

First Record of *Trichodinella epizootica* (Raabe, 1950) Šramek-Hušek, 1953, with Description of *Trichodina notopteridae* sp. n. (Ciliophora: Peritrichida) from Freshwater Fishes of India

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Summary. Very few studies of ectoparasitic trichodinid ciliophorans occurring on edible fish in India have been done. During surveys of the trichodinid parasites in the Churni River, India, one each species of the genus *Trichodina* and *Trichodinella* from the gills of freshwater fishes were investigated and morphologically studied. Of these, one is *Trichodinella epizootica* (Raabe, 1950) Šramek-Hušek, 1953 found for the first time in India from the gills of a minor carp *Puntius gelius* (Hamilton-Buchanan) and the other is described as new: *Trichodina notopteridae* sp.n. from the gills of *Notopterus notopterus* (Pallas). Taxonomic descriptions of these trichodinids based on the wet silver nitrate impregnated specimens are presented. For the new species comparisons with closely related species are provided.

Key words: Ciliophora, freshwater fish, India, taxonomy, *Trichodina notopteridae* sp. n., *Trichodinella epizootica*.

INTRODUCTION

In India, studies on the trichodinid ciliophorans, although not very comprehensive, is getting momentum in many sectors. As a result, 10 species of trichodinid ciliophorans representing the genera *Trichodina* Ehrenberg, 1838; *Paratrachodina* Lom, 1963 and

Tripartiella Lom, 1959 were identified from different freshwater and estuarine Indian fishes (Hagargi and Amoji 1979; Mukherjee and Haldar 1982; Das and Haldar 1987; Das *et al.* 1987; Mishra and Das 1993; Saha *et al.* 1995a, b; Saha and Haldar 1996, 1997; Asmat and Haldar 1998; Basu and Haldar 1998; Mitra and Haldar 2003). Surveys of the trichodinid ciliophorans in the edible fishes of the Churni River, revealed the occurrence of *Trichodinella epizootica* (Raabe, 1950) Šramek-Hušek, 1953 from the gills of a minor carp *Puntius gelius* (Hamilton-Buchanan) and a new species from the gills of *Notopterus notopterus* (Pallas). In this paper taxonomic descriptions of both the species are

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provided with *T. epizootica* recorded for the first time from India.

MATERIALS AND METHODS

Fishermen were employed to collect host fishes from the Churni River and adjoining beels and kharis, situated in the district of Nadia (Latitude 23°N and Longitude 88.5°E), West Bengal, India. Host fishes were brought to the laboratory alive condition 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 objective $\times 100$ with an oil immersion lens and photographs were taken with an Olympus camera. All measurements are in micrometers and follow the uniform specific characteristics proposed by Lom (1958), Wellborn (1967) and Arthur and Lom (1984). In each case minimum and maximum values are given, followed in parentheses by 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 proposed by Van As and Basson (1989). Sequence and method of the description of denticle elements follows the recommendations of Van As and Basson (1992).

RESULTS AND DISCUSSION

Two species of trichodinids were identified from collected fish. These are *Trichodinella epizootica* (Raabe, 1950) Šramek-Hušek, 1953 and *Trichodina notoapteridae* sp. n. Descriptions of these is provided below.

Trichodinella epizootica (Raabe, 1950) Šramek-Hušek, 1953 (Figs 1, 2, 7; Table 1)

Body of ciliophoran small and has shape of a vaulted disc. Adhesive disc concave. Border membrane narrow, but distinct with fine striations. Blade elongated with almost parallel margins and tapering to region of anterior projection. Distal margin closely adjoining border membrane truncated or slightly curved with blunt tangent point which forms small line with y-1- axis, situated lower than distal margin (Fig. 7). Anterior margin runs at slight angle to y-axes. Anterior projection slender, but prominent and fits well into notch between central part and blade of preceding denticle, directed obliquely in a distal direction in some specimens. Posterior projection not well developed. Central part rounded and pronounced touches and extends slightly beyond y axes.

(Fig. 7). Ray forms a short delicate hook curved along central part, not easy to distinguish in live specimens and rather difficult to impregnate. Macronucleus horseshoe shaped, but micronucleus could not be detected. Adoral ciliary spiral takes a turn of 180°.

Taxonomic summary

Host: *Puntius gelius* (Hamilton-Buchanan)

Locality: River Churni, West Bengal, India (Lat. 23°N and Lon. 88.5°E)

Location: Gills

Reference material: PG/3/11-2001 in the collection of authors.

Remarks: Raabe (1950) was the first to describe *Trichodinella epizootica* from the gills of various host fishes by using Klein's silver impregnation technique. During the present investigation, a moderate infestation of trichodinid in minor carp, *Puntius gelius* (Hamilton-Buchanan) was observed. This ciliophoran was identified as belonging to the genus *Trichodinella* based on Lom (1963) specifically as *T. epizootica*. *T. epizootica* obtained in the present study is morphometrically compared with those of other authors in Table 1.

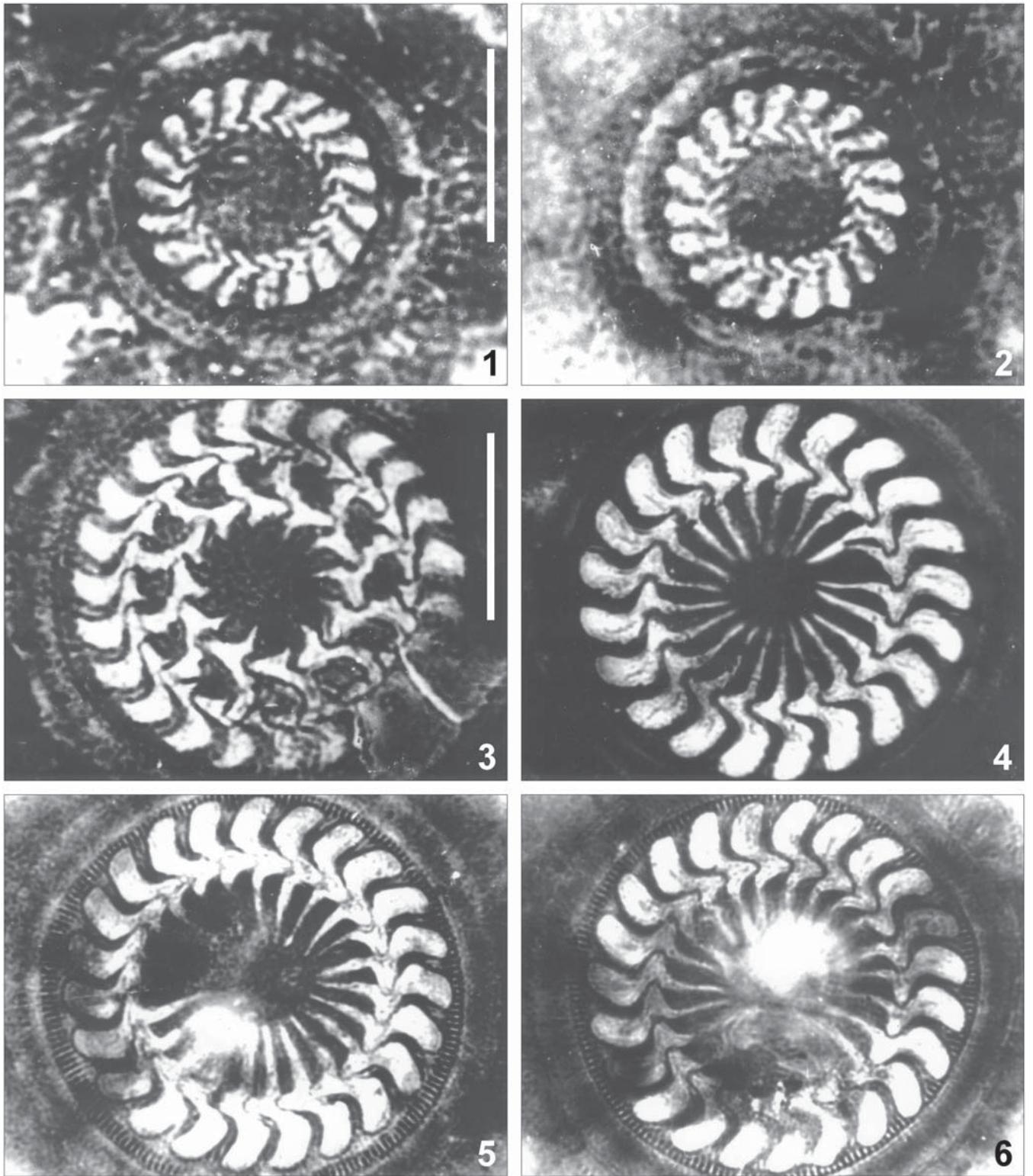
Trichodina notoapteridae sp. n. (Figs 3-6, 8A; Table 2)

Falls in range of medium sized ciliophorans. Body disc shaped. Concave adhesive disc surrounded by relatively broad border membrane. Blade almost rectangular in shape in majority of specimens. Distal margin of blade flat, runs parallel to border membrane, situated at higher level than tangent point. Tangent point rounded. Blade broad, fills most of spaces between y-axes (Fig. 8A). Anterior margin of blade almost touches y+1 axis (Fig. 8A). Apex prominent. Blade apophysis distinct. Posterior margin of blade runs parallel to anterior margin and forms a shallow semilunar curve, at same level of apex. Moderately sized, triangular central part ends in blunt rounded tip and extends up to halfway to y-1 axis (Fig. 8A), fitting tightly into preceding denticle. Sections of central part above and below x-axis similar. Ray connection delicate with ray apophysis situated high and directed distally. Ray of equal thickness along its length, ending in rounded tip. Direction of rays towards y+1 axis.

Taxonomic summary

Type host: *Notopterus notopterus* (Pallas)

Locality: Churni River, West Bengal, India (Lat. 23°N and Lon. 88.5°E)



Figs 1-6. Photomicrographs of silver nitrate impregnated adhesive discs of trichodinid ciliophorans. **1, 2** - *Trichodinella epizootica* (Raabe, 1950) Šramek-Hušek, 1953 from gills of *Puntius gelius*. **3-6** - *Trichodina notopteridae* sp. n. from gills of *Notopterus notopterus* (Pallas). Scale bars 10 μ m (1, 2); 20 μ m (3-6).

Table 1. Morphometric comparison of *Trichodinella epizootica* (Raabe, 1950) Šramek-Hušek, 1953 obtained in the present study with those of other authors.

Species	<i>T. epizootica</i>	<i>T. epizootica</i>	<i>T. epizootica</i>	<i>T. epizootica</i>
Host	<i>Puntius gelius</i>	<i>P. fluviatilis</i>	<i>Cyprins carpio</i>	<i>Cyprins carpio</i>
Locality	Ranaghat, India	Czechoslovakia	South Africa	Philippines
Location	Gills	Gills	Gills	Gills
References	present study	Lom and Haldar (1977)	Basson <i>et al.</i> (1983)	Albaladejo and Arthur (1989)
Diameter of body	17.3-23.4 (19.4 ± 2.0, 20)	23-50	18.2-26.5 (22.2 ± 2.2)	19.0-26.0 (22.5 ± 1.8)
adhesive disc	13.3-19.4 (15.8 ± 1.9, 20)	30	14.4-22.5 (18.4 ± 2.0)	15.0-21.9 (18.5 ± 1.6)
Dimension of body denticulate ring	6.1-9.2 (7.6 ± 0.9, 20)	27	7.4-13.2 (10.3 ± 1.4)	9.0-12.5 (11.2 ± 1.1)
central area	-	-	-	-
Width of the border membrane	1.3-2.2 (1.8 ± 0.3, 20)	1.4-3.3	1.5-2.3 (2.1 ± 0.2)	-
Number of denticles	17-24 (19, 20)	16-28	20-25 (23)	19-24 (21.2 ± 1.0)
radial pins/denticle	3.0-6.0 (4, 20)	4-6	5-6 (5)	5-6
Dimension of denticle span	3.0-5.1 (4.1 ± 0.5, 20)	-	-	4.0-6.0 (5.1 ± 0.6)
length	1.5-2.5 (2.1 ± 0.3, 20)	-	1.8-2.9 (2.3 ± 0.3)	1.6-2.7 (2.2 ± 0.3)
Dimension of denticle components				
length of the ray	-	-	-	-
length of the blade	2.1-4.1 (3.3 ± 0.5, 20)	2.2-3.6	1.7-3.8 (2.7 ± 0.4)	2.5-4.0 (3.2 ± 0.4)
width of the central part	0.5-1.0 (0.9 ± 0.2, 20)	0.6-2.2	0.7-1.2 (1.0 ± 0.2)	1.1-2.8 (2.0 ± 0.5)
Adoral ciliary spiral	180-190°	180°	180°	-

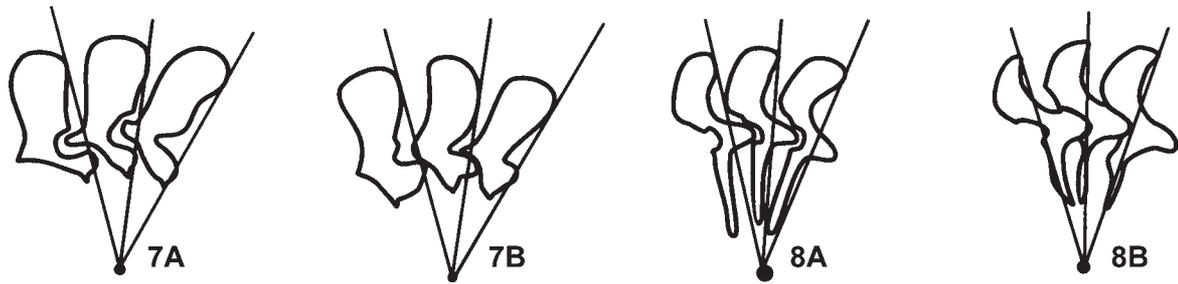
Type specimen: *Trichodina notopteridae* sp. n.

Reference material: Holotype, slide NNX-1, and paratype, slide NNX-12 in the collection of the Protozoology Laboratory, Department of Zoology, University of Kalyani, Kalyani 741235, West Bengal, India and slide NNX-2 bearing some paratype materials in the collection of Harold W. Manter Laboratory of Parasitology, Lincoln, Nebraska USA (HWML 16744).

Remarks: The present trichodinid species, in having a rectangular blade, a slightly curved distal margin, a moderately sized and triangular central part; a straight and strong ray of even thickness with rounded tip, differs

significantly from other known trichodinid species and only shows some resemblance with *Trichodina luciopercae* Lom, 1970.

Trichodina luciopercae was described by Lom (1970) from gills of *Stizostedion lucioperca* in Tisza River near Kotelek at Szolovok, Hungary. The distal surface of the blade is flat in the case of *Trichodina notopteridae* and runs parallel with the border membrane (Fig. 8A), but truncated (Fig. 8B) in *T. luciopercae*. Trichodinid ciliophorans obtained from *Notopterus notopterus* have robust blades with the anterior and posterior margins running parallel (Fig. 8A). But in case



Figs 7A, B. Diagrammatic drawings of the denticles of two specimens of *Trichodinella epizootica* (Raabe, 1950) Šramek-Hušek, 1953 obtained from the gills of *Puntius gelius* (Hamilton-Buchanan).

Figs 8A, B. Diagrammatic drawings of the denticles of two *Trichodina* Ehrenberg, 1838 species. **A** - *Trichodina notopteridae* sp. n. obtained from the gills of *Notopterus notopterus* (Pallas); **B** - *Trichodina luciopercae* Lom, 1970; redrawn from Lom (1970).

Table 2. Morphometric comparison of *Trichodina notopteridae* sp. n. with *Trichodina luciopercae* Lom, 1970.

Species	<i>Trichodina notopteridae</i> sp. n.	<i>T. luciopercae</i>
Host	<i>Notopterus notopterus</i>	<i>Stizostedion lucioperca</i>
Locality	Churni River, West Bengal, India	Tisza River, Hungary
Location	gills	gills
References	present study	Lom (1970)
Diameter of		
body	43.0-55.7 (50.7 ± 3.2, 20)	41-55 (45-52)
adhesive disc	35.7-45.9 (41.9 ± 3.1, 20)	33-44 (37-40)
Dimension of body		
denticulate ring	20.9-29.6 (25.0 ± 2.3, 20)	19-26 (21-33)
central area	4.1-9.2 (6.5 ± 1.7, 20)	-
clear area	-	-
Width of the border membrane	3.6-5.1 (4.4 ± 0.5, 20)	3.5-5.0
Number of denticles	21-24 (22, 20)	20-23 (20)
radial pins/denticle	7-10 (9, 20)	7-9
Dimension of denticle		
span	11.5-17.2 (14.6 ± 1.6, 20)	-
length	5.3-8.1 (6.8 ± 0.7, 20)	8-9
Dimension of denticle components		
length of the ray	4.1-8.1 (6.5 ± 1.1, 20)	5-5.5
length of the blade	5.1-7.1 (6.1 ± 0.6, 20)	4.5-5.0
width of the central part	1.2-2.3 (1.9 ± 0.2, 20)	2.1-3.0
Adoral ciliary spiral	310-400°	-

of *T. luciopercae* the anterior and posterior margins are not parallel. In case of *T. notopteridae* the posterior tip of the central part extends almost halfway to y-1 axis (Fig. 8A), but in case of *T. luciopercae* it almost touches y-1 axis (Fig. 8B). The rays of *T. notopteridae* are of equal length along entire their length with almost rounded tips, while the rays of *T. luciopercae* end with pointed tips. However, the morphometric data do not vary significantly (Table 2). We propose this species as a distinct one and designate it in this paper as *Trichodina notopteridae* sp. n. Morphometric comparison of the

Trichodina notopteridae and *Trichodina luciopercae* Lom, 1970 is provided in Table 2.

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