
Dimension of denticle		
span	8.8-11.0 (8.9 \pm 0.7)	8.2-10.7 (9.7 \pm 0.7)
length	5.1-6.2 (5.6 \pm 0.7)	2.5-5.6 (4.7 \pm 0.8)
Dimension of denticle components		
length of ray	2.8-3.2 (2.9 \pm 0.6)	2.5-4.1 (3.0 \pm 0.5)
length of blade	3.5-4.5 (4.1 \pm 0.4)	3.1-5.1 (4.2 \pm 0.6)
width of central part	1.5-2.2 (1.9 \pm 0.3)	1.5-3.1 (2.5 \pm 0.6)
Adoral ciliary spiral	390-400°	380-390°

n = number of specimens measured

Table 2. Morphometric comparison of *Paratrachodina bassonae* n. sp. with *P. corlissi* Lom et Haldar, 1977. Measurements in μm .

Species	<i>P. bassonae</i> n. sp. (n = 30)	<i>P. corlissi</i>
Host fish	<i>Mystus cavasius</i>	<i>Gobio kessleri</i>
Locality	India	Bulgaria
Location	gills	gills
Reference	present study	Lom and Haldar (1977)
Diameter of		
body	14.8-19.3 (17.1 \pm 1.2)	33 (27-39)
adhesive disc	11.2-14.8 (13.4 \pm 3.2)	22 (19-25)
Dimension of body		
denticulate ring	12.2-24.5 (19.0 \pm 4.6)	12 (10-15)
central area	3.6-7.5 (5.4 \pm 1.3)	-
Width of border membrane	1.8-2.5 (2.2 \pm 0.6)	1.8-2.2
Number of		
denticles	18-21 (20)	21 (18-24)
radial pins/denticle	3-5 (4.0 \pm 0.5)	6 (5)
Dimension of denticle		
span	3.3-6.6 (5.4 \pm 0.8)	-
length	1.9-2.3 (2.0 \pm 0.1)	-
Dimension of denticle components		
length of ray	1.1-1.9 (1.8 \pm 0.3)	2.2-3.3
length of blade	1.7-3.5 (2.7 \pm 1.1)	3.3-3.8
width of central part	0.5-1.2 (0.9 \pm 1.7)	1-2
Adoral ciliary spiral	170-230°	180-240°

n = number of specimens measured



Figs 9, 10. Diagrammatic drawings of the denticles of trichodinid ciliophorans. **9** - *Trichodina haldari* n. sp. obtained from the gills of *Glossogobius giuris* (Hamilton-Buchanan); **10** - *Paratrichodina bassonae* n. sp. obtained from the gills of *Mystus cavasius* (Hamilton-Buchanan).

a small straight line, which is almost a point rather than a line in case of the new species. The rays are also different in both the species. In *P. corlissi* the width of the rays are almost the same along the entire length. But in case of the new species described from *Mystus cavasius* (Hamilton-Buchanan) the rays rapidly taper to rounded ends. Morphometric data of the new species also varies when it is compared with that of *P. corlissi*. *P. bassonae* is comparatively a small sized ciliophoran (Table 2).

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