

Trichodinid ectoparasites (Ciliophora: Peritrichida) of some River Nile fish, Egypt

Khaled A.S. Al-Rasheid^{a,*}, Mohammed A. Ali^b, Thabit Sakran^c,
Abdel Azeem Abdel Baki^c, Fathy A. Abdel Ghaffar^{a,d}

^aDepartment of Zoology, College of Science, King Saud University, P.O. Box 2455, Riyadh 11451, Saudi Arabia

^bNational Institute of Oceanography and Fisheries, Cairo, Egypt

^cZoology Department, Beni-Suef Faculty of Science, Cairo University, Cairo, Egypt

^dZoology Department, Faculty of Science, Cairo University, Cairo, Egypt

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Abstract

Four species of trichodinid ectoparasites (Ciliophora: Peritrichida) were collected from the gills of the following River Nile fish in Egypt: *Hydrocynus forskalii*, *Mormyrus kannume*, *Schilbe mystus*. These species are: *Trichodina heterodontata* Duncan, 1977, *Trichodina fahaka* sp. n., *Trichodinella epizootica* Raabe, 1950, *Tripartiella dactyloidentata* sp. n. Photomicrographs and morphometric data are presented for each species. © 2000 Elsevier Science Ireland Ltd. All rights reserved.

Keywords: Trichodinid; Fish ectoparasites; Ciliophora; Peritrichida; Nile River; Egypt

1. Introduction

Trichodinid ectoparasites can cause serious threats, particularly under culture conditions [1]. However, these parasites are still scarcely studied

in Africa except in South Africa. In Egypt, a few studies were carried out on trichodinids [2,3]. In this work, four ectoparasitic trichodinids are described from Nile fish including two new species.

2. Materials and methods

Freshly caught fish specimens were collected from the River Nile at Beni-Suef (120 km south

* Corresponding author. Tel.: +966-1-4675758; fax: +966-1-4678514.

E-mail address: krasheid@ksu.edu.sa (K.A. Al-Rasheid).

of Cairo) from May, 1996 to December, 1997. A total of 411 Nile fish of different sizes were examined. These fish were identified according to Bailey [4] as follows: *Barbus bynni* (50 fish), *Labeo niloticus* (64 fish), *Tetradon fahaka* (100 fish), *Malpterurus electricus* (30 fish), *Schilbe mystus* (66 fish), *Mormyrus kannume* (53 fish), *Hydrocynus forskalii* (eight fish), *Synodontis schall* (40 fish). Smears were made from gills and skin and impregnated with silver nitrate. Measurements follow the specific characteristic systems of Lom [5] and Welborn [6]. The denticle description was carried out according to Van As and Basson [7]

and Basson and Van As [8]. All measurements are expressed in micrometers with mean \pm S.D. (range).

3. Results

Only four fish species were infested and all trichodinids were collected from the gills.

3.1. *Trichodina heterodontata* Duncan, 1977

Figs. 1, 2 and 11a; Host: *Hydrocynus forskalii*.

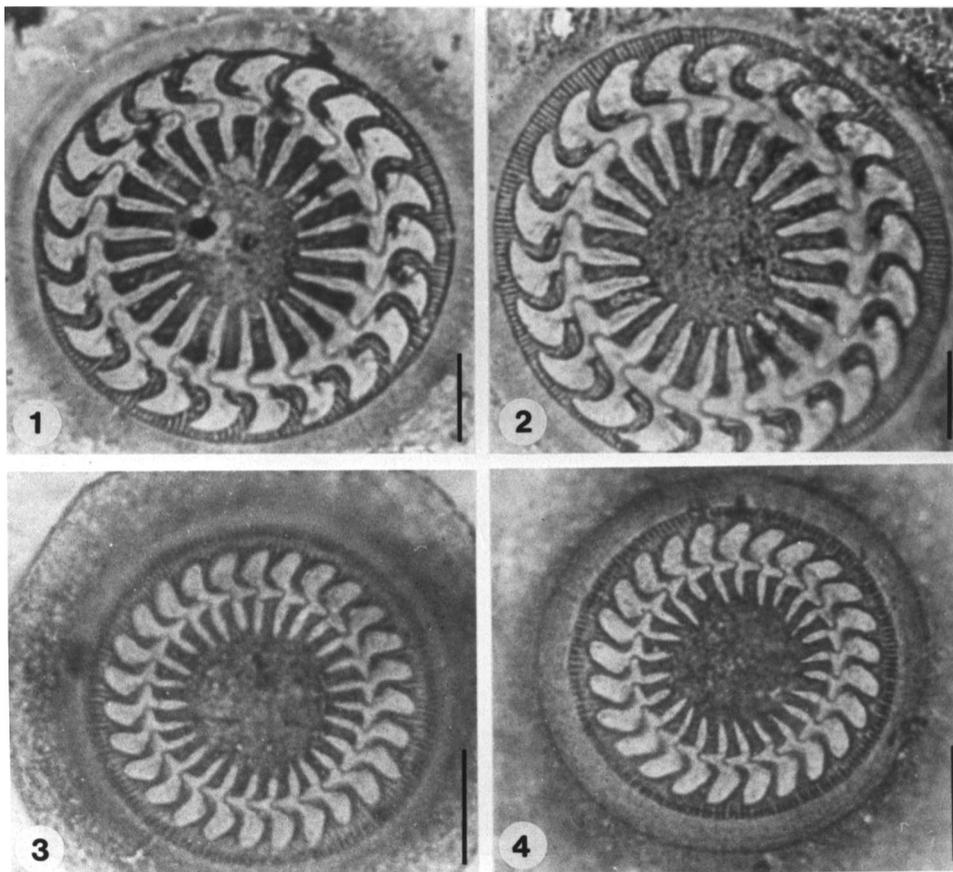


Fig. 1. Photomicrographs of silver-impregnated adhesive discs of *Trichodina* spp. *Trichodina heterodontata* Duncan, 1977 (scale bar = 2.5 μ m).

Fig. 2. Photomicrographs of silver-impregnated adhesive discs of *Trichodina* spp. *Trichodina heterodontata* Duncan, 1977 (scale bar = 2.5 μ m).

Fig. 3. Photomicrographs of silver-impregnated adhesive discs of *Trichodina* spp. *Trichodina fahaka* sp. n. (scale bar = 2.5 μ m).

Fig. 4. Photomicrographs of silver-impregnated adhesive discs of *Trichodina* spp. *Trichodina fahaka* sp. n. (scale bar = 2.5 μ m).

3.1.1. Description

Body comparatively large with a diameter of 54.6 ± 4.1 (51.2–60.0), adhesive disc concave, 46.2 ± 3.2 (44.0–52.0) in diameter, border membrane 3.5 ± 0.5 (4.0–5.0) wide, denticle ring 31.6 ± 2.7 (28.0–36.0) in diameter, number of denticles 23 (21–24), number of radial pins per denticle 12 (10–13), dimensions of denticle, length 9.2 ± 0.9 (8.0–10.4), blade 6.3 ± 0.8 (5.6–7.2), central part 2.2 ± 0.3 (1.6–2.4), ray 7.5 ± 0.8 (6.4–8.8), span 14.6 ± 1.4 (12.8–16.0).

3.1.2. Taxonomic affinity

The morphology and general dimensions of the present *Trichodina* match with different reports of *T. heterodentata*. It is similar in dimensions to the original description of Duncan [11] and other descriptions of Basson et al. [12], Basson and Van As [13] and Van As and Basson [7,14]. *T. heterodentata* is characterized by its population variations as observed in the original description [9] and in re-description by Van As and Basson [7]. Such variations were encountered in the population described during this study.

3.2. *Trichodina fahaka* sp. n.

Figs. 3, 4 and 11b; Host: *Tetradon fahaka*.

The intensity of infestation with this trichodinid was always very high and it prevailed almost throughout the year.

3.2.1. Description

A medium-sized trichodinid with a disc- to bell-shaped body, diameter 32.9 ± 0.9 (31.4–34.3), adhesive disc; concave, 27.7 ± 0.7 (26.5–28.4) in diameter, border membrane 3.7 ± 0.5 (2.5–3.9) wide, denticle ring diameter 18.6 ± 0.8 (17.6–19.6). The number of radial pins per denticle 6 (6–7), number of denticles: 25 (24–27), dimensions of denticle, length 3.7 ± 0.4 (2.9–4.1), blade 3.6 ± 0.2 (3.2–3.9), central part 1.1 ± 0.1 (0.9–1.2), ray 2.8 ± 0.3 (2.1–3.1), span 7.3 ± 0.4 (6.9–7.6).

3.2.2. Denticle description

The blade is broad, rectangular, filling all the spaces between the Y-axis. The distal surface is flat or slightly curved. The tangent point to the

Y-axis is flat and forms a small line. The anterior blade surface slopes gently to form an angle of approximately 45° (with the Y + 1 axis). A blade apex is present, rounded and almost touches the Y + 1 axis. Blade apophysis is present. The posterior blade surface forms a shallow curve with the deepest point at the lower third. Blade connection is thin and no posterior projection is present. The central part is conical with a rounded point, fitting loosely into the preceding denticle. Sections above and below the X-axis are similar. The central part extends to half the way of the Y – 1 axis. Ray connection is not clear and ray apophysis is present but weakly developed. The ray is wedge like, tapering to a pointed end and slightly curved posteriorly between the Y-axis.

3.2.3. Taxonomic affinity

Despite the distinguished shape of denticles of the present trichodinid, some components of the adhesive disc could be compared with the following species: *Trichodina capiolosae* Dogiel, 1940; *T. macomarcum* Raabe and Raabe, 1959; *T. acuta* Lom, 1961; *T. nigra* Lom, 1961; *T. noturi* Welborn, 1967 and *T. modesta* Lom, 1970 [15,16].

T. capiolosae as described by Lom [17] has a close blade shape but rays are smaller and have uniform thickness with blunt tips. The dimensions of *T. capiolosae* are smaller than the present species. *T. macomarcum* described from molluscs has a very close blade shape but differs in its thin rays and the center of adhesive disc which contains 'peculiar light spots in the shape of rods or spindles'. Also, dimensions of *T. macomarcum* are quite larger than the present trichodinid. *T. acuta* as compiled by Lom and Dykova [10] markedly differs in the presence of a white circle in the center of the adhesive disc. Dimensions of *T. acuta* are almost twice the present species and has a wide range of 22–33 denticles. Blades of *T. nigra* as cited by Lom and Dykova [10] resemble the present material only in general shape. However, in comparing the dimensions, *T. nigra* possesses massive denticles, larger overall dimensions and smaller central area of adhesive disc. *T. noturi* has similar blades and dissimilar rays. The central part of the denticle is sturdy compared with the delicate one in *T. fahaka*. Dimensions of

T. noturi are larger. Rays of *T. modesta* are delicate and run uniformly with very conspicuous ray apophysis rather than the wedge shape and pointed ends in *T. fahaka*.

Reviewing the present species with the African trichodinids revealed no resemblance with any of described forms. *Tetradon fahaka* is a Nile endemic fish which belongs to the family Tetradontidae and represents the only member of this family in freshwater. The parasite was found in large numbers on the host and no other fish species was infected with this trichodinid during this study. Therefore, this parasite can be allocated as a new species.

3.2.4. Etymology

The specific name 'fahaka' is derived from the Arabic name of the host fish.

3.2.5. Type specimens

Type specimens of these materials are deposited in the Department of Zoology, Beni-Suef Faculty of Science, Cairo University (FWP-104, 105/99).

3.3. *Trichodinella epizootica* Raabe, 1950

Figs. 5, 6 and 11c; Host: *Mormyrus kannume*.

3.3.1. Description

A small trichodinid with a disc-shaped body, diameter 20.1 ± 1.5 (17.6–22.4), adhesive disc concave, 16.2 ± 1.6 (13.6–19.2) in diameter, border membrane 1.6 ± 0.1 (1.4–1.8) wide, denticle ring diameter 8.3 ± 0.6 (7.2–9.6), number of radial pins per denticle seven (six to eight), number of denticles 21 (20–22), dimensions of denticle, length 1.7 ± 0.3 (1.2–2.2), blade 2.7 ± 0.3 (2.4–3.2), central part 0.9 ± 0.1 (0.8–1.0), ray 1.1 ± 0.2 (0.8–1.2), span 4.4 ± 0.4 (4.0–4.8).

3.3.2. Taxonomic affinity

On analyzing the morphology and quantitative data of the present species it was readily identified as *Trichodinella epizootica* Raabe, 1950. The dimensions of the present material are very close to those recorded in South Africa and Israel by Basson et al. [12] and in Philippines by Albaladejo

and Arthur [18]. However, the present population is smaller in size than forms recorded by Lom and Haldar [19] and Arthur and Lom [9].

3.4. *Tripartiella dactyloidentata* sp. n.

Figs. 7–10 and 11d; Host: *Mormyrus kannume* and *Schilbe mystus*.

This trichodinid was found in large numbers on gills of *Mormyrus kannume* and moderately on *Schilbe mystus*. The population of this parasite showed two sizes, small and large, in both infested hosts. The small forms were much abundant in the smears. The two forms had the same characteristic features.

3.4.1. Description

A small-sized trichodinid with an almost flat body. Dimensions of the large form: body diameter 30.2 ± 1.0 (29.7–31.7), adhesive disc concave 24.8 ± 2.1 (22.7–27.7) in diameter, border membrane 3.7 ± 0.7 (2.5–3.9) wide, denticle ring diameter 13.4 ± 1.3 (11.9–14.9), number of radial pins per denticle eight (seven to nine), number of denticles 29 (27–32), dimensions of denticle, length 3.9 ± 0.5 (2.9–4.9), blade 4.6 ± 0.5 (4.0–5.9), central part 1.8 ± 0.4 (1.6–2.2), ray 2.9 ± 0.4 (2.8–3.3), span 9.3 ± 0.7 (8.9–9.9). Dimensions of the small form: body diameter 25.1 ± 1.8 (23.0–27.8), adhesive disc concave 21.0 ± 1.9 (19.1–23.8) in diameter, border membrane 1.6 ± 0.2 (1.2–1.9) wide, denticle ring diameter 9.6 ± 1.2 (8.2–10.7), number of radial pins per denticle seven (six to eight), number of denticles 27 (26–29), dimensions of denticle, length 2.8 ± 0.5 (2.4–3.2), blade 3.6 ± 0.3 (3.2–5.0), central part 1.4 ± 0.1 (1.3–1.5), ray 2.4 ± 0.3 (2.0–2.9), span 7.2 ± 0.8 (6.2–8.3).

3.4.2. Denticle description

The blade is finger like, with two bulbous parts, sloping from tip downwards and slanting backwards. The distal blade surface is round. The tangent point is relatively large, round and slightly lower than distal surface. Anterior and posterior surfaces of the blade run convergent with no apex. The blades occupy more than half the distance between the Y-axes. The blade apophysis is

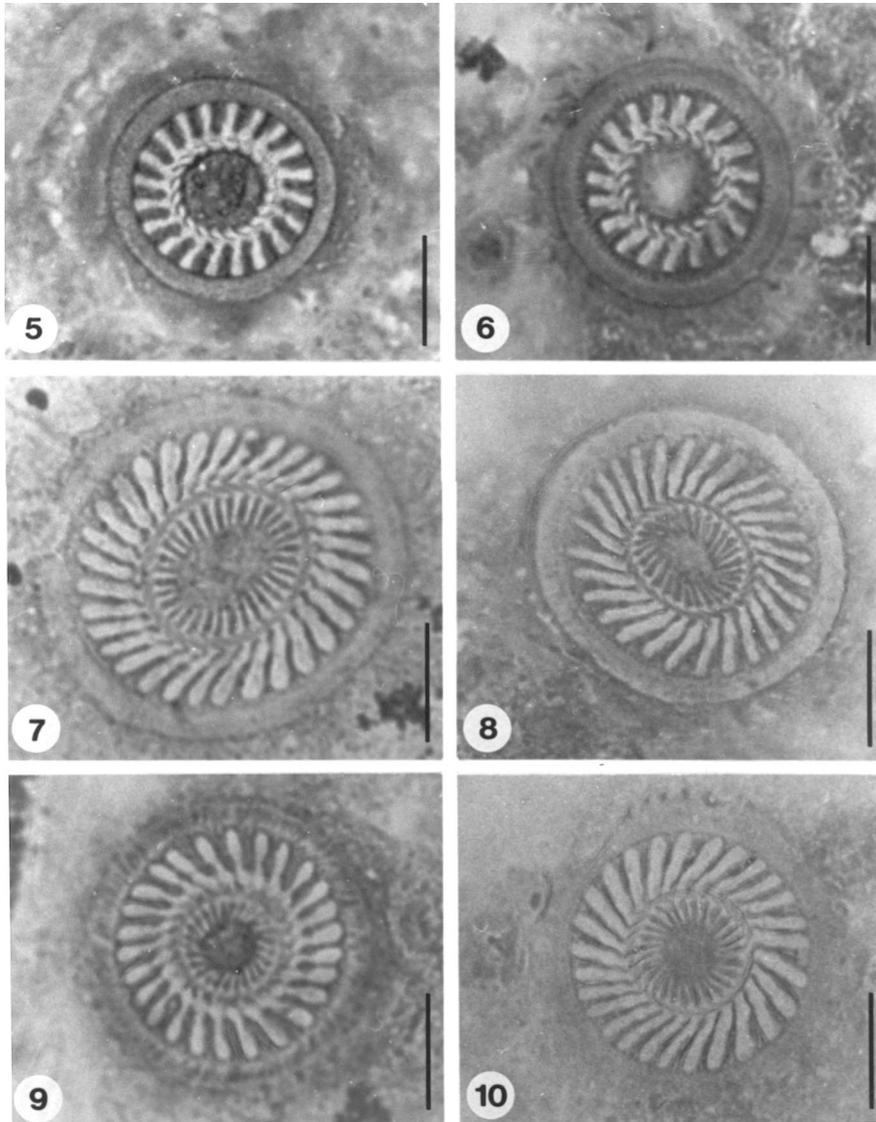


Fig. 5. Photomicrographs of silver-impregnated adhesive discs of Trichodina spp. *Trichodinella epizootica* Raabe, 1950 (scale bar = 2.5 μ m).

Fig. 6. Photomicrographs of silver-impregnated adhesive discs of Trichodina spp. *Trichodinella epizootica* Raabe, 1950 (scale bar = 2.5 μ m).

Fig. 7. Photomicrographs of silver-impregnated adhesive discs of Trichodina spp. *Tripartiella dactylodentata* sp. n., large form (scale bar = 2.5 μ m).

Fig. 8. Photomicrographs of silver-impregnated adhesive discs of Trichodina spp. *Tripartiella dactylodentata* sp. n., large form (scale bar = 2.5 μ m).

Fig. 9. Photomicrographs of silver-impregnated adhesive discs of Trichodina spp. *Tripartiella dactylodentata* sp. n., small one (scale bar = 2.5 μ m).

Fig. 10. Photomicrographs of silver-impregnated adhesive discs of Trichodina spp. *Tripartiella dactylodentata* sp. n., small one (scale bar = 2.5 μ m).

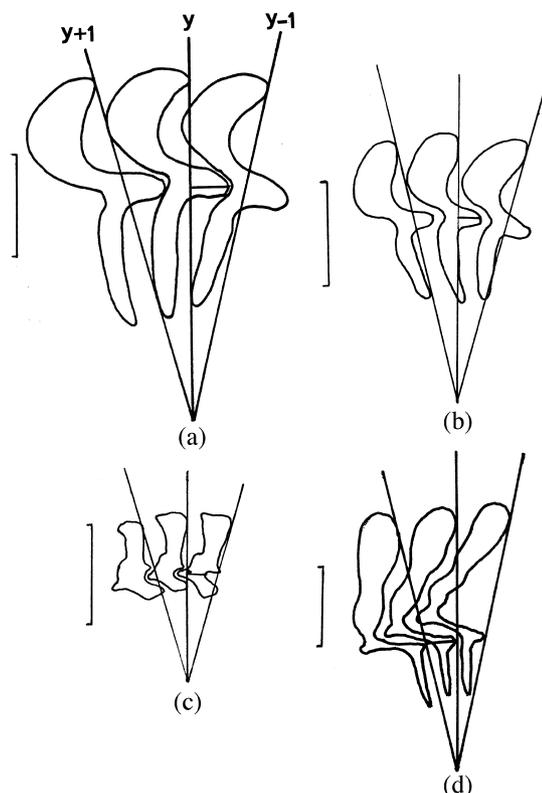


Fig. 11. Diagrammatic drawings of the denticles of trichodinids. (a) *Trichodina heterodentata* Duncan, 1977. (b) *Trichodina fahaka* sp. n. (c) *Trichodinella epizootica* Raabe, 1950. (d) *Tripartiella dactylodentata* sp. n. (scale bar = 5 μ m).

conspicuous and abrupt. The blade forms an L-shape with the central part via a thin connection. The central part is concave, traverses the whole area between $Y+1$ and $Y-1$ axes and runs obliquely backwards. The denticles are loosely connected to each other at the central part. Ray connection is indistinct. Rays are straight, thin, tapering to a round end and run parallel to Y -axes and sometimes slanting backwards.

3.4.3. Taxonomic affinity

The morphometrical measurements of the present trichodinid could be compared with: *Tripartiella bursiformis* Davis, 1947; *T. bulbosa* Davis, 1947 and *T. cichlidarum* Basson et al., 1983. *T.*

bursiformis as reported by Hoffman and Lom [20] showed a similar shape of the central part and ray but differed in blade shape which lacked the two bulbous parts observed in the present material. *T. bursiformis* was also larger in overall body and denticle dimensions.

T. bulbosa as described by Vanthan and Margaritov [21] resembles the present material in general blade shape and body dimensions. However, central part is very thick with short and sturdy ray. *T. cichlidarum* was originally described by Basson et al. [12] from *Tilapia* species in the Golan heights. The number of species found were few in number (12 specimens) and were mainly characterized by V-shaped denticles. The present studied species matches to a large extent *T. cichlidarum*. However, *T. cichlidarum* varies in: lacking the bulbous parts of blades, rays are curved and blades are more slanted. Dimensions of both species are very close except the blades and denticle length in *T. cichlidarum* which are longer.

The differences among species of this group are basically in morphology, which allow us to raise a new species and the name *T. dactylodentata* is proposed.

3.4.4. Etymology

The specific name 'dactylodentata' was derived from the finger like appearance of the blades (finger = dactyle).

3.4.5. Type specimens

Type specimens of these materials are deposited in the Department of Zoology, Beni-Suef Faculty of Science, Cairo University (FWP-106, 107/99).

4. Discussion

Trichodinids of African fish still need more study. Apart from South Africa, few studies were reported. The number of Nile fish species in Egypt has drastically decreased after building of the High Dam in Aswan (in the south of the country). However, almost all the diversity of these fish are still found in the Nile at Sudan and require more investigation.

Van As and Basson [12] examined *Hydrocynus forskalii* (20 fish) and found no trichodinid infestation. Therefore, *T. heterodentata* is infesting this host for the first time.

Trichodinella epizootica is one of the most widely distributed trichodinids and showed a wide range of morphological variations [14]. The present investigation extends this area to include the River Nile and *Mormyrus kannume* is added to the list of hosts. It is likely that *Trichodinella epizootica* is transferred to the present host through grass carp (*Ctenopharyngodon idella*) which was introduced to the Nile channels.

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