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Trichodina cancilae sp. n. (Mobilina: Trichodinidae) from the Gills of a Freshwater Gar, *Xenentodon cancila* (Hamilton) (Belonidae)

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Summary. A population of a trichodinid ciliate (Mobilina: Trichodinidae) was found in the gills of the freshwater gar, *Xenentodon cancila* (Hamilton) (Belonidae) collected from Kalyani of Nadia District, West Bengal, India and was described as a new species. The specimens are characterized by the shape of denticles being elongated and arched blades; 1 or 2 cut-like notches in the convex side of the blade and the presence of the single non-staining granule at the base of blades and the base of rays; moderate central part; and broad and greatly arched rays. The body diameter ranged from 50.0-74.4 μm, whilst denticle number ranged from 28-32. Approximately 49.5% of the host fishes (213 out of 430) were infested with the ciliate on their gills during September 1995 and December 1997, sometimes in concurrent infestation with *Tripartiella bursiformis* (Davis, 1947) Lom, 1959. The highest percentage of infestation was recorded in December 1996 (73.3%). The variation is recorded and discussed.

Key words: freshwater gar, gills, India, Mobilina, *Trichodina cancilae* sp. n., *Xenentodon cancila*.

INTRODUCTION

In India, studies on the trichodinid ciliates, relatively less so far, is getting momentum in many sectors. As a result, 10 species of trichodinid ciliates representing the genera *Trichodina* Ehrenberg, 1838; *Paratrichodina* 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*. 1995 a, b; Saha and Haldar 1996, 1997; Asmat and Haldar 1998). The primary objectives of the present study were to identify the trichodinid ciliates inhabiting the freshwater and estuarine fishes and to study on the morphology and taxonomic status of these trichodinids. During the present study, the gills of a freshwater gar, *Xenentodon cancila* (Hamilton) was found to host a dense population of trichodinids. The ciliophoran proved to be a new species and is described here.

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MATERIALS AND METHODS

A total of 430 freshwater gars, *Xenentodon cancila* were examined during September 1995 to December 1997. The host fishes

(10-20 cm, 20-80 g) were collected by fishing nets once in each month from different rivulets of Nadia district of West Bengal, India Gill scrapings were made at the riverside. Air-dried gill scrapings were transported to the laboratory. The slides with trichodinid ciliates were impregnated with Klein's dry silver impregnation technique (Klein 1958). Examinations of preparations were made under the Olympus phase-contrast microscope at x100 magnification. Measurements were made according to the recommendations of Lom (1958), Wellborn (1967), Arthur and Lom (1984) and Van As and Basson (1992). Numerous photomicrographs were made in order to have comprehensive morphological analyses of the ciliates.

RESULTS

Trichodina cancilae sp. n. (Figs. 1-20)

Description

This is a large trichodinid with disc-shaped body and surrounded by a finely striated, wide border membrane. The texture of central area is finely granular and similar as rest of adhesive disc. The denticulate ring consists of 28-32 (29.8 ± 1.2) large denticles. There are 8-12 (10.7 ± 1.0) radial pins per denticle. The adoral cilia described a turn of about 390-395°.

The blade of denticle is broad and curved, filling almost the entire spaces between y+1 axis (Figs.17, 19), sometimes angular (Figs.7, 8), which are also found in newly born individuals (Figs. 13, 14). The tangent point is blunt in most cases, slightly lower than distal margin. The anterior margin is rounded with slightly flattened apex, not touching y+1 axis in most specimens. The apical depression is well developed and never impregnated. But the anterior margin of apical region bears one or two cut-like notches (Figs.1, 3, 7, 8). The anterior blade apophysis is sometimes prominent. The blade connection is well developed. The posterior margin forms narrow, elongated, semilunar curve with deepest point at same level (Figs.17, 18) or lower (Fig.19) than apex. The posterior blade apophysis is not always distinctly visible. The inter-blade space is moderate and often fills with non-impregnable matters.

The central part is moderate to robust, fitting tightly into the preceding denticle with rounded point that extends more than halfway to y-1 axis, sometimes touching this line. The section of central part above and below x-axis is similar. The indentation in lower central part is not always seen.

The ray connection is short and thin with well-developed ray apophysis situated high, pointed in an anterior direction. The ray connection is very delicate with prominent constriction just below ray apophysis. The ray is considerably longer than blade, broad, distinctly grooved with almost same thickness, and rounded end, rarely thin (Fig.1). Typically, ray is slightly curved posteriorly, which is also characteristic of developing individuals (Figs.13, 14, 16), but lying parallel to y-axes. In between ray bases, in many trichodinids, contain non-impregnable pearl-shaped glistening particles (Figs. 9-12).

Intraspecific Variability

Considerable variations among the individuals of the described species concern the shape of blade, orientation of ray, and presence of non-impregnable particles between inter-blade space and ray bases. These variations are not related to body dimensions or seasons of the year, but could be found in a single fish host.

Two types of blade shapes were found in the present species. In one form, the blade is arch-shaped, but with narrow semilunar curve (Figs.6-8), while in others, it is rather spoon-shaped having broad distal end tapering towards central part, giving an erect posture (Figs.4-5). In relation to these shapes, the shape of distal margin, tangent point and semilunar curve also differ. The orientation of ray follows three district patterns. Typically, rays are slightly curved in posterior direction (Fig.17), but in some specimens, rays are anteriorly directed, extending beyond y+1 axis (Fig.19), while in others, rays are oriented posteriorly, extending beyond y-1 axis (Fig.18). The cause of the presence of non-impregnable particles in interblade space and in between ray bases (Figs.9-12) in many specimens is not known. Some developing stages of the species were also found (Figs.13-16).

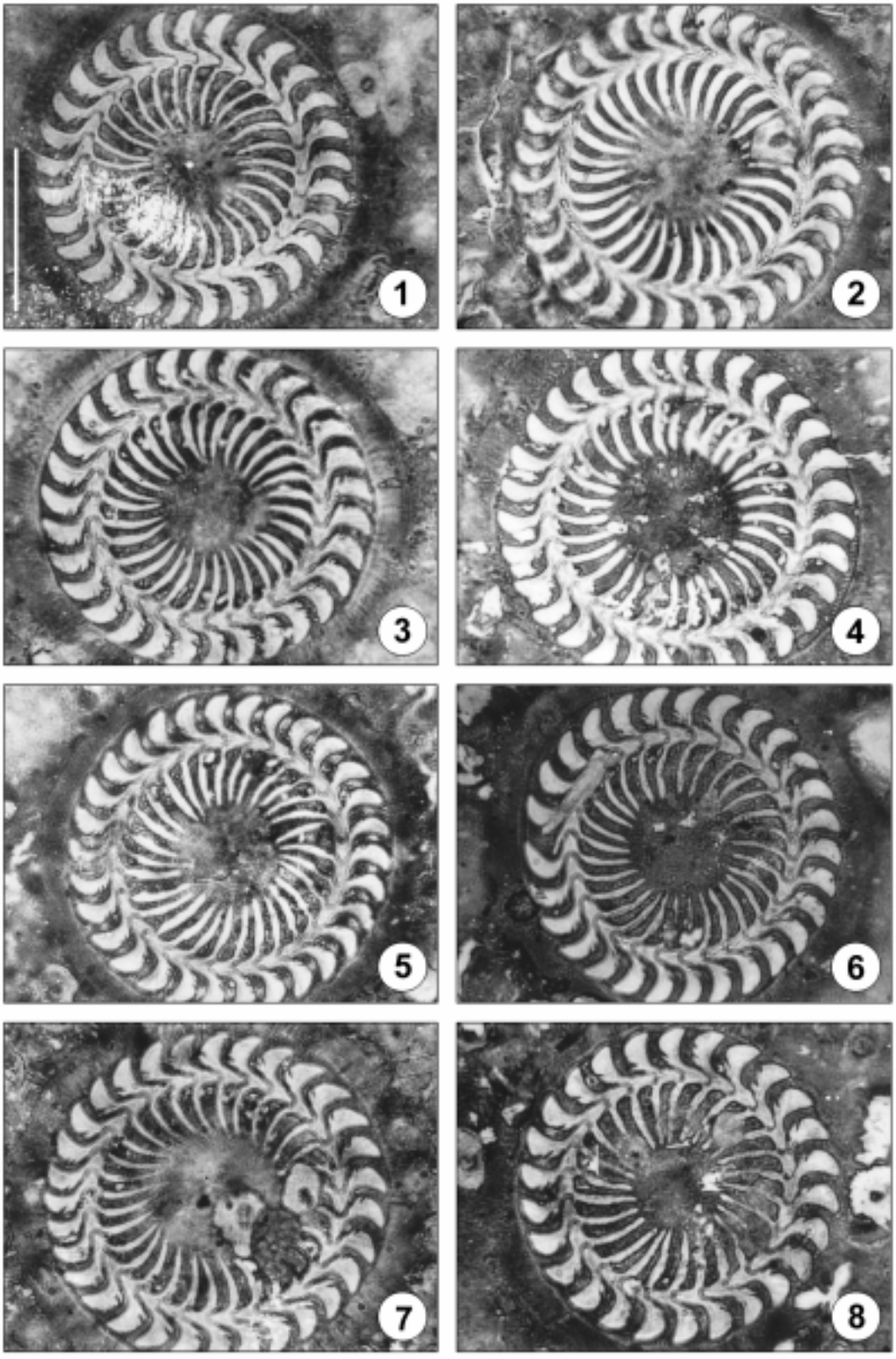
Type host: *Xenentodon cancila* (Hamilton) (Belonidae).

Type locality: Kalyani of Nadia District, West Bengal, India (23.3°N 88.4°E).

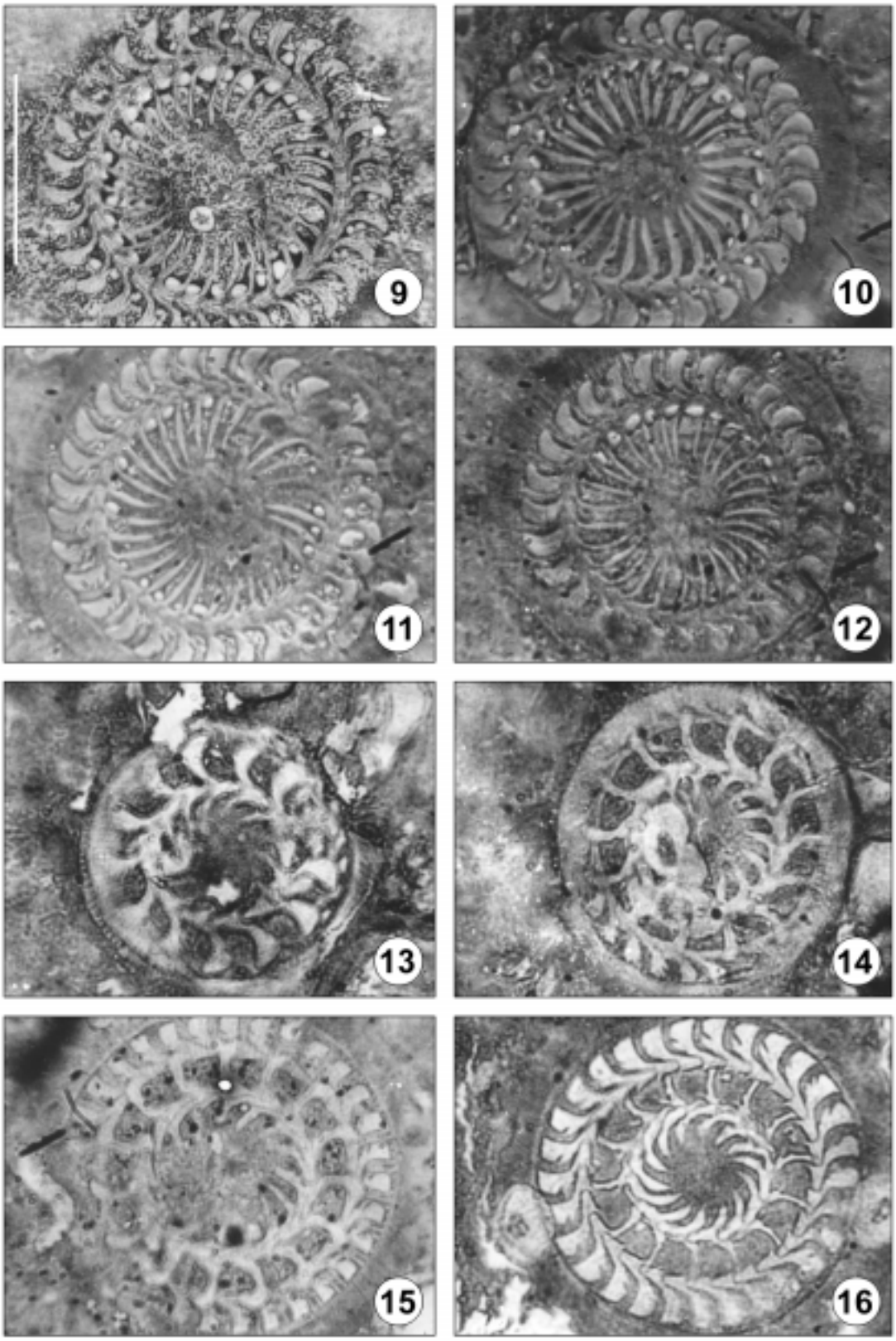
Location: gills.

Etymology: named after the specific name of the type host fish, *Xenentodon cancila* (Hamilton).

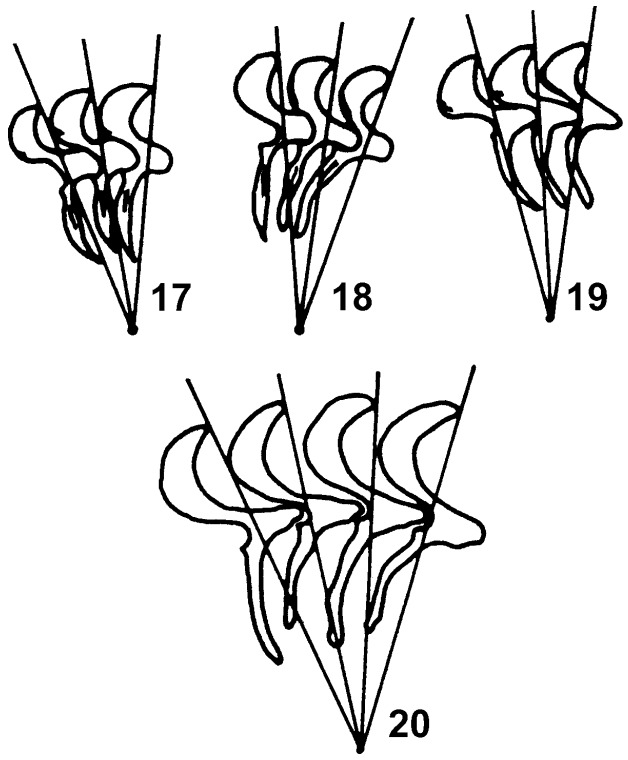
Type specimens: holotype, slide XC-1 prepared on 4.3.1996; paratypes on the above mentioned slide and in other slides prepared on different dates in the collection



Figs. 1-8. Photomicrographs of *Trichodina cancilae* sp. n. from *Xenentodon cancila* showing the variation in the structure of denticle. Scale bar - 30 μm



Figs. 9-16. Photomicrographs of *Trichodina cancilae* sp. n. from *Xenentodon cancila* showing the non-impregnated particles between the bases of blade and between the bases of ray (**9-12**) and the developing stages (**13-16**). Scale bar - 30 μm



Figs.**17-20.** Diagrammatic drawings of denticles of trichodinids. **16-19** - *Trichodina cancilae* sp. n. from India; **20** - *T. magna* Van As and Basson, 1992 redrawn from Van As and Basson (1992) from South Africa

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DISCUSSION

As classified by Van As and Basson (1992) the described species falls in the category of large trichodinid with a diameter of 50.0-74.4 (61.9 ± 5.4) µm. *Trichodina cancilae* sp. n. is comparable to *Trichodina magna* Van As and Basson, 1989. However, *Trichodina cancilae* sp. n. differs from the latter species in a number of points of denticle shape, particularly in blade shape, orientation of ray, by the presence of cut-like notches in the convex side of denticle of blade and the presence of the single non-staining granule at the base of the blades and the base of the rays. These characters establish this ciliate as a new species and *Trichodina cancilae* sp. n. is proposed here after the specific name of the type host fish, *Xenentodon cancila* (Hamilton).

The blade of *T. magna* is uniform, regardless of host or locality, but in the present form two types of blade shapes namely arch-shaped and spoon-shaped were noticed, even within a single fish host. The arch-shaped blade forms a narrow semilunar curve rather than larger one as in *T. magna* (Figs.17, 19). The spoon-shaped blade having broad distal end, tapering towards the central part giving an erect posture and which, unlike *T. magna*, have narrow and elongated crescent, at posterior margin. In the spoon-shaped blade, the distal margin is angular, the anterior margin never touches y+1 axis, and the tangent point is also blunt (Fig.18), whilst in the forms having arch-shaped blade, the direction and general blade shape is somewhat similar to those of *T. magna*. Although the shape of apex of blade is similar

Table 1. Morphometric comparison of *Trichodina cancilae* sp. n. and *T. magna* Van As and Basson, 1989. Measurements in µm

Species		*Trichodina cancilae* sp. n. (n=40)	*T. magna* (n=22)
Host		*Xenentodon cancila*	13 species of fish
Locality		Kalyani, West Bengal, India	Capri, South Africa
Location		Gills	Skin, fins
Reference(s)		Present paper	Van As and Basson (1989)
Diameter of body		50.0-74.4 (61.9 ± 5.4)	71.2-111.8 (99.1 ± 9.5)
Diameter of adhesive disc		41.8-60.3 (52.0 ± 5.6)	59.7-94.8 (81.7 ± 8.2)
Diameter of denticulate ring		30.6-46.6 (36.9 ± 4.4)	35.6-57.5 (50.0 ± 4.8)
Diameter of central area		9.7-20.4 (15.3 ± 3.0)	-
Width of border membrane		3.1-6.1 (4.7 ± 0.7)	6.2-13.9 (8.9 ± 1.4)
Number of denticles		28-32 (29.8 ± 1.2)	24-27 (25)
Number of radial pins/denticle		8-12 (10.7 ± 1.0)	10-13 (11)
Dimensions of denticle	span	12.3-23.5 (17.4 ± 2.0)	-
	length	7.1-10.3 (8.7 ± 0.9)	7.4-13.6 (10.9 ± 1.4)
Dimensions of denticle components	ray	6.1-14.3 (9.1 ± 1.4)	7.7-16.0 (13.0 ± 1.7)
	blade	5.1-7.1 (6.1 ± 0.7)	6.0-10.9 (8.6 ± 0.8)
Width of central part		2.0-4.6 (4.0 ± 3.4)	3.7-7.4 (5.6 ± 0.9)
Degree of adoral ciliature		390-395°	400°

in both species, its position in relation to the deepest point is different. In the case of *T. magna,* it is situated lower than deepest point of posterior margin, while in the present form; the apex is situated at same level (Figs.17, 18) or higher than deepest point (Fig.19). The shape and orientation of ray in relation to y-axes also differ in the two species. The ray is thin and of an even thickness throughout in *T. magna* (Fig. 20), but broad and massive, rarely thin, in the presently described species. The orientation of ray follows three patterns in the present form, even within a single fish host. In most cases, the rays are slightly curved posteriorly, but remain parallel to y-axes. Some specimens possess anteriorly directed rays, which extend beyond y+1 axis, as in *T. magna*, while in other forms; the rays are oriented in a posterior direction, extending beyond y-1 axis. Posteriorly oriented rays are also visible in developmental stages (Figs.13, 14). The point of rays, however, is similar in both species. Morphometric comparison between *T. magna* and the presently described species is given in Table 1.

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