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Trichodian anabasi sp.n. (Cilioiphora: Trichodinidae) from Climbing Perch, *Anabas testudineus* (Bloch, 1795) (Anabantidae) in Chittagong

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Abstract: A population of trichodinid (Ciliophora: Trichodinidae) was found in the gills of climbing perch, *Anabas testudineus* (Bloch, 1795) and was described as a new species. It is characterized by large body dimensions and having uniformly stained, dark central area at the centre of the adhesive disc; broad blade with angular and slightly rounded distal margin and flat tangent point, but almost parallel anterior and posterior margin; stout and cylindrical central part with bluntly rounded point which extends slightly more than halfway to the y-axis; and the ray is slightly curved in the posterior direction with anterior margin parallel to the y+1 axis and distinct central groove. Approximately 19.6% of the host fishes (45 out of 230) were infected with the ciliate on their gills during August 1999 and December 2001, The prevalence of this ciliate was higher during the post monsoon and colder period of the year. The variation is recorded and discussed. The species is probably more closely related to *Trichodina ngoma, T. kwando, T. frenata* and *T. mutabilis*.

Key words: Trichodinid, ciliophora, trichodinidae, *Trichodina anabasi,* Bangladesh

Introduction

Bangladesh with its vast freshwater areas which include the great river like the Padma, the Jamuna and their innumerable tributaries, is one of the richest area in this subcontinent in respect of freshwater fishery (Rahman, 1989). In addition, the country has an extensive floodplain and numerous ponds and natural depressions. The freshwater fishes of Bangladesh contains 266 species under 145 genera and 55 families (Anonymous, 2000). At least 13 exotic species were also introduced since 1952. As mentioned by Anonymous (2000 *Anabas testudineus* is a widely distributed freshwater fish and is not threatened locally as well as globally. However, there is no published report on the trichodinid ciliates of fishes in Bangladesh, except that of Asmat *et al.* (1997) and Bhouyain *et al.* (1999) during the present survey on the species diversity of the trichodinid ciliates from some freshwater fishes of Chittagong between August, 1999 and December, 2001, a new species of *Trichodina,* parasitizing the gills of *A. testudineus* was found and is described here.

Materials and Methods

In order to identify the trichodinids, specimens were collected from host fish from August, 1999 to December, 2001. Gill scrapings were made at the pondside. 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 prepared slides were made under research microscope at x 100 magnification. Measurements were done following the recommendations of Lom (1958), Wellborn (1967), Arthur and Lom (1984) and Van As and Basson (1989, 1992). For comprehensive morphological details of the ciliates numerous photomicrograph were made. The level of infestation was presented as low (1-5 ciliate/slide), medium (6-10 ciliate/slide) and high (more than 11 ciliates/slide). Measurements are given in μm. The results and photographs were compared to results from other studies.

Results and Discussion

Host: *Anabas testudineus* (Anabantidae); Prevalence: $^{45}/_{230}$ (19.6%); Infection: medium to high.

Description: This is large and cup-shaped ciliate, 49.9-72.6 (6.3±6.5). The adhesive disc is concave, 44.5-63.3 (55.3±6.1) and contains a centre whose texture is similar to the rest of adhesive disc. The adoral zone of cilia forms a spiral of 385-390°. The denticulate ring is composed of 20-28 (24.5±1.6) large denticles. There are 5-10 (6.9±0.9) radial pins to one denticle.

The blade of a denticle is broad, fills the space between the y + 1 axis. The distal margin of blade is angular, slightly rounded, situated higher than the tangent point (Figs. 7a-b) and lies close to the border membrane (Fig. 1-6). The tangent to the y-1 axis is flat, forms a small line rather than point, sometimes rounded (Fig. 3). The anterior and posterior margins are almost parallel (Fig. 1, 4-5). The anterior blade apophysis is sometimes

prominent (Figs. 2-5), but posterior one is not clearly visible. The posterior margin form L-shaped curve with deepest point at the lowest and i.e., at the same level as apex. The blade connection is thin.

The central part of the denticle is stout, cylindrical with bluntly rounded point which extends slightly more than halfway to the y axis (Figs, 7a-b) fitting tightly into the corresponding denticle. The section of the central part above and below the x-axis is similar in shape.

The ray connection is short and thin with ray apophysis, situated high and pointing upward direction. The indentation on the lower central part is not clearly visible. The ray is not considerably longer than blade, but slender, almost of equal thickness, sometimes with gradually pointed tip. Typically, the ray is slightly curved in the posterior direction with anterior margin parallel to the y + 1 axis (Fig. 7b). The central groove in the ray is prominent in most cases.

Intra-specific variations: The individuals of the described ciliate showed some variations among themselves. The specimens recovered from the gills of *A. testudineus* during the winter months (November to January) (Fig. 4-5) were somewhat larger in size and in denticle dimensions than those obtained from other months of the year. Another difference may be mentioned in the orientation of rays. Typically, the ray is slightly curved with posterior margin parallel to the y + 1 axis. In some specimens, the ray curves in such a direction that the line of y-axes passes through the middle of the ray, the tip of ray could remain parallel to the y axes (Fig. 7b). In a few individuals, the tip of the anteriorly curved ray touches the y-1 axis. The apical depression, in some specimens, impregnates in such a way that the blade appears club-shaped structure (Fig. 3). However, most of the variations could be found in the same population or even in the same sub-populations of this ciliate.

The original shape of the denticle could be found in young specimens (Fig. 6). In young specimens, the anterior margin of the blade curves smoothly and forms a distinct apex with prominent apical depression. In these cases, the tangent point is pointed and the posterior margin of the blade forms semilunar curve. The distal margin is difficult to recognize and remains apart from the border membrane. The ray-bases in the young individuals are broader than the adult one.

Type Host: *Anabas testudineus* (Bloch 1795) [Perciformes: Anabantidae].

Type locality: Beluardighi at pahartali (22°23'N 92° 47'E), Chittagong, Bangladesh

Location: gills

Type materials: Holotype, slide AT-1 prepared on 7-9-1999; paratypes slide AT-2 prepared on 10-11-1999 and slide AT-3 prepared ib 13-2-2000 are in the collection of the Department of Zoology, University of Chittagong, Chittagong 4331, Bangladesh.

Etymology: named after the generic name of the host fish, *Anabas testudineus*

The described species of *Trichodina* is characterized by the silver impregnated adhesive disc. This is a large trichodinid having uniformly stained, dark central area at the centre of the adhesive disc; broad blade with angular and slightly rounded distal margin and flat tangent point, but almost parallel anterior and posterior margin; stout and cylindrical central part with bluntly rounded point which extends slightly more than halfway to the x-axis; and the ray is slightly curved in the posterior direction with anterior margin parallel to the y + 1 axis and distinct central groove.

By the denticle morphology, the present trichodinid could be compared with *Trichodina ngoma* Van As and Basson (1992) from the of the fish, *Hemigrammocharax multifasciatus* in the Lake Lisikili, South Africa; *Trichodina kwando* Van As and Basson (1992) from the skin, fins and gills of the fish, *Brycinus lateralis* and *Micralestes acuitidens* in the Zambesi River, South Africa; *Trichodina frenata* Van As and Basson (1992) from the gills of the fish, *Aethiomastacembalus frenatus* in the Zambesi River, South Africa and *T. mutabilis* Kazubski and Migala, 1968 from *Cyprinus carpio* in Poland.

The species under discussion shows some resemblance with *T. ngoma* in having denticles which posses slightly rounded distal margin with blunt tangent point, almost parallel anterior and posterior margins and occasional indentation at the anterior margin due to impregnation. The two species differ from each other in several of the important features as follows: in *T. ngoma,* 1) the distal margin of blade (Fig. 7c) is mostly rounded (vs falcate or angular); 2) the deepest point of the semilunar curve formed by the posterior margin indentation lies slightly above the apex of anterior margin (vs at the same level of apex); 3) the central part of denticle is triangular with sloped upper part (vs stout and cylindrical having similar shapes of upper and lower section) and 4) the anterior margin of the ray runs parallel to the y-axes (vs the posterior margin of the ray runs parallel to those axes. Moreover the morphometric data are greater in the described ciliate (Table 1).

Table 1: Morphometric comparison of Trichodina anabasi sp. N. with closely related species

Species	Trichodin ngoma (n=19)	Trichodina kwando (n=15)	Trichodina frenata (n=19)	Trichodina anabasi sp. .n.
Host	Hemigrammocharax Multifasciatus	Brycinus lateralis	Aethiomastacembalus Frenatus	Anabas testudineus
Locality	Lake Lisiki, South Africa	Zambesi River, South Africa	Zambesi River, South Africa	Chittagong, Bangladesh
Location	Skin, fins, gills	Skin, fins, gills	Gills	Gills
Reference	Van As and Basson (1992)	Van As and Basson (1992)	Van As and Basson (1992)	Present paper
Diameter of				
body	36.5-57.0	37.5-46.0 (41.8±2.9)	31.0-38.0 (34.5±1.9)	38.3-82.6 (63.3±6.5)
adhesive disc	29.5-49.5	32.5-39.0 (35.4±2.2)	25.5-31.5 (28.6±1.8)	30.0-74.2 (55.3±6.1)
denticulate ring	18.0-30.5	19.0-25.5 (22.7±1.8)	(15.0-20.0 (17.1±1.3)	20.2-47.6 (32.7±3.8)
central area	-	-	-	8.0-33.3 (17.0±3.9)
width of border membrane	2.5-4.0	2.5-3.5 (3.1±4.0)	2.0-3.5 (3.0±0.1)	3.0-8.4 (6.0±0.8)
Number of				
denticles	21-27 (23)	25-27 (23)	19.23 (22)	20.28 (24.5±1.6)
radial pins/denticle	8-10 ()	7-10 ()	7-9 (8)	5-10 (6.9±0.9)
span of denticle	8-5-15.0 (11.0±1.5)	9.0-12.0 (11.0±1.5)	6.5-9.0 (8.0±0.7)	10.2-26.6 (16.6±2.7)
Length of				
denticle	3.1 (5.0±0.8)	3.5-5.5 (4.8±0.6)	3.0-4.0 (3.5 (2.8±0.4)	4.5-12.6 (7.5±1.1)
ray	3.0 (4.9±1.3)	4.5-6.5 (4.8±0.7)	2.0-3.5 (2.8±0.4)	4.0-11.2 (7.3±1.1)
blade	3.5 (4.4±0.2)	3.5-6.0 (4.4±0.7)	3.0-4.5 (3.7±0.4)	4.8-9.8 (6.9±0.9)
width of central part	1.5 (1.7±0.2)	1.0-2.0 (1.4±0.2)	1.0-2.0 (1.4±0.2)	2.5-5.6 (3.2±0.6)
Degree of adoral ciliature	408	378	390	385-390

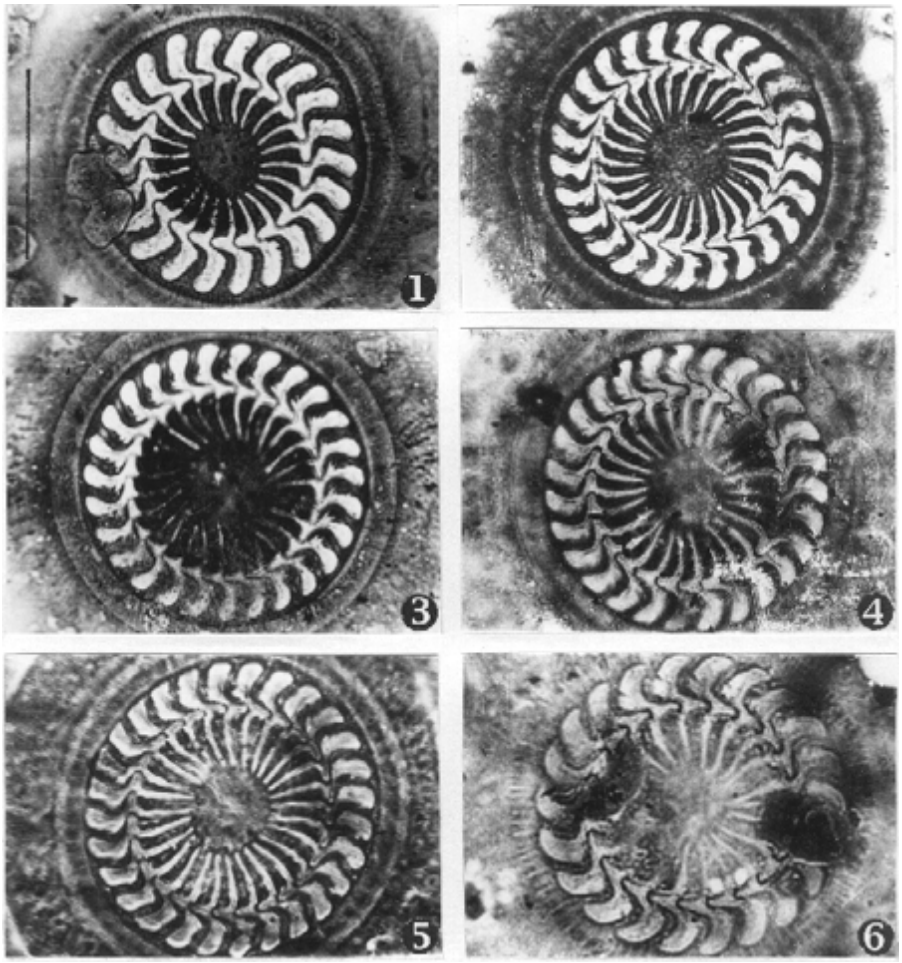

Fig. 1-6: Photomicrograph of silver impregnated adhesive discs of *Trichodina anabasi* sp.n. showing variation. Scale bar-30 μm

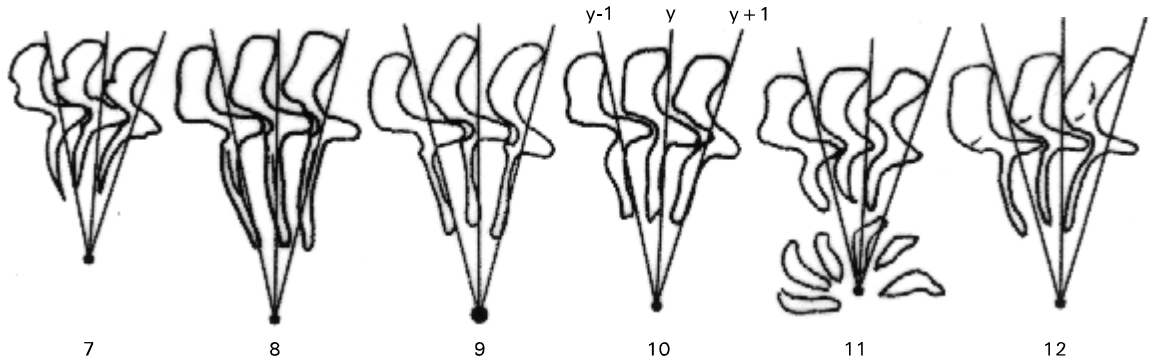

Fig. 7a-f: Denticles of trichodinids: a-b of *Trichodina anabasi* sp. n. From the gills of *Anabas testudineus* in Chittagong: c) *T. ngoma* Van As and Basson, 1992 from *Hemigrammocharax multifasciatus* in South Africa (Redrawn from Van As and Basson, 1992); d) *T. kwando* Van As and Basson, 1992 from the skin fins and gills of *Brycinus lateralis* in South Africa (redrawn from Van AS and Basson, 1992); e) *T. frenata* Van As and Basson, 1992 from the gills of *Aethiomastacembalus frenatus* in South Africa (redrawn from Van As and Basson, 1992) and f) *T. mutabilis* Kazubski and Migala 1968 from the gills of *Cyprinus carpio* in Poland (redrawn from Kazubski and Migala, 1968)

The present species of *Trichodina* resembles *T. Kwando* in having the blade with flate distal margin with blunt tangent point, parallel margins, apex at the base on the anterior margin and L-shaped indentation formed by the posterior margin. However, the described species differs significantly in terms of the shape of central part and ray. In *T. kwando,* the blade is straight the central part is less stout and triangular, having sloped upper part than the present trichodinid. The margins of ray are perfectly parallel with the posterior margin parallel to the y-1 axis (Fig. 7d). The morphometrical data also significantly differs in the two species (Table 1).

The angular shape of the blade and the impregnated anterior margin above the apex of the present ciliate reminds *T. frenata,* but can be distinguished from the letter species basing on the triangular and sharply pointed central part, broad and robust ray which fills almost the entire space between the y-axes and robust ridges arranged symmetrically in a circle at the central of the adhesive disc (Fig. 7e) and overall dimensions (Table 1).

To a lesser extent the shape of blade of *T. mutabilis* resembles the present species. But the erect posture of the blade, more slender central part and thin rays of *T. mutabilis* (Fig. 7f) are sufficient to differentiate from the described species.

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References

Arthur, J.R. and J. Lom, 1984. Trichodinid protozoa (Ciliophora: peritrichida) from freshwater fishes of Rybinsk Reservoir, USSR. J. Protozool., 31: 82-91.

Asmat, Ghazi S.M., A.M. Bhouyain and P.S. Siddiqua, 1997. First record of a species of *Paratrichodina* Lom, 1963 (Mobilina: Urceolariidae) from *Mystus vittatus* (Bloch) in Bangladesh. Environ. Ecol., 15: 843-845.

Bhouyain, A., G.S.M. Asmat and P.S. Siddiqua, 1999. Record of *Tripartiella copiosa* Lom, 1959 (Mohilina: Trichodinidae) from the gills of Mystus vittatus (Bloch) in Bangladesh. The Chittagong Univ. J. Sci., 23: 67-73.

Anonymous, 2000. Red Book of Threatened Fishes of Bangladesh. IUCN-The World Conservation Union.

Kazubski, S.L. and K. Migala, 1968. Urceolariidae from breeding carp Cyprinus carpio L. In Zabieniec and remarks on the seasonal variability of trichodinids. Acta Protozool., 6: 137-160.

Klein, B.M., 1958. The dry silver method and its proper use. J. Protozool., 5: 99-103.

Lom, J.A., 1958. Contribution to the systematics and morphology of antiparasitic trichodinids from amphibians, with a proposal of uniform specific characteristics. J. Protozool., 5: 215-263.

Rahman, A.K.A., 1989. Freshwater fishes of Bangladesh. The Zoological Society of Bangladesh, Dhaka, Bangladesh.

Van, As. J.G. and L. Basson, 1989. A further contribution to the taxonomy of the Trichodinidae (Ciliophora: Peritrichida) and a review of the taxonomic status of some fish ectoparasitic trichodinids. Syst. Parasitol., 14: 157-179.

Van, As J.G. and L. Basson, 1992. Trichodinid ectoparasites (Ciliophora: Peritrichida) of freshwater fishes of the Zambesi River system, with a reappraisal of host specificity. Syst. Parasitol., 22: 81-109.

Wellborn, T.L. Jr., 1967. *Trichodina* (Ciliate: Urceolariidae) of freshwater fishes of the Southern United States. J. Protozool., 14: 399-412.