

## *Trichodina porocephalusi* sp. n. (Ciliophora: Trichodinidae) from an Indian Flathead Sleeper, *Ophiocara porocephalus* (Valenciennes) (Eleotrididae)

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**Summary.** A population of trichodinids (Ciliophora: Trichodinidae) was found on the gills of an Indian estuarine flathead sleeper, *Ophiocara porocephalus* collected from the Hooghly River in West Bengal, India and was described as a new species. The species is characterized by the shape of denticles having broad and rectangular blades with truncated distal margins, parallel borders, apexes with distinct notches in the lower border of the anterior margins; robust, conical central parts; backwardly directed short, stumpy rays with prominent ray apophyses and grooves; and argentophobic central areas which are somewhat elevated from the rest of the adhesive disc and contains few to many argentophilic dots or patches. The body diameter ranged from 32.5-50.5 ( $42.3 \pm 5.2$ )  $\mu\text{m}$ , whilst the denticle number was 20-27 ( $24.3 \pm 1.5$ ). This ciliophoran infested approximately 20.8% of the host fishes (54 out of 240) on their gills during March 1996 to December 1997, sometimes along with *Trichodina acuta* Lom, 1961 and *Triptiella copiosa* Lom, 1959. The highest percentage of infestation was recorded in October 1997 (90%). The variation of the adhesive disc is recorded and discussed.

**Key Words:** Ciliophora, estuarine fish, gills, India, *Ophiocara porocephalus*, *Trichodina porocephalusi* sp. n., trichodinid.

### INTRODUCTION

In India, studies on the trichodinid ciliophorans, relatively few so far, is gaining momentum recently in various aspects. As a result, 12 species of trichodinid ciliophorans representing the genera *Trichodina* Ehrenberg, 1838; *Paratrachodina* Lom, 1963; and *Triptiella* Lom, 1959 were reported 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.* 1995 a, b; Saha and Haldar 1996, 1997; Asmat and Haldar 1998; Asmat 2001a, b). During the present study on the biodiversity of the trichodinid ciliophorans inhabiting the freshwater and estuarine fishes, a new species of *Trichodina* was found on the gills of an estuarine flathead sleeper, *Ophiocara porocephalus*.

### MATERIALS AND METHODS

The host fishes (4.5-8.0 cm, 20-50 g) were collected by fishing nets from different rivulets of the Hooghly River in the Hooghly District of West Bengal during March 1996 to December 1997. Gill scrapings were made at the riverside. Air-dried gill scrapings were transported to the laboratory. The slides with trichodinid

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ciliophorans were impregnated with Klein's dry silver impregnation technique (Klein 1958). Examinations of prepared slides were made under the Olympus phase-contrast microscope at  $\times 100$  magnification. Measurements were made according to the recommendations of Lom (1958), Wellborn (1967), Arthur and Lom (1984) and Van As and Basson (1989, 1992).

## RESULTS

### *Trichodina porocephalus* sp. n. (Figs 1-16, Table 1)

This is a medium-sized and bell-shaped trichodinid,  $32.5\text{-}50.5$  ( $42.3 \pm 5.2$ )  $\mu\text{m}$ , having unique adhesive disc surrounded by a finely striated border membrane. The centre of the disc is argentophobic, somewhat elevated from the rest of the disc (Fig. 8), contains few to many argentophilic dots or patches and surrounded by undulated or notched border. The denticulate ring consists of 20-27 ( $24.3 \pm 1.5$ ) rectangular, medium-sized denticles. The interblade space is medium. The number of radial pins per denticle is 6-9 ( $7.4 \pm 1.0$ ).

Typically, the blade is broad and rectangular. The distal margin is truncated, runs parallel to the border membrane or slightly curved. The gap between the distal margin of blade and border membrane is moderate to large. The tangent point is blunt, rarely forms a line with y-axes, situated lower than the distal margin. The anterior margin angularly curves down and forms a shallow apex at the base of blade that rarely extends beyond the y+1 axis (Figs 9-12). A notch is present just below the apical cone in the anterior margin. The anterior blade apophysis is sometimes prominent (Figs 3-6). The curve of posterior margin forms a shallow crescent with deepest point at the same level as apex (Figs 9-12). The posterior blade apophysis is absent. The blade connection is thin.

The central part of denticle is robust, wide and sharply triangular. The tip rarely extends halfway past the y-1 axis and interposed firmly into the preceding denticle (Figs 9-12). Shapes of the central part above and below the x-axis are similar. Indentation on the lower central part sometimes prominent (Figs 4, 6).

The ray connection is short and broad bearing distinct ray apophysis directed antero-distally (Figs 1-8). The ray is much shorter than the blade, stumpy, crooked at the base, broad with prominent central groove and slightly bent in backward direction. Lateral margins of the ray are parallel, ending in a round or truncated point that almost touches the y-1 axis (Figs 10-12). The space

between the tip of ray and the central clear area forms a narrow impregnated ring.

The adoral zone of cilia spirals about  $380\text{-}390^\circ$ .

### Intraspecific variability

Remarkable variation in the denticle morphology was recorded in the present study. Based on the denticle shape three types of specimens could be identified. These are designated here as Type I, Type II and Type III.

In Type I, the blades are larger, robust with crescent-shaped blade and shorter and slightly arched ray. In these cases the ray base is barely distinguishable from the central part (Fig. 1). These ciliates are big in size.

In Type II, the blade is elongated, sickle-shaped with more or less parallel borders, relatively longer rays and distinct ray connection (Fig. 2). These are medium sized trichodinid.

In Type III, the denticle consists of more slender and shorter blades with parallel margins and truncated distal margin and more arched and slender rays (Figs 3-8). These are small sized members of this species. The specimens of Type III were found to be greater in number in each population, while Type I was rather rare. Whether these variations are due to adaptation of trichodinids to face unfavorable condition in host body or related to the age of individual specimens or to the seasons of the year or other reasons are matter of future studies. All the types mentioned above were found not only in the same population but also on the same host fish on many occasions.

Type host: *Ophiocara porocephalus* (Valenciennes) (Eleotrididae).

Type locality: Hooghly River (Latitude  $22^\circ 00' \text{N}$ , Longitude  $88^\circ 07' \text{E}$ ) of Hooghly District, West Bengal, India.

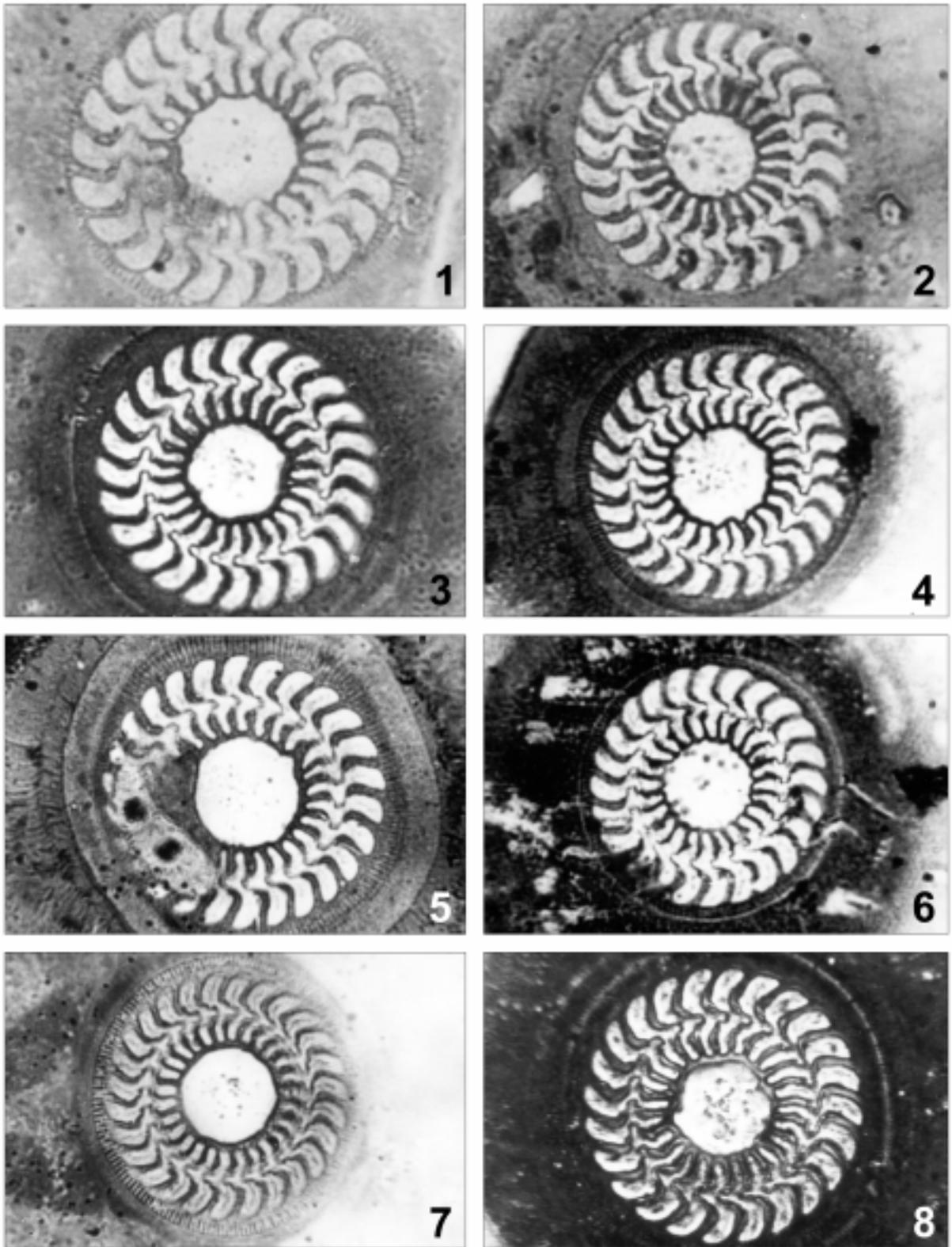
Location: gills.

Etymology: named after the specific name of the host fish, *Ophiocara porocephalus* (Valenciennes).

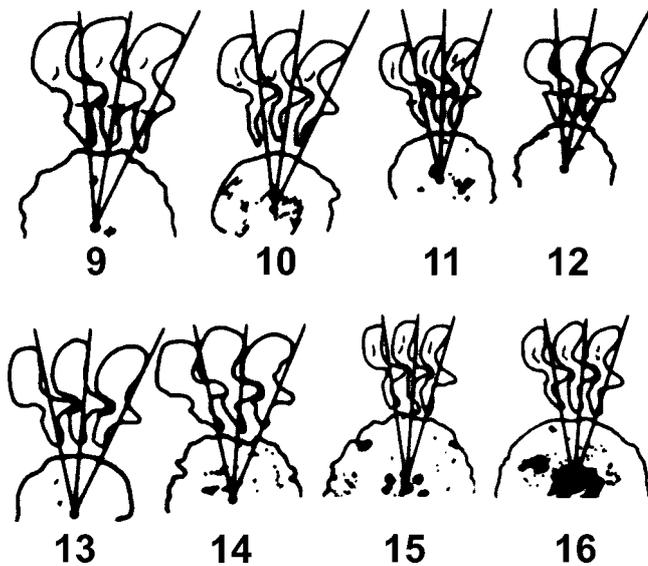
Type specimens: holotype, slide OP-1 prepared on 05-10-1996; paratypes, slide OP-2 prepared on 05-10-1996 and slide OP-3 prepared on 15-1-1997 are in the collection of the Department of Zoology, University of Chittagong, Chittagong 4331, Bangladesh.

## DISCUSSION

The centre of the adhesive disc in the described species possesses an undivided clear area with a rounded



**Figs 1-8.** Photomicrographs of *Trichodina porocephalusi* sp. n. from *Ophiocara porocephalus* showing the variation in the structure of denticle



**Figs 9-16.** Diagrammatic drawings of denticles of trichodinids. **9-12** - *Trichodina porocephalusi* sp. n. from India; **13, 14** - *T. jadranica noblei* Lom, 1970 redrawn from Lom (1970); **15, 16** - *Trichodina* sp. 2 of Grupcheva *et al.* (1989) redrawn from Grupcheva *et al.* (1989)

or slightly notched perimeter containing a few to a large number of dark granules, which rarely form patches. Based on this character and the unique shape and variability of the denticles among the silver impregnated specimens of the present species, it may be said that to

a lesser extent, it resembles *T. jadranica noblei* Lom, 1970 and *Trichodina* sp. 2 of Grupcheva *et al.* (1989).

Lom (1970) described *T. jadranica noblei* from the gills of a marine fish, *Eleotris sandwicensis* in Oahu, Hawaii. The character of central clear area in some specimens of the presently studied species with clumps of irregular dark materials in the middle (Figs 6, 8) is similar to *T. j. noblei* but the denticle morphology distinctly differs in two species. The shape of blade in *T. j. noblei* is somewhat broad, oval, and shorter than the ray (Figs 13, 14). The ray is almost straight in *T. j. noblei* (Fig. 13). Lom (1970) mentioned his Fig. 2 of Plate V (Fig. 14 in the present paper) as an atypical specimen. The shape of denticle in the species under discussion is significantly different from that of *T. j. noblei* in having considerably larger denticles with rather rectangular blades, backwardly bent rays, which are almost half of the size of blade. The two species also differs in morphometrical data (Table 1).

In considering the shape of denticles, the members of the specimens of Type II in the present work having denticles with elongated, sickle-shaped blades and relatively longer rays are somewhat similar to *Trichodina* sp. 2 of Grupcheva *et al.* (1989) as shown by them in Figs 1A, B. They collected the specimens from the gills of the Mediterranean *Gobius niger*. *Trichodina* sp. 2 differs from the presently studied trichodinid in lacking of distinct notch at the anterior margin and truncated tip of

**Table 1.** Morphometric (in  $\mu\text{m}$ ) comparison of *Trichodina porocephalusi* sp. n. with *T. jadranica noblei* Lom, 1970 and *Trichodina* sp. 2 of Grupcheva *et al.* (1989)

Species	<i>Trichodina jadranica noblei</i>	<i>Trichodina</i> sp. 2 (n=31)	<i>Trichodina porocephalusi</i> sp. n. (n=20)
Host	<i>Eleotris sandwicensis</i>	<i>Gobius niger</i>	<i>Ophiocara porocephalus</i>
Locality	Oahu, Hawaii	Mediterranean, Banyuls, France	Hooghly, West Bengal, India
Location	Gills	Gills	Gills
References	Lom (1970)	Grupcheva <i>et al.</i> (1989)	Present paper
Diameter of body	26 - 40 (32)	63-110 (79)	32.5-50.5 (42.3 $\pm$ 5.2)
of adhesive disc	21- 29 (25)	41-61 (51)	27.0-42.3 (35.2 $\pm$ 4.8)
of denticulate ring	13 - 17 (14)	25-38 (32)	16.3-26.0 (20.9 $\pm$ 2.8)
of central area	-	-	7.1-17.4 (12.4 $\pm$ 2.6)
of clear area	-	-	6.1-15.3 (10.4 $\pm$ 2.5)
Width of border membrane	2.5	4.8-5.8	2.0-4.8 (3.5 $\pm$ 0.7)
Number of denticles	21 - 25 (23)	28-32 (30)	20-27 (24.3 $\pm$ 1.5)
of radial pins/denticle	6	8-9	6-9 (7.4 $\pm$ 1.0)
Span of denticle	-	-	8.2-10.7 (9.7 $\pm$ 0.7)
Length of denticle	4	3.8-6.7 (5.5)	2.5-5.6 (4.7 $\pm$ 0.8)
of ray	2.5-3	3.8-5.8 (4.6)	2.5-4.1 (3.0 $\pm$ 0.5)
of blade	2	4.3-6.7 (5.7)	3.1-5.1 (4.2 $\pm$ 0.6)
Width of central part	1.2	1.9-3.4 (2.4)	1.5-3.1 (2.5 $\pm$ 0.6)
Degree of adoral ciliature	-	-	380-390 <sup>o</sup>

blade, ray apophysis and in having not much variation in the shape of denticles, and rays sometimes having slightly broadened tips. The clear central area of *Trichodina* sp. 2 is larger than the present species and contains dense black patches at the centre (Figs 15, 16). The described species also differs from *Trichodina* sp. 2 in having the smaller diameter of the adhesive disc and the denticulate ring as well as in the denticle dimensions (Table 1).

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