

## Identification of trichodinids (Ciliophora: Trichodinidae) from red tilapia (*Oreochromis niloticus* x *O. mossambicus*) in Pathumthani Province, Thailand

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**Abstract** Trichodinid ciliates are well-known pathogenic in aquacultures. This study aimed to identify trichodinid species isolated from red tilapia (*Oreochromis niloticus* x *O. mossambicus*). Ninety red tilapia (40-152 [mean ± SD: 69.5 ± 26.4] mm) were monthly collected from an earthen pond in Nong Suea Prefecture, Pathumthani Province, Thailand by scoop net. The mucous smear and wet smear of gills were prepared for trichodinid examination. Klein's silver-impregnation technique was used for the morphological study of trichodinid specimens. Three species of trichodinids (i.e., *Trichodina heterodentata*, *T. centrostrigata* and *T. compacta*) were isolated and described in this research. Our result revealed the new host and locality record in Thailand. Additionally, the characteristics of these three species are documented based on Thai specimens for the first time.

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**Key words:** trichodinid, red tilapia, *Trichodina heterodentata*, *Trichodina centrostrigata*, *Trichodina compacta*

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### Introduction

In Thailand, intensive aquaculture of tilapia is popularly conducted for high productivity. A constraint of that is fish health problem. Parasitic diseases are directly affected in tilapia culture. Trichodinid is a common ectoparasite found from the skin and gills of tilapia. It can cause the serious problem in aquaculture industry. There

were several documents reported of this parasite from tilapia in Thailand (Bangkok, Chiang Mai and Nakhonsithammarat) but the identification of which were obscured. (Thonguthai, 1996; Chitmanat et al., 2005; Lerssutthichawal, 2008). A few studies were carried out on trichodinids in Egypt and Africa (Basson & Paperna, 1983 ; Noor El-Din & Naeim, 1998 ; Al-Rasheid et al., 2000).

Therefore, this study aimed to clarify and display the morphology of trichodinid species parasitic on cultured red tilapia (*Oreochromis niloticus* × *O. mossambicus*) from Pathumthani Province, Thailand.

## Materials and methods

A total of 90 red tilapia were monthly collected from earthen pond in Nong Suea Prefecture, Pathumthani Province, Thailand, by scoop net during December 2012 to February 2013. Fish were killed by severing the nerve cord and the gills and skin parasites were examined. Trichodinid specimens were smeared and impregnated by Klein's silver-impregnation technique (Klein, 1958). The observation and measurement were made by oil immersion light microscopy (Olympus BX50). The morphology terminology and measurement follow Lom (1958), Wellborn (1967) and Arthur & Lom (1984). All measurements (in micrometers) are given with the arithmetic mean and the range in parentheses. In the case of denticles and radial pins, the mode is represented instead of the arithmetic mean. Parasite voucher specimens are deposited in the invertebrate collection at the Zoological Museum, Kasetsart University, Bangkok, Thailand (ZMKUPRO0001-0005).

## Results

Three species of trichodinids, *Trichodina heterodentata*, *T. centrostrigeata*, and *T. compacta* were found from red tilapia (*Oreochromis niloticus* × *O. mossambicus*) (40-152 [mean ± SD: 69.5 ± 26.4] mm standard length) caught

in earthen pond from Nong Suea Prefecture, Pathumthani Province, Thailand. The infection level differed between the species: highest in *T. heterodentata* (the overall prevalence: 93.3%), moderate in *T. compacta* (33.3%) and lowest in *T. centrostrigeata* (3.3%). The description and morphometric of these trichodinids are given below.

### *Trichodina heterodentata* Duncan, 1977 (Figure 1)

*Host:* red tilapia (*Oreochromis niloticus* × *O. mossambicus*)

*Site of attachments:* skin, gills.

*Locality:* Nong Suea Prefecture, Pathumthani Province, Thailand.

*Description* (10 specimens): *Trichodina heterodentata* is a large *Trichodina* species with disc-shaped body, cell diameter 76.9 (62.2-92.5). Diameter of adhesive disc 67.1 (49.0-83.7). Diameter of denticulated ring 39.2 (28.7-47.5). Number of denticles 27 (24-27). Number of radial pins per denticle 10 (9-10). Length of denticle 8.9 (7.5-10.0); length of thorn 8.9 (6.2-11.2); length of blade 6.9 (5.0-8.7) (Figure 1B). Blade falcate, broad, fills most of spaces between Y and Y+1 axes. Tangent point rounded. Thorn thickened at base, curved posteriorly, tapers to a blunt end (Figure 1C).

*Remarks:* *T. heterodentata* was first identified from cultured cichlids in Philippines (Duncan, 1977). Subsequently, this species has been reported in South Africa and Israel (Basson, Van As & Paperma, 1983; Van As & Basson, 1992); Philippines (Albaladejo & Arthur, 1989; Bondad-Reantaso & Arthur, 1989); Taiwan (Basson & Van As, 1994); Egypt (Al-Rasheid et al., 2000); India (Asmat, 2004) and Australia (Dove & O'Donoghue, 2005). The

morphometric of *T. heterodentata* from this study fits to original description except the length of blade and thorn (blade and thorn length; 6.9 (5.0-8.7), 8.9 (6.2-11.2) in the present study vs. 4.1, 6.9 in Duncan' description), while it was larger than other previous reports. According to

those previous reports 40 species of fish from 16 families can be harbored for this trichodinids. Therefore, this study was documented the new supplementary host record for *T. heterodentata* in Thailand.



**Figure 1** *Trichodina heterodentata* Duncan, 1977, A, Photomicrograph of silver nitrate impregnated; B, whole body; C, Diagrammatic drawings of denticles. Scale-bars: B, 50  $\mu$ m; C, 25  $\mu$ m

***Trichodina centrostrigata* Basson, Van As and Paperna, 1983** (Figure 2)

*Host:* red tilapia (*Oreochromis niloticus* x *O. mossambicus*)

*Site of attachments:* skin, gills.

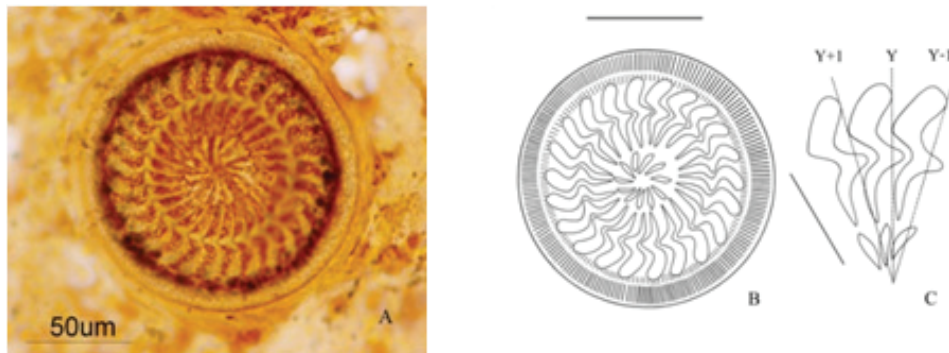
*Locality:* Nong Suea Prefecture, Pathumthani Province, Thailand.

*Description* (10 specimens): *Trichodina centrostrigata* is a medium *Trichodina* species with disc-shaped body, cell diameter 45.4 (37.5-49.2). Diameter of adhesive disc 38.8 (31.2-42.5). Diameter of denticulated ring 23.6 (20-27.5). Number of denticles 29 (27-30). Number of radial pins per denticle 6 (6-7). Length of denticle 3.8 (3.7-4.5); length of thorn 5.9 (5.0-7.5); length of blade 5.1 (5.0-5.5). The central adhesive disc has 14-15 ridges. Blade truncate, lateral margins almost parallel (Figure 2B). Anterior margin

reaches to Y+1 axis. Posterior margin forms L-shaped. Thorn long, slightly curved, broad at base and tapering to sharp rounded at the point. Some thorn extends beyond Y+1 axis (Figure 2C). *Remarks:* *T. centrostrigata* was originally described by Basson, Van As & Paperna (1983) based on the specimens on the gills, skin and fins of *Oreochromis mossambicus*, *Pseudocrenilabrus philander*, *Tilapia rendalli*, *T. sparmanii* and *Cyprinus carpio* in South Africa. This species has been reported from *O. mossambicus* in Taiwan and India (Basson & Van As, 1994; Van As & Basson, 1986; Mitra & Bandyopadhyay, 2006), from *O. niloticus* in Philippines and Egypt (Bondad-Reantaso & Arthur, 1989; Noor El-Din & Naeim, 1998), from various host in Africa (Van As & Basson, 1992). The morphology and morphometric of *T. centrostrigata* from

present study were fit to most of previous report. Based on those previous studies 12 fish host species from 4 families can be harbored for

*T. centrostrigeata*. Then, the present study represents new supplementary host record for this parasite in Thailand.



**Figure 2** *Trichodina centrostrigeata* Basson, Van As and Paperna, 1983, A, Photomicrograph of silver nitrate impregnated; B, whole body; C, Diagrammatic drawings of denticles. Scale-bars: B, 50 µm; C, 25 µm

***Trichodina compacta* Van As and Basson, 1989** (Figure 3)

*Host:* red tilapia (*Oreochromis niloticus* x *O. mossambicus*)

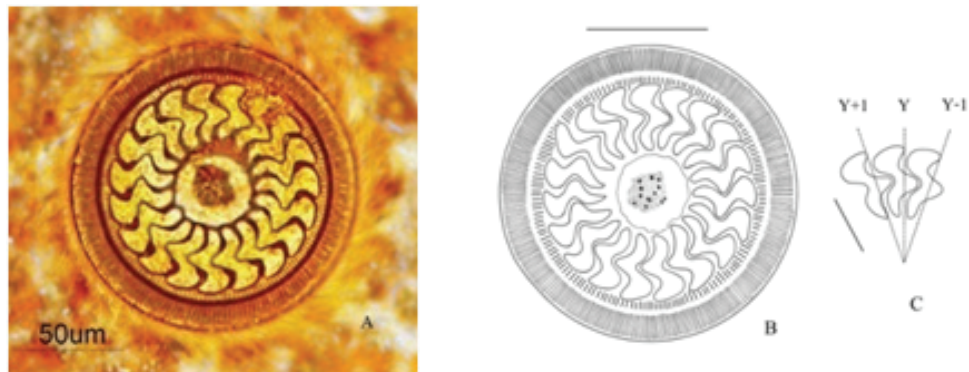
*Site of attachments:* skin, gills.

*Locality:* Nong Suea Prefecture, Pathumthani Province, Thailand.

*Description* (10 specimens): *Trichodina compacta* is a medium *Trichodina* species with a flattened, disc-shaped body, cell diameter 44.3 (38.7-50.0). Diameter of adhesive disc 36.7 (33.2-42.0). Diameter of denticulated ring 21.6 (19.2-25.0). Diameter of central circle 11.1 (8.7-12.5). Distinct dark spots in the centre of adhesive disc. Number of denticles 18 (18-21). Number of radial pins per denticle 9 (8-11). Length of denticle 6.4 (5.7-7.5); length of thorn 4.1 (3.7-5.0); length of blade 3.7 (3.2-5.0) (Figure 3B). Blade falcate, curve and short, fills

most of spaces between Y and Y+1 axes. Distal surface has a flat portion running parallel to the border membrane. Tangent point rounded. Short thorn, thickened at base, curved posteriorly, tapers to a blunt end and close to the central circle (Figure 3C).

*Remarks:* *T. compacta* was originally described by Van As and Basson, which was identified as *T. acuta* from various fishes in South Africa and Israel (Van As & Basson, 1989). This species has been recorded from *Tilapia* sp. in Taiwan (Basson & Van As, 1994), from *O. niloticus* in Brazil (Ghiraldelli & Martins, 2006). The morphology and morphometric of the present study fits to all those previous reports. Based on those reports 15 species from 6 families can be harbored for this parasite. This study provides a new supplementary host record for this parasite in Thailand.



**Figure 3** *Trichidina compacta* Van As and Basson, 1989, A, Photomicrograph of silver nitrate impregnated; B, whole body; C, Diagrammatic drawings of denticles. Scale-bars: B, 50 µm; C, 25 µm

## Discussion

Three species of trichodinids found from this study were common species, because of their low host specificity. Based on the standard description by Van As & Basson (1989), the most important characteristic is the shape and accessory protrusion of denticle. On the other hand, the body size and denticles dimension can be considered as minor key characters because of the variation between organisms: for example, the body diameter of *T. heterodentata* is 76.9 (62.2-92.5) vs. 55.3 (47.5-69.1) from South Africa and Israel; 48.8 (45.5-52.5) from Africa; 57.9 (50.0-65.0), 63.7 (60.0-65.5) and 47.1 (39.2-53.0) from Philippines; 53.9 (49.0-61.0) from Taiwan; 54.6 (51.2-60.0) from Egypt; 54.6 (46.1-61.2) from India (Basson, Van As & Paperma, 1983; Albaladejo & Arthur, 1989; Bondad-Reantaso & Arthur, 1989; Van As & Basson, 1992; Basson & Vas As, 1994; Al-Rasheid et al., 2000; Asmat, 2004). This difference may be caused by host preference. In this study,

the overall prevalence of this species is the highest. On the other hand, *T. centrostrigata* showed the lowest of infection level. It can be explained that these parasites demonstrated community competition.

Tilapia is a popular species for foodfish aquaculture in Thailand. Many techniques have been employed to improve the productivity in term of quality; for example, super intensive culture and fish breeding. One constraint of which is ectoparasitic diseases, especially parasitic protozoa that can cause a serious loss. However, very little is known about parasite trichodinid species found in Thailand. A previous study reported *T. pediculus* only as free living organism (Charubhun & Charubhun, 2000). In contrast, parasitic trichonids were identified at the genus level only. Therefore, this study constitutes the new host, locality record and the taxonomy of *T. heterodentata*, *T. centrostrigata*, and *T. compacta* found in Thailand for the first time.

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## การจำแนกชนิดปรสิตเห็บระฆัง (Ciliophora: Trichodinidae) จากปลานิลแดง (*Oreochromis niloticus* x *O. mossambicus*) ในจังหวัดปทุมธานี ประเทศไทย

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**บทคัดย่อ** ปรสิตเห็บระฆัง เป็นสาเหตุหนึ่งของการเกิดโรคในสัตว์น้ำ ดังนั้นในการศึกษาคั้งนี้จึงมุ่งเน้นการจำแนกชนิดของเห็บระฆังจากปลานิลแดง (*Oreochromis niloticus* x *O. mossambicus*) จำนวน 90 ตัว (ขนาดความยาว 40-152 [mean ± SD: 69.5 ± 26.4] มิลลิเมตร) จากบ่อดิน ที่อำเภอหนองเสือ จังหวัดปทุมธานี ประเทศไทย ด้วยสวิตกปลา ทำการตรวจหาปรสิตจากเหงือกและเมือกของปลา ตัวอย่างเห็บระฆังที่พบนำไปย้อมสีด้วยเทคนิคของ Klein และทำเป็นสไลด์ถาวร จากลักษณะสัณฐานวิทยาของเห็บระฆังที่พบ สามารถจัดจำแนกได้เป็น *Trichodina heterodentata*, *T. centrostrigeata* และ *T. compacta* จากการศึกษาครั้งนี้ จัดเป็นการจำแนกชนิดของปรสิตเห็บระฆังจากปลานิลแดงในประเทศไทยครั้งแรก

**คำสำคัญ** : เห็บระฆัง, ปลานิลแดง, *Trichodina heterodentata*, *Trichodina centrostrigeata*, *Trichodina compacta*