

TRICHODINIDS (CILIOPHORA: PERITRICHA) ECTOPARASITES OF CULTURED CICHLIDS FROM TAIWAN

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J. G. Van As and Linda Basson (1986) Trichodinid (Ciliophora: Peritricha) ectoparasites of cultured cichlids from Taiwan. *Bull. Inst. Zool., Academia Sinica* 25(2): 135-139. During July 1984 specimens of cultured cichlids were examined from fish ponds in Taiwan. The Mocambique tilapia, *Oreochromis mossambicus* (Peters, 1852) was found to be moderately infested by a gill parasite, *Tripartiella spatula* n. sp., as well as a predominantly gill parasite, *Trichodina centrostrigata* Basson, Van As and Paperna, 1983 and a predominantly skin parasite, *T. heterodentata* Duncan, 1977. Comparative descriptions of the two known species and a description of the new species are presented.

Key words: cichlids, ectoparasites, Taiwan, taxonomy, trichodinids,

Trichodinid ectoparasites (Ciliophora: Peritricha) have been found associated with various freshwater as well as marine fish species. Although many of the taxonomic descriptions of trichodinid parasites are based on material collected from fish in culture systems, only a few species have been described from cultured cichlids: Duncan (1977) describes *Trichodina heterodentata* Duncan, 1977 and *T. acuta* Lom, 1961 from *Oreochromis mossambicus* (Peters, 1852) and *Tilapia zillii* (Gervais, 1848) collected from fish ponds in the Philippines. Basson, Van As and Paperna (1983) found *T. heterodentata* and *T. centrostrigata* Basson, Van As and Paperna, 1983 to be common parasites of different wild cichlid species and Van As, Basson and Theron (1984) also recorded these two species from *O. mossambicus* from fish ponds in South Africa. *T. heterodentata* was found to be a common parasite of cultured *O. mossambicus* and other cichlids in Israel (Basson, *et al.* 1983) and

recently *T. centrostrigata* was found associated with *Oreochromis niloticus* (Hasselquist, 1757) and *T. zillii* in Lake Kinneret, Israel (personal unpublished data). *T. heterodentata* has also been recorded from *O. mossambicus* in Lake Valencia, Venezuela (Paperna, Van As and Basson, 1984).

Very few papers have been published on the occurrence of trichodinid ectoparasites from fish in Taiwan (Hsiao and Chen, 1977; Liu, 1978 and Wang and Yu, 1978). However, no specific identifications of the species have been made in this area.

The material presented in this paper is taxonomic descriptions of trichodinid ectoparasites collected from cultured cichlids in Taiwan.

METHODS

During a visit to Taiwan in July 1984, the senior author examined cichlids, including the hybrid red tilapia, *O. mossambicus*, *O.*

niloticus and *O. hornorum* (Norman, 1922), from fish ponds in the Tungkang Marine Laboratory and *O. mossambicus* from the Lukang Branch of the Taiwan Fisheries Research Institute.

Fish were examined at the collection site by studying wet smears from the skin and gills with a compound microscope. Positive smears were air dried and taken back to the laboratory in Johannesburg for further examination. In order to study details of the adhesive disc, air dried smears were impregnated with silver nitrate and for studying the nuclear apparatus, air dried smears were stained with Harris haematoxylin according to the methods described by Basson, *et al.* (1983).

All the measurements of the body dimensions (e.g. diameter of denticle ring, length of ray, width of central part, etc.) given in the results below are in micrometers. These dimensions conform to a standard system of uniform specific characteristics as proposed by Lom (1958) and now considered to be essential for taxonomic descriptions in this field. In the results minimum and maximum values are given, followed in parentheses by the arithmetic mean, standard deviation and number of specimens measured, e.g. diameter of adhesive disc 53.0–82.6 (64.9±8.1, 25). In the case of the number of denticles, number of radial pins and number of centre ridges, the mode is given instead of arithmetic mean. Body diameter is measured as the adhesive disc plus border membrane.

RESULTS

Of all the cichlids examined from the Tungkang Marine Laboratory, only the red tilapia was found to host small numbers of trichodinid parasites on the skin. These were identified as *T. heterodontata*, but not enough material was available to present a taxonomic description. All 20 specimens of *O. mossambicus* examined from the Lukang laboratory were found to be infested by moderate

numbers of skin or gill trichodinids. The taxonomical descriptions presented below were based on this material.

Trichodina heterodontata Duncan, 1977

(Figure 1A & B)

Host and locality: *Oreochromis mossambicus* (Peters, 1852), Lukang Branch of the Taiwan Fisheries Research Institute.

Location on host: Skin and fins, rarely gills.

Comparative description: A large trichodinid with a disc-shaped body, 62.3–95.2 (76.2±7.4, 25) in diameter. Adhesive disc concave, 53.0–82.6 (64.9±8.1, 25) in diameter surrounded by a finely striated border membrane 3.9–7.0 (5.4±0.7, 25) wide. Diameter of denticular ring 31.4–51.7 (40.8±4.8, 25). The centre of the adhesive disc finely granular in silver impregnated specimens, stains lighter than the rest of the disc. Number of denticles 22–29 (24, 25). Length of denticle 8.1–11.6 (9.7±1.0, 25); length of ray 6.1–11.3 (9.1±1.2, 25); width of central part 2.7–4.9 (3.9±0.6, 25); length of blade 4.7–7.7 (6.1±0.7, 25). Rays thick of irregular length, slightly curved and tapers to blunt points. Base of ray constricted. Blade falcate with an acute angled prominence on the anterior edge. Posterior distal side of blade tapers to a somewhat blunt point. Number of radial pins per denticle 10–13 (12, 25). Nuclear apparatus consists of a C-shaped macronucleus; external diameter 40.8–71.9 (63.1±8.9, 11); thickness 7.6–11.6 (9.9±3.1, 11); length of sector between terminations of macronucleus 9.5–30.7 (17.5±6.9, 11). No micronucleus could be detected. Adoral zone of cilia turns about 400 degrees to 410 degrees. Velum is present.

Remarks: The presently described population of *T. heterodontata* shows considerable intraspecific variability in size and denticle dimensions. The same range of variability was also recorded by Duncan (1977) from *T. heterodontata* in the Philippines, as well as Basson, *et al.* (1983) for populations in South

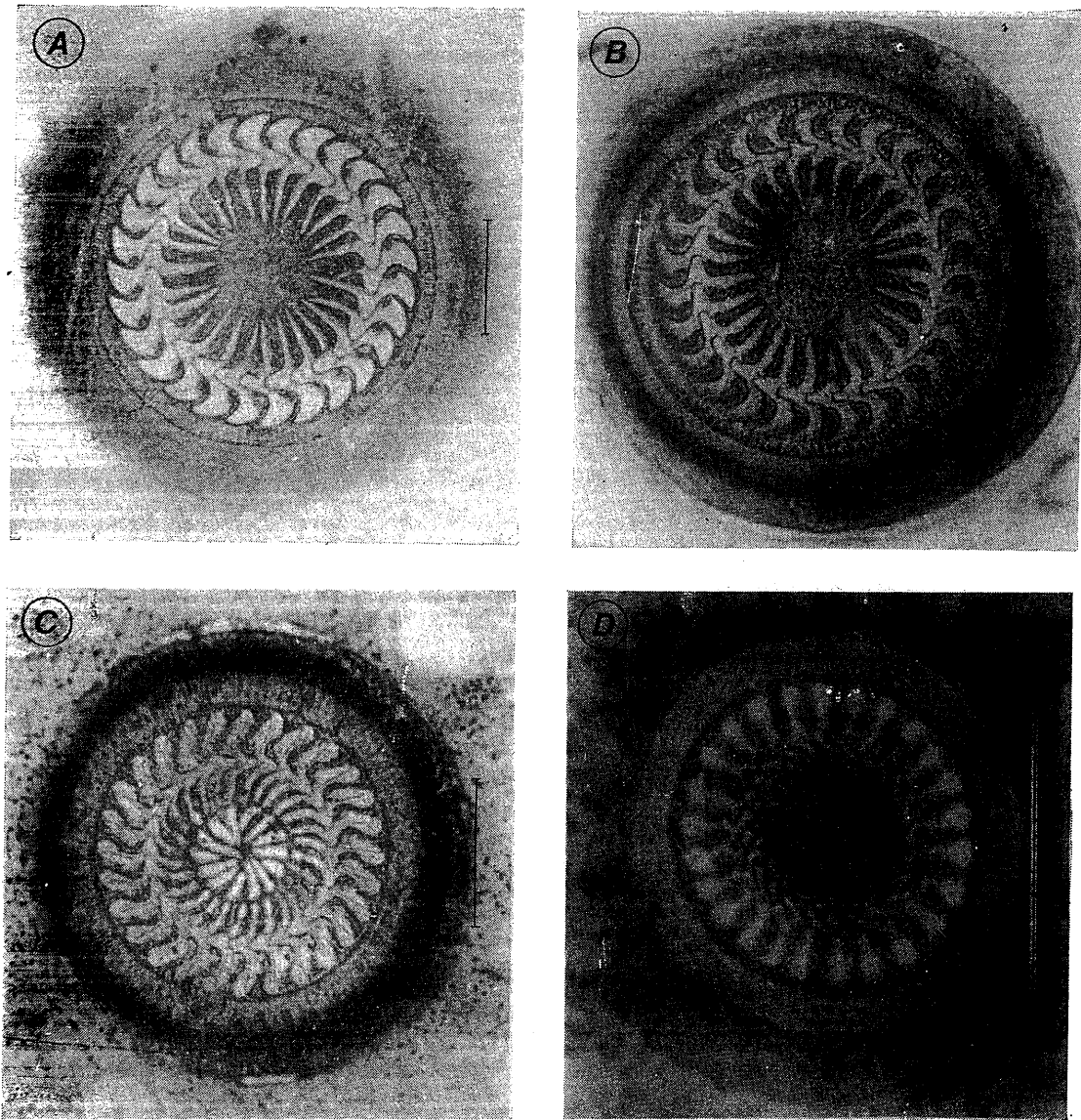


Fig. 1. Photomicrographs of silver impregnated adhesive discs of A and B. *Trichodina heterodentata*, C. *T. centrostrigata* and D. *Tripartiella spatula*. Scale in all figures indicates 20 μm .

Africa and Israel. The present material, however, includes the largest specimens of *T. heterodentata* in terms of body size and denticle dimensions so far found. Previously the largest specimens of *T. heterodentata* were collected from *O. mossambicus* and *Tilapia rendalli swierstrai* Gilchrist and Thompson, 1917 at a fisheries station in Transvaal, South Africa with an adhesive disc diameter of up to 71. These specimens had a maximum

denticle length of 9.9, whereas the present material exceeds 11.

Among the material examined in the present study were several specimens of *T. heterodentata* that differed in denticle shape as well as body and denticle dimensions which were in the upper limit of the range. These specimens show a characteristic ring of lighter impregnation in the striated membrane between the distal edge of the blade and the

border membrane. Duncan (1977) made no mention of such specimens in his paper, but in some of his figures this phenomenon is clearly visible. Lom (1961) notes that in the ontogeny of trichodines some slight morphological changes in denticle shape occurs. The observed variation in these specimens are probably due to their state of development and may even be an early stage of binary fission.

T. heterodontata most nearly resembles *T. pediculus* Ehrenberg, 1838. The main differences between these two parasites were illustrated by Basson, *et al.* (1983). The specimen of *T. heterodontata* in Figure 1B shows some resemblance with *T. pediculus*, but can still be distinguished from it due to the prominent anterior part of the blade which in the case of *T. pediculus* is smooth and rounded.

***Trichodina centrostrigata* Basson, Van As en Paperna, 1983 (Figure 1C)**

Host and locality: *Oreochromis mossambicus* (Peters, 1852), Lukang Branch of the Taiwan Fisheries Research institute.

Location on host: Gills, occasionally on the skin and fins.

Comparative description: A medium-sized trichodinid with a high, almost cylindrical body, 39.3–55.7 (47.6 ± 4.8 , 22) in diameter. Adhesive disc cup-shaped, 32.9–48.4 (40.5 ± 4.2 , 22) in diameter, surrounded by a finely striated border membrane 2.2–4.8 (3.9 ± 0.6 , 22) wide. Centre of adhesive disc, of all specimens examined, has distinctive ridges which are visible in live specimens. Number of centre ridges 12–16 (14, 22). Diameter of denticular ring 19.6–29.7 (24.0 ± 2.7 , 22). Number of denticles 25–29 (25, 22). Length of denticle 4.0–6.5 (5.2 ± 0.6 , 22); length of ray 4.0–6.2 (5.2 ± 0.7 , 22); width of central part 1.2–3.1 (2.0 ± 0.4 , 22); length of blade 4.7–7.4 (6.0 ± 0.7 , 22). Blade truncate with lateral margins almost parallel and distal side blunt and rounded. Ray long, slightly curved anteriorly; narrow at point of attachment to central part with a rounded end. Central part slender. Number of radial pins per

denticle 6–8 (8, 22). Macronucleus horseshoe-shaped; external diameter 27.3–39.9 (34.1 ± 4.3 , 10); thickness 3.0–7.3 (4.6 ± 1.2 , 10); length of sector between terminations of macronucleus 7.4–19.3 (10.4 ± 3.6 , 10). Micronucleus oval to round, lies in $-y$ position, occasionally in $-y'$ position; length 3.0–3.9 (3.2 ± 0.3 , 10); width 1.8–2.9 (2.2 ± 0.3 , 10); value of $-y$ distance 1.2–11.5 (4.8 ± 3.2 , 10). Adoral ciliary groove turns 410 degrees to 455 degrees.

Remark: *T. centrostrigata* was originally described from a small cichlid, *Pseudocrenilabrus philander* (Weber, 1897), but has also been found on various other cichlids as well as *O. mossambicus* from fish ponds in South Africa. This parasite can be distinguished from all other freshwater trichodinids by the presence of rodshaped centre ridges. The presently described population falls within the same range of size and denticle dimension variability than *T. centrostrigata* from South Africa as described by Basson, *et al.* (1983).

***Tripatiella spatula* n. sp.**
(Figure 1D)

Type host and locality: *Oreochromis mossambicus* (Peters, 1852), Lukang Branch of the Taiwan Fisheries Institute.

Location on host: Gills

Type specimens: Holotype, slide 84/7/11-8 and paratype, slide 84/7/11-6 and 84/7/11-22 in the collection of the Department of Zoology of the RAU, Johannesburg.

Description: A small trichodinid with a bell-shaped body, 22.9–32.6 (27.4 ± 2.2 , 25) in diameter. Adhesive disc saucershaped, 19.0–26.9 (22.9 ± 2.1 , 25) in diameter; surrounded by a finely striated border membrane 1.8–3.3 (2.4 ± 0.4 , 25) wide. Diameter of denticular ring 11.2–16.6 (13.6 ± 3.7 , 25). Number of denticles 20–27 (24, 25). Length of denticle 2.5–4.1 (3.2 ± 0.4 , 25); length of ray 1.9–3.1 (2.6 ± 0.3 , 25); width of central part 0.9–1.7 (1.2 ± 0.2 , 25); length of blade 2.5–3.8 (3.2 ± 0.4 , 25). Blade big and spoonshaped. Anterior projection well developed. Ray thin and delicate. Central part very delicate. Blade longer than ray. Number of radial pins per denticle 4–6

(5, 25). Nuclear apparatus consists of a U-shaped macronucleus with external diameter 15.8-26.3 (20.9 ± 2.8 , 16); thickness 4.0-6.5 (5.1 ± 0.7 , 16); length of sector between the terminations of the macronucleus 4.6-12.2 (8.6 ± 2.1 , 16). Micronucleus could not be detected in any of the specimens studied. Adoral zone of cilia forms a spiral of 185 degrees to 190 degrees.

Remarks: This species shows significant differences in denticle shape and dimensions from all other known *Tripartiella* Lom, 1959 species.

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臺灣養殖慈鯛魚類的車輪蟲類體外寄生

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在 1984 年七月間，作了臺灣養殖慈鯛魚類的檢驗，南洋鯽魚 *O. mossambicus*，(Peters, 1852) 被發現有一種鰓寄生的車輪蟲 *Tripartiella spatula*，被 Basson, Van As 及 Paperna (1983) 發現另一種鰓寄生的車輪蟲 *Trichodina centrostrigata*，以及被 Duncan (1977) 發現另一種皮膚寄生的車輪蟲 *T. heterodentata* 溫和的騷擾，兩種已知品種的比較描述及一種新種的描述都呈獻於此。

