

Short Communication

**First record of *Trichodina centrostrigeata* Basson, Van As & Paperna, 1983
(Ciliophora: Trichodinidae) from *Oreochromis niloticus* (Linnaeus, 1758)
cultured in southeastern Mexico**

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ABSTRACT. Nile tilapia *Oreochromis niloticus* is one of the most economically important freshwater fish cultivated worldwide. Despite its importance and being one of the cichlid fish most studied from a parasitological point of view in Mexico, there are few studies about the ectoparasite protozoa that infect them. In this study, a total of 240 juvenile individuals of *O. niloticus* from an experimental culture (in Tabasco, Mexico) were examined to detect the presence of trichodinid parasites. Trichodinid parasites were impregnated with silver nitrate and stained with Harris' hematoxylin solution for taxonomic evaluation. A disc-shaped trichodinid with a body diameter of $38 \pm 3.3 \mu\text{m}$ adhesive disc diameter of $34 \pm 3.3 \mu\text{m}$ and a denticulate ring diameter of $19 \pm 2.1 \mu\text{m}$ was found. *Trichodina centrostrigeata* has been previously reported having specificity for cypriniform species, but in the present study, the Nile tilapia was reported as a new fish host and southeastern Mexico as a new geographical distribution for this parasite.

Keywords: *Trichodina*; Ciliophora; ciliated protozoa; ectoparasite; tilapia; Mexico

Ciliated protozoa of the genus *Trichodina* are one of the most common ectoparasites of both freshwater and marine fishes. These parasites are capable in some cases of inflicting significant damage to their hosts with resultant mortalities. Despite the threat they pose in other regions of the world, in Mexico, there are few studies (Rodríguez-Santiago, 2002). The study of parasites as pathogenic agents for host fish is important in the ingrowth processes, in particular in aquaculture conditions. Infestation in fish increases when they are cultured intensively since high density causes an increase in the parasite populations, which may cause an epizootic mainly in the case of parasites of a direct cycle such as certain protozoans (Woo, 1999). Trichodinids, known for their frequency and negative effects, have been found as parasites especially in weakfish in overpopulated conditions in supply pools

with low oxygen environments (Snieszko & Axelrod, 1971). Cichlids and carps are commonly affected by trichodinids which cause "epizootic" buds with great economic losses in cultures (Paperna, 1996). The larval stages of fish are the most sensitive to the development of protozoan diseases, including trichodiniasis. Clinical signs of trichodiniasis consist of an increase of the quantity of white mucus, fin raveling, lethargy, anorexia, scale loss and tendency to group near the water entrances. The fish present skin hyperemia and when the gills are involved it may cause asphyxia. The problem is more complicated when there are secondary infections, bringing as a consequence bacteria diseases, together constituting a set of considerable processes in the fish pathology. *Trichodina centrostrigeata* Basson, Van As & Paperna, 1983 (Basson *et al.*, 1983), among other ciliated parasites, are natives from Asia or Africa

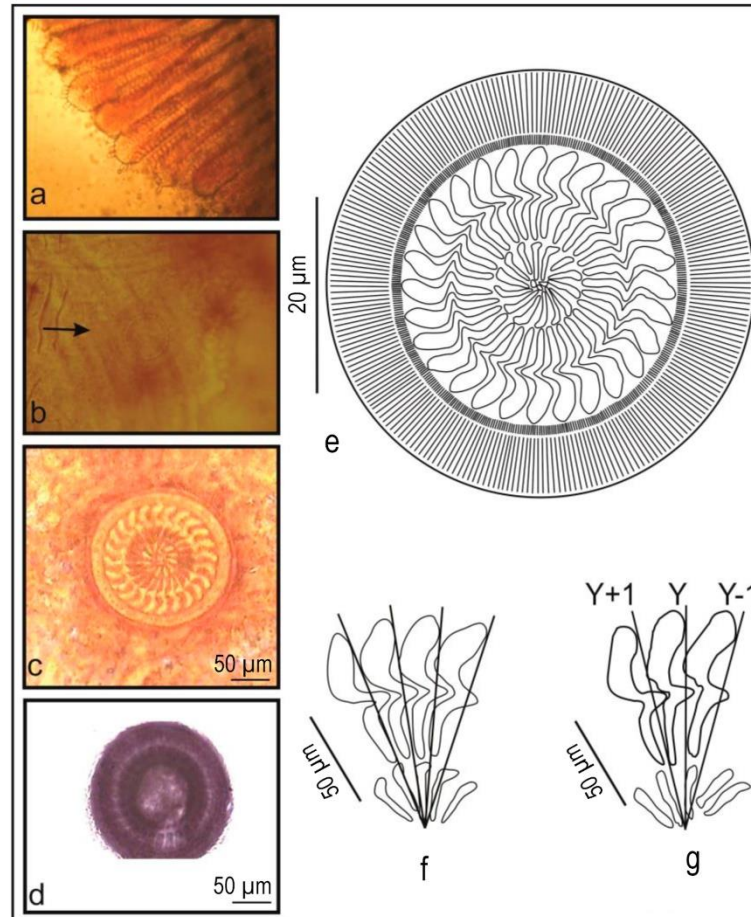


Figure 1. a) Trichodinids in a fresh-mounted smear from the gill arches, b) parasite *Trichodina centrostrigeata* in differential interference employing a contrast microscope, c) adhesive disc of parasite in silver nitrate impregnation, d) Ehrlich's acid hematoxylin stained nuclear apparatus of parasite, e) drawing of parasite whole body diagrammatic drawings of denticles, f-g) parasite of Nile tilapia from the present study, d) parasite of Nile tilapia of South Africa (Van As & Basson, 1984).

but have been disseminated to many localities worldwide (Rodríguez-Santiago, 2002). Understanding *Oreochromis niloticus* in cultured freshwater fish is central to the aquaculture industry in Mexico, which ranks 28th in the world with a production of 143,747 t of freshwater species (FAO, 2005, 2012, 2013).

In this study, we report a new geographic location in the southeastern region of Mexico for *T. centrostrigeata* parasitizing the skin, fins, and gills of *O. niloticus*, previously identified for *T. niloticus* from southern Africa (Basson *et al.*, 1983). Nile tilapia is cultured at high densities in fish farms in southeastern Mexico, Villahermosa (Tabasco). Fish showed characteristic disease signs: rubbing on the sides or bottom on the pond, caudal fin erosion, hemorrhagic areas in the skin (Valladão *et al.*, 2013, 2014, 2015, 2016), abundant slime and corneal opacity (29%). Smears of

trichodinids were taken from the skin and gills of 240 infested *O. niloticus* fingerlings and juveniles. The silvery stain by Klein (1958) was used for detailed observation of the denticle structures, the fixation disk characteristics and the number of their constituents, and the Harris' hematoxylin solution was used for the observation of the nuclear apparatus as additional information. The methodology reported by Lom (1958) and Wellborn (1967) was used for taxonomic identification. Once the tinted slides were mounted through the technique by Klein (1958), they were observed in detail under the optical microscope (Motic BA310E) searching for trichodinids (Fig. 1). Those that were completely mature and well-shaped with all the constituents of the adhesive disk clear and well tinted were selected. At a 1000x amplification, the denticle morphology of each one of the organisms was carefully

Table 1. Comparative measurements (μm) of *Trichodina centrostrigeata* taken from *Oreochromis niloticus* (Basson *et al.*, 1983), *O. mossambicus*, *Tilapia rendalli*, *Pseudocrenilabrus philander*, *T. sparrmanii* (Basson & Van As, 1994) and *O. niloticus* Egyptian variety (Rodríguez-Santiago, 2002). Rp/d: number of radial pins per denticle, Med: macronucleu external diameter. Numbers represent the absolute minimum, and maximum values observed. The average \pm SD (standard deviation) is indicated within parenthesis. The number located after SD indicates the quantity of trichodinid specimens that were measured.

	Basson <i>et al.</i> (1983) <i>Oreochromis niloticus</i>	Basson & Van As (1994) Cichlids and cyprinid	Rodríguez-Santiago (2002) <i>Oreochromis niloticus</i> Egyptian variety	This study <i>Oreochromis niloticus</i>
Position on host	Skin and fins	Skin and fins	Skin and fins	Skin and fins
Locality	South Africa	South Africa, Philippines	Sinaloa, Mexico	Villahermosa, Mexico
Body diameter	31.2-45.8 (37.6 \pm 3.6, 100)	30.0-45.0 (36.0 \pm 4.2, 16)	30-44 (37.51 \pm 3.9, 31)	30-43 (36.0 \pm 4.2, 25)
Adhesive disc diameter	18.7-33.3 (23.2 \pm 2.5, 100)	18.5-26.0 (21.7 \pm 2.4, 16)	18-38 (19.64 \pm 2.1, 31)	18-25.0 (21.7 \pm 2.4, 25)
Central rods	12-16 (14, 100)	13-16 (14, 12)	12-15 (13, 31)	12-16 (13, 25)
Number of denticles	26-30 (28, 100)	24-29 (26, 16)	23-29 (26, 31)	20-29 (26, 25)
Rp/d	6-7 (7, 100)	7-8 (8, 7)	6-8 (6, 31)	7-8 (7, 25)
Denticle length	2.0-6.2 (4.1 \pm 0.6, 100)	3.0-5.0 (4.3 \pm 0.6, 13)	3.3-5.6 (4.29 \pm 0.74, 31)	3-5.5 (4.1 \pm 0.6, 25)
Blade length	2.8-6.4 (5.2 \pm 0.7, 100)	5.0-6.0 (5.5 \pm 0.5, 15)	3.3-6.7 (4.55 \pm 0.77, 31)	5.0-6.5 (5.5 \pm 0.5, 25)
Ray length	1.13.0 (1.9 \pm 0.3, 100)	1.0-1.5 (1.1 \pm 0.2, 15)	2.22-6.7 (2.73 \pm 0.89, 31)	1.0-1.5 (1.1 \pm 0.3, 25)
Lightning length	3.2-6.0 (4.5 \pm 0.6, 100)	3.5-5.0 (4.3 \pm 0.6, 15)	3.3-7.8 (5.29 \pm 0.97, 31)	3-5.0 (4 \pm 0.6, 20, 25)
Med	20.9-49.7 (37.6 \pm 6.9, 23)	---	19-37 (32 \pm 7.4, 7, 13)	---

observed: blade and ray, the degree of silvery impregnation of the center of the adhesive disk and presence or absence of chitin structures, etc. The angle described by the adoral spiral was also observed. All of these characteristics were compared to the descriptions by Lom & Dyková (1992) to locate them taxonomically in a tentative way, and this was followed by the review of the original studies for the determination of the species, for which the corresponding measurements were also done. The specific differentiation was based on a description for trichodinids as ectoparasites of cichlids and cyprinid fishes in South Africa and Israel (Basson *et al.*, 1983). Trichodinids were counted using an optical microscope (Motic BA310E) at 60x and 100x magnification (Rodríguez-Santiago, 2002). Although *T. centrostrigeata* was documented in *T. nilotica* in northwestern Mexico by Rodríguez-Santiago (2002), this information was never formally published. The ectoparasite species found was identified as *Trichodina centrostrigeata*, which constitutes the first record for Mexico. The morphologic characteristics that led to its identification were: wide triangular denticle blades with blunt edges, a straight thorn rod-like shape and a curving slightly backward about the blade (Fig. 1). The morphometric characteristics of *T. centrostrigeata* are shown in Table 1. The taxonomical characteristics considered were: wide triangular denticle blades with blunt edges, a straight thorn rod-like shape and a curving slightly backward about the blade.

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