Environment and Ecology 39 (4A) : 1070—1073, October—December 2021
ISSN 0970-0420

First Record of *Trichodina heterodentata* (Ciliophora: Trichodinidae) from Walking Catfish, *Clarias batrachus* Cultivated in West Bengal, India

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Received 26 June 2021, Accepted 8 September 2021, Published on 10 October 2021

ABSTRACT

The walking catfish (*Clarias batrachus*) is a species of fresh water airbreathing catfish native to Southeast Asia. It is common in aquaculture, but few studies regarding diseases of this fish have been performed. This study presents data of the occurrence of *Trichodina heterodentata* Duncan 1977 from walking catfsh, *Clarias batrachus* cultivated in West Bengal, India. Smears were impregnated with silver nitrate stain to observe the taxonomic features of the ciliates. This *Trichodina* species falls within the range of morphometry and agrees closely in the overall appearance of the adhesive disc with the original populations.

Keywords Ectoparasite, *Trichodina heterodentata*, Fish, Catfish, India.

INTRODUCTION

Trichodinid ciliophorans is one of the most common and widely dispersed groups of symbionts as parasites of aquatic invertebrate and vertebrate hosts (Van *et al.* 1989). The taxonomy of Trichodinids is based on the structure and the appearance of the adhesive disc and the number and size of its constituents. All of these features can be revealed only by the silver impregnation technique of Klein (1958). Trichodinids are not well studied in India. Most of the records of trichodinids in India are from West Bengal only. Several new as well as erstwhile described species belonging to the genera *Trichodina* Ehrenberg 1838, *Paratrichodina* Lom 1963, *Trichodinella* Raabe 1950, Šramek-Hušek 1953, *Dipartiella* Raabe 1959, Stein 1961 have so far been reported (Mitra and Halder 2005, Mitra and Bandyopadhyay 2006 a, b, 2009, Mitra *et al*. 2012 a, b, 2013, Mitra 2019 a, b).

Among the freshwater catfishes, magur (*Clarias batrachus*) is in great demand in eastern and north-eastern India; it is revered as highly nutritious and therapeutic. Due to high profit, the culture of magur is very popular among fish farmers in West Bengal, India. To date, there are no records of any protozoan trichodinid ciliophoran parasites on *T. heterodentata*. In the present work, *T. heterodentata* is recorded and detailed descriptions are provided based on the examinations of specimens prepared using the dry silver nitrate impregnation. *T. heterodentata* in this study is medium size, with a disc-shaped body measuring 50.3–69.4 µm, parasitizing the gills of *Clarias batrachus*. Measurement comparisons

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between the present material and other records from different countries are presented.

MATERIALS AND METHODS

Live host fishes were collected from cultured ponds and maintained in the stocking vats with a constant flow of water. 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 prepared slides were made under an Olympus research microscope (Model CH 20i) at 1000 ×magnification with an oil immersion lens and photographs were taken with an Olympus digital camera. All measurements are in micrometers and follow the uniform specific characteristics as proposed by Lom (1958), Wellborn (1967), 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 of Van *et al.* (1989). Sequence and method of the description of denticle elements follow the recommendations of Van *et al.* (1992).

RESULTS AND DISCUSSION

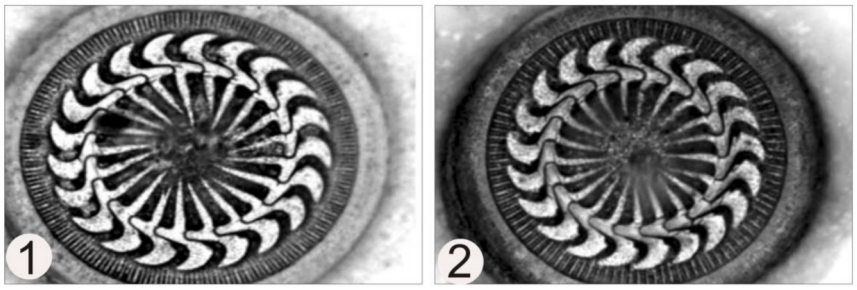
Trichodina heterodentata Duncan 1977

The following morphological description was based on 25 specimens measured (n=25). *Trichodina heterodentata* may be characterized by the trichodinids in which the center of the adhesive disc, impregnates slightly less than the rest of the disc ; denticle having a strongly falcate blade with fine tangent and anterior blade apophysis, strong triangular central part with a bluntly rounded point and thick, straight and pointed ray with distinct central groove.

This is a medium sized ciliophoran with a disc shaped body 50.3-69.4 (61.9± 1.2). The adhesive disc is concave 43.8-61.3 (52.1±1.7), surrounded by a finely striated border membrane 3.1-6.1 (4.4±1.4). The denticulate ring consists of large, falciform denticles 28.0–33.0 (27.9 ± 1.4). The blade of each denticle is broad, relatively short, fills almost the entire space between y+1 axis, sometimes extends beyond this line. The length of the blade 5.0–7.2 (6.1±1.1). The blade is falciform having a strongly curved distal margin with gradually to fine, sharp, backward-directed tangent point which is situated lower than the distal margin. The anterior margin smoothly curves downward and forms a rounded apex with well-developed apical depression which never impregnates. The lower border of the apex forms a kind of notch. The anterior blade apophysis is prominent. The posterior margin of the blade follows almost the same curve as the anterior one and forms a deep semilunar curve with the deepest point at the same level as the apex. The posterior blade apophysis is not visible. The blade connection is strong, wider than the ray connection. The central part measuring 2.1–4.0 (4.2 ± 1.6) is stout, medium-triangular in shape with a bluntly rounded tip that passes more than half to the y-1 axis and interlinked firmly into the preceding denticle. The section of the central part above the x-axis is sloped in a posterior direction and forms a triangle within its axis. The indentation in the lower central part is not visible. The ray connection is short and broad with indistinct ray apophysis. The ray is considerably longer than the blade, measuring 6.0–13.3 (9.2±1.3), strong and straight with thickened base and gradually tapers to a sharp point. The central groove could be rarely seen. The posterior margin of the blade runs to the y-axes. The adoral ciliary zone makes a spiral of 390 degrees- 400 degrees.

Remarks

Trichodina heterodentata was originally described in three different populations from reared *Tilapia zilli* (Gervais 1848), *Oreochromis mossambicus* (Peters 1852) and *Trichogaster trichopterus* (Pallas 1770) from the Phillipines (Duncan 1977). Later, it was also recorded from a large number of fish species, including several Families. In siluriform fish, *T. siluri* Lom (1970) was reported by Bondad-Reantaso and Arthur (1989) but almost all measurements except for blade length were different. The species has been subsequently reported from various cichlids and cyprinid fishes in South Africa and Israel by Basson *et al.*



Figs. 1-2. Silver impregnated adhesive discs of *Trichodina heterodentata* Duncan 1977.

(1983), Van *et al.* (1989, 1992) from *O. mossambicus* in Venezuela and Taiwan by Van *et al*. (1986), from *O. niloticus* in the Philippines by Bondad-Reantaso and Arthur (1989). *T. heterodentata*, thus, presents itself as a widely distributed and well-adapted trichodinid infesting as many as 27 species. Bondad-Reantaso and Arthur (1989), Van *et al.* (1989) reexamined the descriptions and photomicrographs of *T. heterodentata* as presented by Basson *et al.* (1983) and opined that these appear to fall well within the variability of *T. heterodentata* as described by Duncan (1977), Figs. 1-2. Van *et al.* (1989) commented on the origin of *T. heterodentata* and its possible transfer to different geographical areas through *O. mossambicus*. Because this host fish is indigenous to southeast Africa and they collected *T. heterodentata* from this region. Van *et al*. (1992) opined that this parasite, although originally described from the Philippines by Duncan (1977), originated from southern Africa, such as the Limpopo River System, which has not been exposed to introductions of fish from outside Africa. As presented by Duncan (1977), the appearance of silver-impregnated adhesive discs of *T. heterodentata* shows striking variation within each population and between the different populations. Considerable intra- and inter-population variations were also noted by other authors such as Basson *et al.* (1989), Van *et al.* (1984, 1986, 1989). Based on the denticle morphology it seems reasonable to assume that each population of *T. heterodentata* in Duncan's (1977) material could be a separate species, i.e., three species were described under a single name. Since the denticles may present some variability, as supported by Van *et al*. (1989), Basson and Van (1994), the specimens herein studied correspond to another report of *T. heterodentata* South Africa reported by Basson *et al.* (1983) and walking catfish *Clarias batrachus* is reported as a new host in India.

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