First record of *Trichodina heterodentata* (Ciliophora: Trichodinidae) from channel catfish, *Ictalurus punctatus* cultivated in Brazil

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(With 2 figures)

Abstract

This study characterises morphologically *Trichodina heterodentata* Duncan, 1977 from channel catfish, *Ictalurus punctatus* (Rafinesque, 1818) in the State of Santa Catarina, Brazil. Body and gill smears were air-dried at room temperature, impregnated with silver nitrate and/or stained with Giemsa. Ten characteristics were selected to compare the present material with other morphological characterisations of *T. heterodentata*. Prevalence rate was 100%, mean intensity 89,333.70 (3,125 to 299,100 parasites per host). *Trichodina heterodentata* was considered medium-sized trichodinid with mean body diameter 59.4 ± 8.5 µm, denticulate ring 38.5 ± 4.5 µm, adhesive disc 60.2 ± 6.7 µm diameter and 24.4 ± 1.6 denticles. In relation to previous reports of *T. heterodentata* this material resembles in 90% of the analysed characters. This work confirms the biometrical variation that exists in the different populations of *T. heterodentata*. A list of hosts and comparative measurements of *T. heterodentata* are presented and the channel catfish is considered a new host.

Keywords: channel catfish, trichodinid, *Trichodina heterodentata*, morphology.

Primeiro registro de *Trichodina heterodentata* (Ciliophora: Trichodinidae) em bagre-do-canal, *Ictalurus punctatus* cultivado no Brasil

Resumo

Este estudo caracteriza morfologicamente *Trichodina heterodentata* Duncan, 1977 em bagre-do-canal, *Ictalurus punctatus* (Rafinesque, 1818) no Estado de Santa Catarina, Brasil. Esfregaços do corpo e brânquias foram secados à temperatura ambiente, impregnados com nitrato de Prata e/ou corados com Giemsa. Dez características foram selecionadas para comparar o presente material com as diferentes caracterizações morfológicas de *T. heterodentata*. A taxa de prevalência foi de 100%, a intensidade média foi de 89.333.75 (3.125 a 299.100 parasitos por hospedeiro). *Trichodina heterodentata* foi considerado um tricodinídeo de tamanho médio com a média do diâmetro do corpo de 59,4 ± 8.5 µm, anel denticulado 38,5 ± 4,5 µm, disco adesivo 60,2 ± 6,7 µm de diâmetro e 24,4 ± 1,6 dentículos. Em relação a registros prévios de *T. heterodentata*, 90% das características foram semelhantes. Este trabalho confirma a variação biométrica que existe em diferentes populações de *T. heterodentata*. Uma lista de hospedeiros e medidas comparativas de *T. heterodentata* são apresentadas e o bagre-do-canal considerado um novo hospedeiro.

Palavras-chave: bagre do canal, tricodinídeo, *Trichodina heterodentata,* morfologia.

1. Introduction

Trichodinids are among one of the most common ectoparasites in wild and cultivated fish (Basson and Van As, 1994, Martins and Ghiraldelli, 2008). This parasite occurs normally in a few numbers on mucous surface and gills. When the relationship host/parasite/environment is broken by nutritional deficiency, poor water quality, infectious and/or parasitic diseases trichodinids may proliferate being responsible for severe epidermal lesions and disease outbreaks, as reported by Madsen et al. (2000), Martins et al. (2002), Khan (2004) and Huh et al. (2005).

In pond-reared fishes, they have been found on channel catfish, *Ictalurus punctatus* (Rafinesque, 1818) (see Wellborn, 1967), *Clarias gariepinus* (Burchell, 1822) (see Basson and Van As, 1991) and *Heterobranchus longifilis* Valenciennes, 1840 (see Ekanen and Obiekezie, 1996); on perch, *Perca fluviatilis* (Linnaeus, 1758) and roach, *Rutilus rutilus* (Linnaeus, 1758) (see Halmetoja et al., 1992); in carp, *Hypophtalmichthys molitrix* (Valenciennes, 1844) (see Nikolic and Simonovic, 1998); in eel, *Anguilla anguilla* (Linnaeus, 1758) (see

Madsen et al., 2000), and in marine cultivated fishes in Korea (Xu et al., 2001).

In Brazil, fish trichodinids were reported in cultivated Nile tilapia, *Oreochromis niloticus* (Linnaeus, 1758) (Vargas et al., 2000, Tavares-Dias et al., 2001, Ranzani-Paiva et al., 2005, Ghiraldelli et al., 2006 a, b, Martins and Ghiraldelli, 2008); in pacu *Piaractus mesopotamicus* (Holmberg, 1887), piauçu *Leporinus macrocephalus* Garavello and Britski, 1988, carp *Cyprinus carpio* (Linnaeus, 1758); and in mullet, *Mugil platanus* Günther, 1880 (Ranzani-Paiva and Silva-Souza, 2004).

However, in only a few reports are the trichodinids involved identified to species level. This includes *Trichodina steini* Claparede and Lachmann, 1858 from *Bufo ictericus* Spix, 1824 (Kattar, 1975), *Trichodina acuta* Lom, 1961 from *Xiphophorus maculatus*, Gunther, 1866, *X. helleri*, Heckel, 1848, *Betta splendens* Regan, 1910 and *Carassius auratus* Linnaeus, 1758 (Piazza et al., 2006), *Trichodina compacta* Van As and Basson, 1989 reported by Ghiraldelli et al. (2006a) and *Trichodina magna* Van As and Basson, 1989 by Martins and Ghiraldelli (2008) in Nile tilapia *O. niloticus*, *Trichodina machadoi* registered in gastropod *Biomphalaria schrammi* (Crosse, 1864) by Pinto et al. (2006) and *Trichodina heterodentata* found on the body and tail of the tadpole *Rhinella pombali* Baldissera, Caramaschi and Haddad, 2004 (Dias et al., 2009)

This study characterises morphologically *Trichodina heterodentata* Duncan, 1977 in pond-reared channel catfish in the State of Santa Catarina, Southern Brazil. Prevalence, mean intensity of infestation and a list of hosts and comparative measurements were also reported.

2. Material and Methods

Four specimens of channel catfish of 29.5 ± 2.3 cm total length were collected in July 2007 in a farm situated in the municipality of Porto União (26° 14' 17'' S and 51° 04' 42'' W), Santa Catarina, Brazil. Fish were maintained at 1.4 fish.m^{-2} stocking density in ponds of 3,500 m^2 with constant flow of water. In the day of sampling the pH was 5.4 to 6.9; alkalinity 24 to 44 mg.L^{-1}; total ammonia 0.5 to 3.0 mg.L^{-1}; dissolved oxygen 6.2 to 10.8 mg.L^{-1}. Water temperature three days before fish sampling was 13.3 to 15.2 °C and on the day of parasitological examination, it was 9.2 to 10.8 °C.

Wet smears of skin and gills were prepared in the field and examined under the microscope. When parasites were present the smears were air-dried and impregnated with Klein's dry silver method for observation of the adhesive disc as suggested by Lom (1958). Other smears were stained with Giemsa's solution to reveal the nuclear apparatus. The span of the denticle was measured from the tip of blade to the tip of ray as described by Arthur and Lom (1984). The body diameter is the dimension of the adhesive disc plus the border membrane. Wet mounts from the specimens preserved in 5% formalin solution were studied for the observation of adoral ciliature. All measurements are in micrometres and follow the recommendations of Lom (1958) and Van As and Basson (1989). Arithmetic means ± standard deviation is followed, in parentheses, by the minimum and maximum values and number of specimens or structures measured. To compare biometrically our specimens of *T. heterodentata* with others from previous records, 10 characteristics were selected as the most important in a primary observation before morphological comparison, which are: body size, adhesive disc, denticle ring, number of denticles, denticle length, blade length, ray length, central part width and span.

3. Results

All fish examined were parasitised (100% prevalence) with mean intensity of 89,333.75 ± 141,583.80 varying from 3,125; 4,416; 50,694 and 299,100 parasites per host.

Characterised as a medium-sized trichodinid with disc-shaped body; convex adoral surface with ciliature of 307.0° ± 12.6 (292-325, 11); aboral side with slightly concave adhesive disc; centre of adhesive disc did not show granules in silver-impregnated specimens. From the Giemsa-stained specimens the macronucleus also presents a horseshoe-shaped 43.2 ± 4.7 (32-49, 26) of external diameter and 11.0 ± 2.2 (7-17, 26) thickness. The distance between the terminations of macronucleous is 17.6 ± 8.4 (11-27, 26); micronucleus was not observed. The denticles are characterised by wide blade and sickle-shaped provided by apophysis on blade connection with the central part (Figure 1a). The blade fills the space between y and y – 1 axes. Central part robust ending rounded fitting on the next denticle filling the space between y and y – 1 axes. Ray long, robust, slightly directed anteriorly situated between the axes y and y + 1, tapering rounded provided by a relatively short apophysis (Figure 1b). Several specimens studied showed inconstant shape and length of ray.

4. Remarks

Trichodinids reproduces by binary fission and it has been the subject of study since the previous century (Kruger et al., 1995). Figure 2 shows one of the last steps of *T. heterodentata*`s reproduction, showing blades in the process of development whilst the old ring is being resorbed. According to Kruger et al. (1995), the original denticle ring maintains its position but loses its shape. The altering of the original shape of the denticle ring is the result of the resorption process that appears to erode the denticles from the aboral side.

Comparing the measurements of the specimens herein described, 50% out of 10 characters were similar to *T. magna*, *Trichodina claviformis* Dobberstein and Palm, 2000, *Trichodina mutabilis* Kazubski, 1968 and *Trichodina subtilihamata* Tang, Zhao and Tao, 2007; 60% similar to *Trichodina cancilae* Asmat, 2001 and 70% similar to *Trichodina wulai* Basson and Van As, 1994 and *Trichodina gulshae* Asmat, Kibria and Naher, 2003. Nevertheless, 90% of characters were similar to *T. heterodentata*.

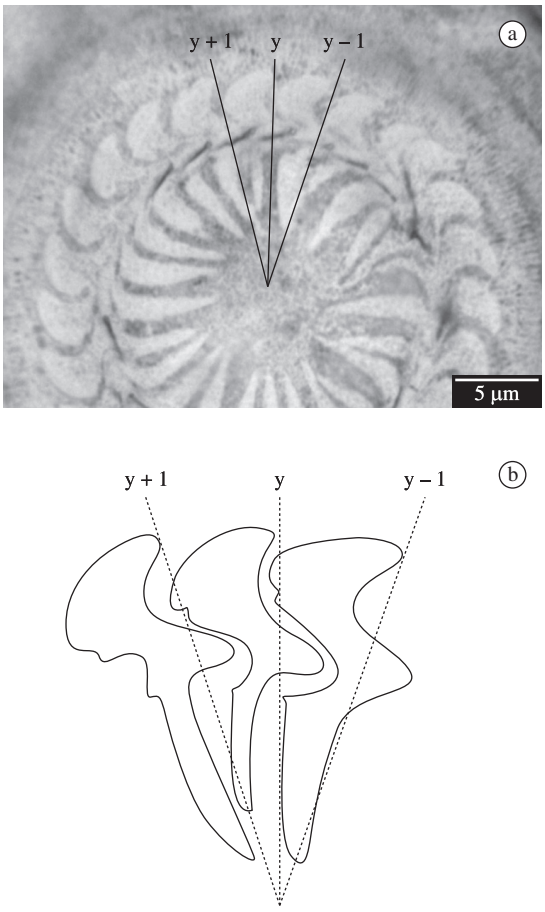

Figure 1. a) Photomicrographs of *Trichodina heterodentata* from *Ictalurus punctatus* cultured in the State of Santa Catarina; and b) Schematic drawing of the denticles of *T. heterodentata.*

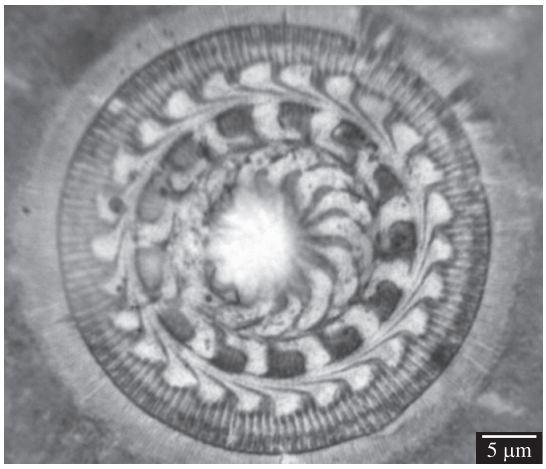

Figure 2. An adhesive disc of *Trichodina heterodentata* during binary fission.

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 (Table 1-4). 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 present specimens showed similar measurements of adhesive disc, denticulate ring and the dimensions of denticles when compared to population B and C of Duncan (1977) and those studied by Van As and Basson (1989). A lower number of denticles was reported in specimens described by Van As and Basson (1989, 1992), but a higher number was noted in two populations originally described by Duncan (1977) (Table 1). In fact, comparing the present material from channel catfish with *T. heterodentata*, a great number of characters measured coincided. Another point that must be commented is the position of ray and blade in relation to y axes. As demonstrated by illustrations of Van As and Basson (1989, 1992) the blade fills the space between y and y – 1 axes. The central part is robust filling the space between y and y – 1 axes. Finally, the length of ray is longer than the length of blade slightly directed anteriorly situated between the axes y and y + 1.

This species resembles the size of *Trichodina vallata* Wellborn, 1967 described from channel catfish (Wellborn, 1967). On the other hand, the adhesive disc and the denticulate ring diameters, as well as the number of denticles were lower than that observed in this work. In relation to *Trichodina discoidea* also described by Wellborn (1967) in channel catfish the number of denticles and the length of blade and ray were similar, but significant lower diameters of body, adhesive disc and denticulate ring were found. Despite the fact that it occurs in wild and cultured channel catfish, the shape of the denticle of *T. discoidea* and *T. vallata* was significantly different when compared to *T. heterodentata* herein characterised.

Due to the fact that the denticles may present some variability, as supported by Van As and Basson (1989) and Basson and Van As (1994), the specimens herein studied correspond to another report of *T. heterodentata* in Brazil and channel catfish is reported as a new host. As to confirming the variation that exists in *T. heterodentata* populations, the present material showed slightly higher measurements of the adhesive disc, denticulate ring, central part width and span than those found in *T. heterodentata* reported by Al-Rasheid et al. (2000) and Asmat (2004), and higher denticulate ring diameter when compared to Dove and O'Donoghue (2005) reports. The characterisation of *T. heterodentata* from tadpoles (Dias et al., 2009) showed lower measurements of denticulate ring and denticle length.

In relation to host specificity, the capacity of trichodinids to occur or not in a special host might be discussed and contested. For example, *T. heterodentata* was found in different fish families as showed in Table 5. On the other

Table 1. Measurements of the most similar species of *Trichodina* with the present material. The means are followed by standard deviation, and in parenthesis the minimum and maximum values.

Characters	*Trichodina heterodentata* Duncan, 1977 (Present study)	*Trichodina heterodentata* Duncan, 1977 Population B	*Trichodina heterodentata* Duncan, 1977 in Van As and Basson (1992)	*Trichodina heterodentata* Duncan, 1977 in Basson and Van As (1994)	*Trichodina heterodentata* Duncan, 1977 in Al-Rasheid et al. (2000)
Body[D]	59.4 ± 8.5 (27.0-77.0; 34*)	80.0 (58.0-108.0)	48.8 ± 2.5 (45.5-52.5)	53.9 ± 3.7 (49.0-61.0)	54.6 (51.2-60.0)
Border membrane[W]	5.1 ± 1.7 (3.0-7.0; 34)	4.7 (3.4-5.5)	3.4 ± 0.6 (3.0-4.5)	4.8 ± 0.3 (4.0-5.0)	3.5 (4.0-5.0)
Adhesive disc[D]	60.2 ± 6.7 (40.0-72.0; 42)	57.0 (45.0-74.0)	41.8 ± 1.7 (40.0-44.0)	44.4 ± 3.5 (40.0-52.0)	46.2 (44.0-52.0)
Denticulare ring[D]	38.5 ± 4.5 (27.0-47.0; 42)	36.0 (29.0-45.0)	24.5 ± 1.0 (23.0-25.5)	27.9 ± 2.6 (24.5-32.5)	31.6 (28.0-36.0)
Denticle number	24.4 ± 1.6 (23.0-28.0; 42)	26.0 (20.0-31.0)	21.0 (20.0-22.0)	22.0 (21.0-24.0)	23.0 (21.0-24.0)
Denticle[L]	10.3 ± 1.2 (7.0-13.0; 126)	9.2 (7.5-11.0)	7.1 (6.0-8.0)	7.4 ± 0.7 (6.0-9.0)	9.2 (8.0-10.4)
Blade[L]	6.2 ± 0.8 (4.0-8.0; 126)	5.7 (4.7-7.1)	4.1 ± 0.9 (2.0-5.0)	4.8 ± 0.3 (4-5.5.0)	6.3 (5.6-7.2)
Ray[L]	8.5 ± 1.7 (3.0-12.0; 126)	-	6.3 ± 0.9 (5.5-7.5)	6.4 ± 0.4 (5.5-7.0)	7.5 (6.4-8.8)
Central part[W]	3.8 ± 0.7 (2.0-6.0; 126)	2.6 (1.4-3.4)	2.5 ± 0.7 (1.5-4.0)	2.3 ± 0.3 (2.0-3.0)	2.2 (1.6-2.4)
Span	18.4 ± 2.2 (12.0-22.0; 126)	-	12.0 ± 0.8 (11.5-14.5)	13.8 ± 0.8 (12.0-16.0)	14.6 (12.8-16.0)
Radial pins/denticle	11.8 ± 2.1 (5.0-15.0; 42)	10.0 (6.0-14.0)	11.0 (10.0-12.0)	10.0 (8.0-10.0)	12.0 (10.0-13.0)

[D]Diameter; [W]Width; [L]Length; *the number of structures measured.

Table 2. Measurements of the most similar species of *Trichodina* with the present material. The means are followed by standard deviation, and in parenthesis the minimum and maximum values.

Characters	*Trichodina puytoraci* Lom, 1962 in Mitra and Haldar (2005)	*Trichodina discoidea* Wellborn, 1967	*Trichodina vallata* Wellborn, 1967	*Trichodina siluri* Lom, 1970 in Bondad-Reantaso and Arthur (1989)	*Trichodina magna* Van As and Basson, 1989 in Martins and Ghiraldelli (2008)
Body[D]	45.0 (37.0-62.0)	42.0 (36.0-50.0)	61.0 (52.0-70.0)	49.0 ± 3.0 (45.8-53.0)	84.3 (47.0-104.0)
Border membrane[W]	3.5 (2.9-4.1)	1.0-2.0	4.0 (3.0-5.0)	4.0 ± 0 (4.0)	7.2 (33.0-83.0)
Adhesive disc[D]	32.0 (27.0-38.0)	44.0 (36.0-51.0)	44.0 (31.0-49.0)	41.5 (37.1-45.0)	60.7
Denticulare ring[D]	20.0 (17.0-25.0)	23.0 (18.0-27.0)	27.0 (24.0-29.0)	24.2 ± 1.7 (22.1-26.1)	38.5 (24.0-56.0)
Denticle number	24.0 (20.0-27.0)	23.0 (19.0-26.0)	22.0 (20.0-23.0)	25.5 ± 1.0 (24.0-27.0)	26.0 (23.0-29.0)
Denticle[L]	4.5 (2.9-5.3)	7.0 (6.0-9.0)	10.0 (9.0-11.0)	6.0 ± 0.2 (5.9-6.3)	20.3 (15.0-26.0)
Blade[L]	3.9 (3.4-4.8)	5.0 (4.0-6.0)	5.5 (4.5-6.0)	5.4 ± 0.5 (4.7-6.3)	7.0 (3.0-8.0)
Ray[L]	3.4 (2.9-4.6)	5.0 (4.0-6.0)	7.0 (6.5-7.5)	5.8 ± 0.3 (5.5-6.5)	11.3 (8.0-15.0)
Central Part[W]	1.4 (1.0-2.0)	1.5-2.0	1.5-2.0	1.6 ± 0.8 (1.2-1.9)	3.6
Span	8.8 (7.6-10.4)	-	-	12.9 ± 0.4 (12.6-13.4)	28.6
Radial pins/denticle	7.0 (6.0-8.0)	-	-	-	7.7

[D]Diameter; [W]Width; [L]Length.

Table 3. Measurements of the most similar species of *Trichodina* with the present material. The means are followed by standard deviation, and in parenthesis the minimum and maximum values.

Characters	*Trichodina maritinkae* Basson and Van As, 1991	*Trichodina sangwala* Van As and Basson, 1992	*Trichodina canton* Basson and Vans As, 1994	*Trichodina wulai* Basson and Van As, 1994	*Trichodina claviformes* Dobberstein and Palm, 2000
Body[D]	51.2 (36.5-60.5)	61.1 (49.5-69.5)	59.1 (50.9-66.5)	66.9 (57.0-72.0)	85.3 (74.7-100.9)
Border membrane[W]	4.2 (2.2-5.4)	5.1 (4.5-6.5)	4.5 (3.5-5.0)	5.0-6.5	5.4 (3.9-6.6)
Adhesive disc[D]	42.9 (31.1-50.2)	50.7 (39.0-59.0)	50.3 (43.0-57.0)	56.3 (47.0-62.0)	59.3 (51.1-66.8)
Denticulare ring[D]	23.0 (18.0-27.0)	29.9 (23.5-37.0)	30.6 (26.0-34.0)	33.9 (28.0-37.0)	39.2 (28.2-43.9)
Denticle number	25.0 (23.0-26.0)	28.0 (23.0-31.0)	25.0 (25.0-31.0)	26.0 (24.0-26.0)	26.0-27.0 (25.0-29.0)
Denticle[L]	6.6 (5.3-7.7)	6.4 (5.5-7.5)	7.7 (7.0-8.0)	8.6 (7.5-10.0)	8.9 (7.9-10.1)
Blade[L]	4.8 (3.8-5.8)	5.5 (4.0-6.5)	5.7 (4.0-7.0)	5.9 (5.0-6.5)	5.7 (3.9-7.2)
Ray[L]	6.9 (5.7-8.4)	7.5 (4.5-10.0)	6.9 (6.0-8.0)	8.1 (7.0-10.0)	-
Central Part[W]	2.2 (1.6-2.7)	2.5 (2.0-3.0)	2.3 (2.0-3.0)	3.0 (2.5-4.0)	2.3 (1.7-3.3)
Span	-	12.5-18.5	15.1 (13.0-16.0)	17.2 (15.0-20.0)	11.7 (9.0-14.4)
Radial pins/denticle	10.0 (9.0-12.0)	10.0 (9.0-12.0)	10.0-12.0	10.0 (9.0-11.0)	10.0-11.0

[D]Diameter; [W]Width; [L]Length.

Table 4. Measurements of the most similar species of *Trichodina* with the present material. The means are followed by standard deviation, and in parenthesis the minimum, maximum values and the number of structures measured.

Characters	*Trichodina cancilae* Asmat, 2001	*Trichodina gulshae* Asmat, Kibria and Naher, 2003	*Trichodina bassonae* Dove and O´Donoghue, 2005	*Trichodina mutabilis* Kazubski and Migala, 1968	*Trichodina subtilihamata* Tang, Zhao and Tao, 2007
Body[D]	61.9 (50.0-70.4)	65.5 (50.0-85.5)	-	65.4 (57.0-70.0)	52.2 (50.0-56.0)
Border membrane[W]	4.7 (3.1-6.1)	6.4 (3.1-7.6)	-	5.6 (4.6-6.5)	4.6 (4.0-5.0)
Adhesive disc[D]	52.0 (41.8-60.3)	56.6 (43.0-71.4)	33.3 (30.2-37.9)	52.4 (46.0-58.0)	42.3 (38.0-48.0)
Denticulare ring[D]	36.9 (30.6-46.6)	35.5 (28.6-45.9)	22.9 (19.7-26.4)	52.6 (29.0-37.5)	28.2 (26.0-30.0)
Denticle number	29.8 (28.0-32.0)	24.6 (21.0-28.0)	24.0 (23.0-26.0)	27.1 (23.0-29.0)	26.0-29.0
Denticle[L]	8.7 (7.1-10.3)	9.0 (6.1-11.2)	-	7.4 (7.0-8.0)	5.6 (5.0-7.0)
Blade[L]	6.1 (5.1-7.1)	6.8 (5.1-8.2)	2.9 (2.5-3.6)	6.5 (6.0-7.0)	5.4 (5.0-6.0)
Ray[L]	9.1 (6.1-14.3)	6.3 (5.1-7.6)	3.5 (3.0-4.4)	7.5 (6.5-8.0)	6.6 (5.0-8.0)
Central Part[W]	4.0 (2.0-4.6)	3.8 (3.1-5.1)	2.8 (2.2-3.5)	1.9 (1.5-2.5)	2.3 (2.0-3.0)
Span	17.4 (12.3-23.5)	16.9 (13.8-19.9)	9.8 (8.7-10.8)	16.4 (15.0-18.0)	15.6 (13.0-17.0)
Radial pins/denticle	10.7 (8.0-12.0)	9.8 (7.0-13.0)	10.0 (9.0-11.0)	10.0 (9.0-11.0)	10.0-12.0

Table 5. Fish hosts of *Trichodina heterodentata* Duncan, 1977.

Hosts	Reference
Alestidae	
Hydrocynus forskali	Al-Rasheid et al. (2000)
Ambassidae	
Ambassis agassizi	Dove and O´Donoghue (2005)
Anabantidae	
Anabas testudineus	Asmat (2004)
Apogonidae	
Glossamia gilii	Dove and O´Donoghue (2005)
Balitoridae	
Crossostoma lacustre	Basson and Van As (1994)
Characidae	
Micralestes actuidens	Van As and Basson (1989)

Table 5. Continued...

Hosts	Reference
Cobitidae	
Misgurnus anguillicaudatus	Basson and Van As (1994)
Cichlidae	
Chetia flaviventris	Van As and Basson (1989)
Oreochromis aureus	Van As and Basson (1989)
Oreochromis mossambicus	Duncan, 1977, Basson, Van As and Paperna (1983), Van As and Basson (1986, 1989), Dove and O´Donoghue (2005)
Oreochromis niloticus	Bondad-Reantaso and Arthur (1989), Arthur and Quang Te (2006)
Pseudocrenilabrus philander	Van As and Basson (1989, 1992)
Sarotherodon galilaeus	Basson, Van As and Paperna (1983), Van As and Basson (1989)
Tilapia rendalli	Basson, Van As and Paperna (1983)
Tilapia sparrmanii	Basson, Van As and Paperna (1983)
Tilapia zillii	Duncan, 1977
Tilapia fry	Basson, Van As and Paperna (1983)
Tilapia sp.	Basson and Van As (1994)
Cyprinidae	
Acanthobrama sp.	Van As and Basson (1989)
Barbus eutaenia	Van As and Basson (1989)
Barbus marequensis	Van As and Basson (1989)
Barbus paludinosos	Basson, Van As and Paperna (1983)
Barbus trimaculatus	Basson, Van As and Paperna (1983), Van As and Basson (1989)
Carassius auratus	Basson, Van As and Paperna (1983), Van As and Basson (1989), Basson and Van As (1994)
Candida barbata	Basson and Van As (1994)
Ctenopharyngodon idella	Basson, Van As and Paperna (1983), Albaladejo and Arthur (1989), Van As and Basson (1989)
Cyprinus carpio	Basson, Van As and Paperna (1983), Basson and Van As (1994), Dove and O´Donoghue (2005)
Hypophthalmichthys molitrix	Basson and Van As (1994)
Hypophthalmichthys nobilis	Albaladejo and Arthur (1989)
Labeo cylindricus	Van As and Basson (1989)
Neobola bravianalis	Van As and Basson (1989)
Puntius gelius	Asmat (2004)
Sarcocheilichthys nigripinnis	Basson and Van As (1994)
Eleotridae	
Hypseleotris compressa	Dove and O´Donoghue (2005)
Hypseleotris galii	Dove and O´Donoghue (2005)
Hypseleotris klunzingeri	Dove and O´Donoghue (2005)
Philypnodon grandiceps	Dove and O´Donoghue (2005)
Galaxiidae	
Galaxias maculatus	Dove and O´Donoghue (2005)
Galaxias olidus	Dove and O´Donoghue (2005)
Gerreidae	
Gerres sp.	Dove and O´Donoghue (2005)
Gobiidae	
Rhinogobius brunneus	Basson and Van As (1994)
Glossogobius giurus	Van As and Basson (1989)
Ictaluridae	
Ictalurus punctatus	Present study

hand, *Trichodina sylhetensis* Asmat, Hafizuddin and Habib, 2003, *Trichodina aplocheilusi* Asmat, Afroz and Mohammad, 2005 and *Trichodina chittagongensis* Asmat, Afroz and Mohammad, 2005 were found respectively in *Nandus nandus* Hamilton, 1822, *Aplocheilus panchax* Hamilton, 1822 and *Labeo bata* by Hamilton, 1822 Asmat et al. (2003) and Asmat et al. (2005). In this way, the low host specificity of trichodinids can be contested according to published data. We can assume that existing variability in trichodinid host-specificity according to the environment quality in a fish farm and fish species.

5. Taxonomic Summary

- Type hosts: *Oreochromis mossambicus*, *Tilapia zilli*, *Trichogaster trichopterus*
- Type locality: Phillipines
- New host: channel catfish, *Ictalurus punctatus*
- New locality: Porto União (26° 14' 17'' S and 51° 04' 42'' W), Santa Catarina, Brazil
- Site of infection: skin and gills
- Synonyms: *Trichodina equatorales* Kazubski, 1986 (see Bondad-Reantaso and Arthur, 1989)

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