Description of Two New Species of *Gyrodactylus* von Nordmann, 1832 (Monogenea) from Cultured Nile Tilapia, *Tilapia nilotica* (Cichlidae), in the Philippines

DAVID K. CONE, 1 J. RICHARD ARTHUR, 2 AND MELBA G. BONDAD-REANTASO 3, 4

1 Department of Biology, Saint Mary’s University, Halifax, Nova Scotia, Canada B3H 3C3,
2 Maurice Lamontagne Institute, Fisheries and Oceans, P.O. Box 1000, Mont-Joli,
Quebec, Canada G5H 3Z4, and
3 Bureau of Fisheries and Aquatic Resources, Fish Health Section, 860 Quezon Avenue,
Quezon City, Metro Manila 3008, Philippines

**ABSTRACT:** Two new species of *Gyrodactylus* von Nordmann, 1832 (Monogenea) are described from the body surface of Nile tilapia (*Tilapia nilotica*) (Cichlidae) from fish farms in the Philippines. One species, *G. shariffi* sp. n., occurs on fish in brackish water ponds. It resembles species of *Gyrodactylus* reported from mullets (Mugilidae) in other regions of the Pacific and may represent a parasite that *T. nilotica* has acquired from mullets enzootic to coastal waters of the Philippines. The other species, *G. niloticus* sp. n., occurs on fish cultured in freshwater ponds. It resembles species of *Gyrodactylus* described from freshwater fishes (cichlids, characids, and cyprinodontids) in Africa and is believed to have been introduced into the Philippines along with shipments of Nile tilapia from stocks originating on that continent.

**KEY WORDS:** *Gyrodactylus niloticus* sp. n., *Gyrodactylus shariffi* sp. n., morphology, taxonomy.

To date, there are 348 named species of *Gyrodactylus* von Nordmann, 1832 (Monogenea) described from teleost fishes and amphibians. Only one of these, *G. plotosi* Mayes and Brooks, 1977, has been described from a host fish originating from the Philippine Archipelago (Mayes and Brooks, 1977). The only other reports of these parasites from the Philippines involve unidentified species listed only as *Gyrodactylus* sp. (see Lumanlan and Arthur, 1992).

During a study of parasites of Nile tilapia (*Tilapia nilotica*) raised at fish farms at 2 sites in the Philippines, 2 undescribed species of *Gyrodactylus* were found. The present study describes this new material as *Gyrodactylus niloticus* sp. n. and *Gyrodactylus shariffi* sp. n.

**Materials and Methods**

Specimens of *Gyrodactylus* examined were collected during an extensive study of parasites of cultured Nile tilapia throughout the Philippines, the procedures of which have been described elsewhere (Natividad et al., 1986; Bondad-Reantas and Arthur, 1990). Species of *Gyrodactylus* from 2 areas, 1 a freshwater site (culture ponds at the Bureau of Fisheries and Aquatic Resources, National Freshwater Fish Hatchery, Muñoz, Nueva Ecija Province) and the other a brackish water site (culture ponds at the University of the Philippines in the Visayas Brackishwater Aquaculture Center, Ley- ganes, Iloilo Province) are described herein. Formalin-fixed specimens were mounted individually in glycerine jelly and, when cleared, examined microscopically. Pertinent morphometric measurements were calculated from drawings prepared with the aid of a drawing tube. Enlarged photomicrographs of the marginal hooks were used to prepare the detailed drawings of the marginal hook sickle. The morphometrics follows that of Malmberg (1970). Measurements are given in micrometers (μm) and are presented as the range followed by the mean ± 1 SD in parentheses.

**Results**

*Gyrodactylus niloticus* sp. n. (Figs. 1–4)

**DESCRIPTION** (based on 9 flattened specimens): Body 360–416 (388.7 ± 21.1) long, 64–128 (87.1 ± 24.5) wide at middle. Pharynx 22–39 (26.0 ± 4.0) (n = 8) long, 24–35 (27.9 ± 4.6) wide. Penis 10–14 (11.4 ± 1.9) (n = 8) in diameter, with 1 large spine and a row of 4–6 small spines. Hamuli relatively slender, 59–66 (61.3 ± 2.3) (n = 8) long; root 17–25 (20.6 ± 2.6) (n = 8), shaft 42–45 (43.8 ± 1.0) (n = 8), point 22–28 (25.6 ± 1.9) (n = 7). Ventral bar 5–7 (6.2 ± 0.7) long, 20–22 (21.1 ± 0.9) wide, with small, inconspicuous anterolateral processes 2 (2.0 ± 0.0) long. Ventral bar membrane almost square, 13–14 (13.8 ± 0.4) long. Dorsal bar 14–22 (20.0 ± 2.6) (n = 8) wide. Marginal hook 23–29 (27.1 ± 1.9) (n = 8) long. Sickle 7–8 (7.7 ± 0.5) long, 3–4 (3.8 ± 0.5) (n = 8) wide proximally, 4–6 (4.5 ± 0.8) (n = 8) wide distally, with slender blade. Handle 17–21

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4 Present address: Department of Fisheries, Faculty of Agriculture, The University of Tokyo, Yayoi 1-1-1, Bunkyo-Ku 113, Tokyo, Japan.

(19.9 ± 1.4) (n = 8) long, with no terminal swelling. Filament 9–11 (10.0 ± 1.4) (n = 2) long.

**Type Host:** *Tilapia nilotica*, Nile tilapia, (Cichlidae).

**Type Locality:** Culture Ponds at the Bureau of Fisheries and Aquatic Resources National Freshwater Fish Hatchery, Muñoz, Nueva Ecija Province, Philippines.

**Location:** Body surface.

**Type Specimens:** Holotype (No. 84007) and paratype specimens (No. 84008) are deposited in the United States National Museum, Beltsville, Maryland.

**Collection Date:** November 1985.

**Etymology:** This species is named after the host from which it was collected.

**Comments:** *Gyrodactylus niloticus* sp. n. resembles numerous species of the genus (e.g., *G. cichlidarum* Paperna, 1968; *G. microalesis* Paperna, 1968; *G. cytophagus* Paperna, 1968) described from African freshwater fishes including native cichlids, characids, and cyprinodontids (Paperna, 1968). In fact, all of these species, as well as *G. niloticus* sp. n., appear to represent members of the same lineage and are characterized by possessing relatively long, narrow hamuli, a ventral bar with small anterolateral processes and an almost square posterior membrane, and marginal hooks with relatively large slender sickles. This lineage or species group has not been reported from freshwater fishes outside of the African continent, suggesting that *G. niloticus* sp. n. arrived in the Philippines along with host shipments originating in Africa. The haptoral sclerites of *G. niloticus* sp. n. resemble most closely those of *G. cichlidarum*, in both species having hamuli, ventral bars, and marginal hook sickles of similar shape and proportions. However, *G. niloticus* sp. n. is easily separated from this species by its much smaller hamuli (59–66 μm versus 80–100 μm in *G. cichlidarum*).

*Gyrodactylus shariffi* sp. n. (Figs. 5–8)

**Description** (based on 10 flattened specimens): Body 240–383 (289.7 ± 43.9) long, 48–96 (76.6 ± 13.5) wide at middle. Pharynx 20–39 (26.2 ± 6.0) long, 22–43 (30.7 ± 6.4) wide. Penis 9–12 (10.1 ± 1.1) (n = 8) in diameter, with a single large spine and a row of 5 or 6 small spines. Hamuli stout, 44–48 (45.3 ± 1.6) long; root 8–14 (10.8 ± 2.3), shaft 35–38 (36.5 ± 1.1), point 17–21 (19.6 ± 1.1) (n = 9). Ventral bar 5 (5.0 ± 0.0) long, 18–22 (20.2 ± 1.0) wide, with prominent, rounded anterolateral processes 7–10 (9.0 ± 0.9) (n = 9) long. Ventral bar membrane 11–15 (14.0 ± 1.2) long. Dorsal bar 14–20 (17.0 ± 2.0) (n = 9) long. Marginal hook 18–21 (19.5 ± 1.0) long. Sickle compact, 3–4 (3.8 ± 0.4) long, 3–4 (3.2 ± 0.4) wide proximally, 3–4 (3.2 ± 0.4) wide distally. Handle 14–18 (15.8 ± 1.1) long, with no terminal swelling. Filament 6–10 (7.6 ± 1.3) long.

**Type Host:** *Tilapia nilotica.*
Type Locality: Culture ponds at the University of the Philippines in the Visayas, Brackishwater Aquaculture Center, Leganes, Iloilo Province, Philippines.

Location: Body surface.

Type Specimens: Holotype (No. 84009) and paratype specimens (No. 84010) are deposited in the United States National Museum, Beltsville, Maryland.

Collection Date: August 1985, December and January 1986.

Etymology: This species is named in honor of Dr. M. Shariff, Universiti Pertanian Malaysia, Serdang, Malaysia, in recognition of his contributions to fish parasitology in Southeast Asia.

Comments: Gyrodactylus shariffi sp. n. resembles most closely G. zhukovi Ling, 1962, described from the skin of Mugil soiuy in China (Ling, 1962; Zhukov, 1970). Both species belong to a lineage characterized by huge anterolateral processes of the ventral bar, relatively short stout hamuli, and marginal hooks with minute compact sickles. It appears to be a lineage that occurs on mugilid fishes in the Pacific Ocean basin because one of us (D.K.C.) has collected a similar species from Mugil cephalus in brackish water in coastal Peru. Gyrodactylus shariffi sp. n. differs from G. zhukovi by having much smaller hamuli (44-48 μm versus 62 μm).

Discussion

There is considerable international interest in the manner in which fish parasites are being disseminated globally by humans (Hoffman, 1970; Bauer and Hoffman, 1976; Combes and LeBrun, 1990; Arthur and Shariff, 1991; Bauer, 1991; Lumanlan et al., 1992; Kennedy, 1993; Cone et al., 1994). The present study suggests that tilapia introduced into the Philippines brought with them at least 1 species of gyrodactyild parasite (G. niloticus sp. n.) in addition to the 8 species of parasites previously believed to have been introduced with this fish (Bondad-Reantaso and Arthur, 1990).

The presence of G. shariffi sp. n. on T. nilotica cultured in brackish water cages suggests that Nile tilapia may have picked up the infections from wild marine fishes that also inhabit the ponds. Mullets are plentiful in coastal waters of the Philippines (see Schroeder, 1980) and are the most likely reservoir hosts, given the known association of this particular lineage of Gyrodactylus with members of the Mugilidae in the Pacific Ocean.

Bondad-Reantaso and Arthur (1990), in their survey of the parasites of wild and cultured T. nilotica in the Philippines, showed that the assemblages of parasites are made up of those species that were apparently introduced into the region along with the original host shipments and those that have been acquired secondarily from native fishes. This scenario parallels what we suspect has happened with the viviparous monogeneans.

Literature Cited


CONE ET AL.—NEW GYRODACTYLUS FROM TILAPIA IN THE PHILIPPINES

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