

Zeylanicobdella arugamensis (Hirudinida, Piscicolidae), a Leech Infesting Brackish-water Fishes, New to Japan

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Abstract. Specimens of the piscicolid leech *Zeylanicobdella arugamensis* de Silva, 1963 were collected from Mozambique tilapia *Oreochromis mossambicus* in a brackish-water inlet of Okinawa-jima Island, Okinawa Prefecture, southern Japan in May 2008. This finding represents the first record of *Z. arugamensis* in Japan and extends its geographic range from the Philippines north into southern Japan. The external morphology of the specimens is described. A literature review of the hosts, geographic distribution, and pathogenicity of the species reveals that it is not host-specific to teleosts and widely occurs in tropical and subtropical waters of the Indo-West Pacific region and that it is an important pathogenic parasite in finfish mariculture in the region.

Key words: *Zeylanicobdella arugamensis*, *Oreochromis mossambicus*, leech, parasite, new country record

Introduction

The fauna of piscicolid leeches in the Ryukyu Islands, southern Japan, is poorly known (Ito, 2003). Only *Stibarobdella macrothela* (Schmarda, 1861) and unidentified species of *Trachelobdella* have been reported to date from marine fishes (Williams *et al.*, 1994; Yamauchi *et al.*, 2008; Nagasawa *et al.*, 2008). In May 2008, we collected specimens of *Zeylanicobdella arugamensis* de Silva, 1963 from Mozambique tilapia *Oreochromis mossambicus* (Peters) in a brackish-water inlet of Okinawa-jima Island, one of the Ryukyu Islands, Okinawa, southernmost prefecture in Japan. The present paper reports on this collection as the first record of *Z. arugamensis* in Japan.

Materials and Methods

Two Mozambique tilapia *Oreochromis mossambicus* were collected using a cast net in a brackish-

water inlet connecting between the mouth of the Ginoza River and the North Pacific Ocean, near Ginoza Big Bridge (26°29'10"N, 127°58'54"E), Ginoza, Okinawa Prefecture on May 18, 2008. Fish were killed at the sampling site and brought to the laboratory of the University of the Ryukyus, where leeches were taken, observed, and fixed in 10% sea water formalin. Leech specimens are deposited in the annelid (An) collection at the National Museum of Nature and Science, Tokyo (NSMT-An 402). The English and scientific names of fishes follow those recommended by Froese & Pauly (2009).

Results

Zeylanicobdella arugamensis de Silva, 1963

(New Japanese name: Minami-uobiru for both the genus and the species)
(Fig. 1)

Description

Body ($N=3$) 9.0–19.8 mm in total length including suckers and 0.8–2.2 mm in maximum body

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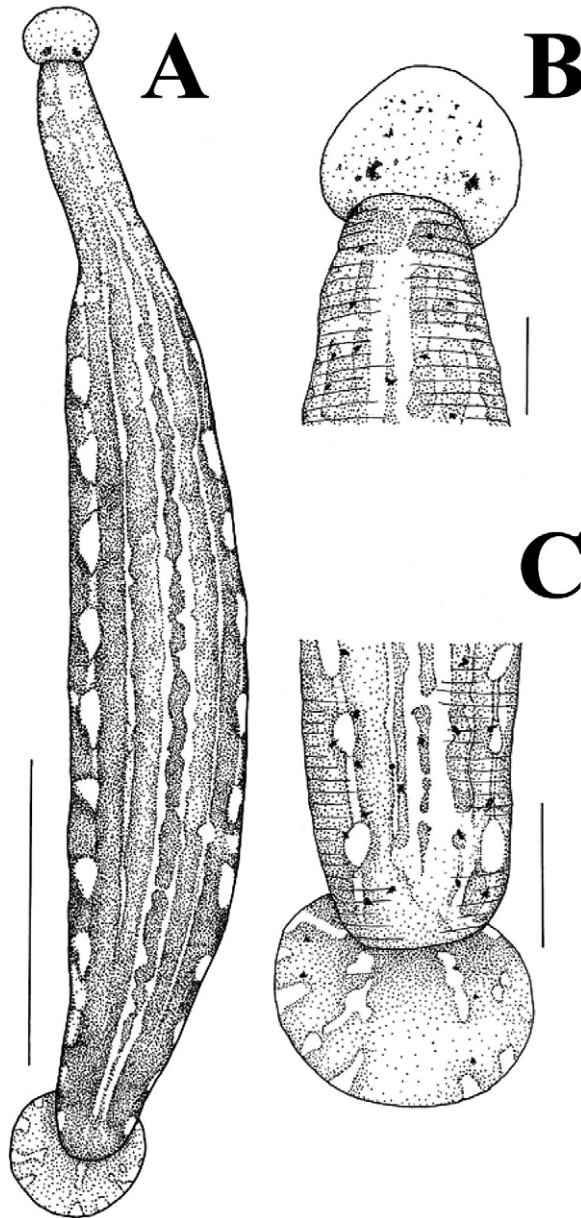


Fig. 1. *Zeylanicobdella arugamensis* from Mozambique tilapia *Oreochromis mossambicus* in a brackish-water inlet of Okinawa-jima Island, Okinawa Prefecture, Japan. A. Entire body, dorsal view, B. Oral sucker, dorsal view, C. Caudal sucker, dorsal view. Scale bars: 5 mm in A, 0.5 mm in B, 1 mm in C.

width near middle of urosome. Body indistinctly divided into subcylindrical trachelosome and much longer and wider, slightly flattened urosome. Skin smooth, lacking papillae, tubercles, or pulsatile vesi-

cles. Oral sucker up to 1.0 mm in diameter and oval shaped: groups of pigments appearing as a pair of eyes on dorsal surface of oral sucker. Caudal sucker larger than oral sucker (up to 1.8 mm in diameter)

and eccentrically attached. Body pigmentation on a largest leech dark brown dorsally and ventrally with black pigments. Twelve unpigmented areas laterally on trachelosome. Six longitudinal, narrow unpigmented stripes dorsally on trachelosome: two central stripes slightly wider and brighter; two outermost stripes faintly connecting lateral unpigmented areas. Irregularly shaped unpigmented areas on caudal sucker. No caudal sucker ocelli. Body pigmentation on smaller leeches pale dark brown.

Occurrence on hosts

Two and one specimens of *Zeylanicobdella arugamensis* were collected each from two fish examined [331 and 290 mm in body length]. The leeches were found on the gill arch ($N=2$) and the roof of the oral cavity ($N=1$) of the fish.

Discussion

The genus *Zeylanicobdella* was previously reported to contain two species, *Z. arugamensis* and *Z. stellata* (Moore, 1958) (= *Otoniobdella stellata* or *Malmiana stellata*) (Hayward, 1997: 182) but the latter species can be regarded as a synonym of *Z. arugamensis* (Burreson & Kalman, 2006: 91).

The external morphology of the specimens in this study is more or less identical with that of *Z. arugamensis* described originally by de Silva (1963) from Sri Lanka and later by de Silva & Fernando (1965) from Singapore. Although de Silva (1963) reported the presence of pulsatile vesicles in the original description, we did not recognize them in our material. Moore (1958) similarly found no pulsatile vesicles when he described the species (as *O. stellata*) from South Africa. The leech has a wide variation in pigmentation. The body, for example, shows pale yellowish ochre (de Silva, 1963), deep olive green (San-

Table 1. Hosts of *Zeylanicobdella arugamensis*.

Order and family	Scientific name	English name	Locality	Literature
Anguilliformes				
Anguillidae	<i>Anguilla reinhardtii</i>	speckled longfin eel	Australia	Gosper (1995)
—	unidentified marine eel		Singapore	de Silva & Fernando (1965)
Siluriformes				
Ariidae	<i>Arius maculatus</i>	spotted catfish	Sri Lanka	de Silva (1963)
Bagridae	<i>Myxus gulio</i>	long whiskers catfish	Sri Lanka	de Silva (1963)
Plotosidae	<i>Plotosus canius</i>	gray eel-catfish	India	Jayadev Babu (1967)
Syngnathiformes				
Syngnathidae	<i>Hippocampus kuda</i>	spotted seahorse	Singapore	de Silva & Fernando (1965)
Perciformes				
Cichlidae	<i>Oreochromis mossambicus</i>	Mozambique tilapia	Sri Lanka, Japan	de Silva (1963), this study
Gobiidae	<i>Glossogobius giuris</i>	tank goby	Sri Lanka	de Silva (1963)
	<i>Scartelaos tenuis</i>	Indian Ocean slender mudskipper	Iran	Polgar <i>et al.</i> (2009)
	<i>Periophthalmus waltoni</i>	Walton's mudskipper	Iran	Polgar <i>et al.</i> (2009)
Drepaneidae	<i>Drepane punctata</i>	spotted sicklefish	Sri Lanka	de Silva & Fernando (1965)
Clinidae	<i>Clinus cottoides</i>	bluntnose klipfish	South Africa	Hayes <i>et al.</i> (2006)
Blenniidae	<i>Parablennius cornutus</i>	—*	South Africa	Hayes <i>et al.</i> (2006)
Scatophagidae	<i>Scatophagus argus</i>	spotted scat	Indonesia	Palm & Rückert (2009)
Sillaginidae	<i>Sillago soringa</i>	soringa sillago	Thailand	Hayward (1997)
Serranidae	<i>Epinephelus coioides</i>	orange-spotted grouper	Philippines, Indonesia	Cruz-Lacierda <i>et al.</i> (2000), Palm & Rückert (2009)
Latidae	<i>Lates calcarifer</i>	barramundi	Malaysia	Kua (2008), Kua <i>et al.</i> (2009)
Mugiliformes				
Mugilidae	<i>Mugil cephalus</i>	flathead mullet	Indonesia	Palm & Rückert (2009)
Unknown host			Borneo	Williams & Burreson (2006)

*: No English name is available in Froese & Pauly (2009).

jeeva *et al.*, 1977), or dark brown (this study). The specimens from Singapore and India had radial bands on the caudal sucker (de Silva & Fernando, 1965; Sanjeeva *et al.*, 1977) but such bands were not observed in our specimens.

Zeylanicobdella arugamensis is known to occur on the coast of various regions in the Indo-West Pacific, including South Africa, Iran, Sri Lanka, India, Thailand, Malaysia, Borneo, Singapore, Indonesia, the Philippines, and Australia (Table 1). The present finding constitutes the first record of *Z. arugamensis* in Japan and expands its geographic range from the Philippines north into Okinawa, southernmost prefecture in Japan. As evident from these localities, the leech is a tropical and subtropical species that widely occurs in the Indo-West Pacific region.

The hosts that so far have been recorded are 17 species of brackish-water or coastal marine teleosts that belong to five orders and 15 families, and one unidentified marine eel (Table 1). This indicates that the leech is not host-specific to teleosts, as has been suggested to be a generalist (Hayward, 1997), and will be collected from more fish species in the Indo-West Pacific region.

We collected the specimens of *Z. arugamensis* from the gill arch and oral cavity of the fish. These attachment sites are different from those reported previously (*e.g.* de Silva, 1963; Sanjeeva *et al.*, 1977; Cruz-Lacierda *et al.*, 2000): the leech usually occurs on the host's body surface, especially in the head region, and near the fins. Since the fish we examined were killed immediately after sampling and brought to the laboratory for parasitological study, the leeches might have moved from the body surface to within the oral cavity during a period (*ca* 6 hours) from capture to examination.

Zeylanicobdella arugamensis was suspected to transmit a hemogregarine and trypanosomes between coastal marine fishes in South Africa (Hayes *et al.*, 2006). The leech is also known to infest cultured fishes (*Anguilla reinhardtii*, *Epinephelus coioides*, *Lates calcarifer*) in Australia, the Philippines, and Malaysia (Gosper, 1995; Cruz-Lacierda *et al.*, 2000;

Cruz-Lacierda & Erazo-Pagador, 2004; Kua, 2008; Kua *et al.*, 2009). Mortality occurred among infested fishes (Cruz-Lacierda *et al.*, 2000; Somga *et al.*, 2001; Kua, 2008; Kua *et al.*, 2009) and the leech has been suggested to induce a secondary bacterial infection (Kua, 2008). Leong *et al.* (2006) have regarded *Z. arugamensis* as an important pathogenic parasite in mariculture in the Asia-Pacific region. Moreover, infestation by an unidentified leech, which is most likely *Z. arugamensis*, is known to cause diseases or mortality in various marine teleosts, including groupers (*Epinephelus* spp., *Cromileptes altivelis*) and humphead wrasse (as Napoleon fish, *Cheilinus undulates*), farmed in Indonesia (Koesharyani *et al.*, 2001), Malaysia (Leong & Wong, 1988), Thailand (Roongkamnertwongsa *et al.*, 2001), and the Philippines (Somga *et al.*, 2002). It is thus highly important to prevent leeches from introducing to and spreading over fish rearing facilities.

Mozambique tilapia are not native to Japan. This species was introduced in 1954 to the main island of Japan from Thailand (Maruyama *et al.*, 1987) and to Okinawa-jima Island from Taiwan (Takehara *et al.*, 1997). Two species of parasites, a ciliate *Trichodina* sp. (Trichodinidae) and a monogenean *Neobenedenia girellae* (Hargis, 1955) (Capsalidae), have been reported that parasitize this fish in Japan (Miyashita, 2006; Ogawa *et al.*, 1995) and *Z. arugamensis* is herein newly added to the parasite fauna of the fish in the country. Mozambique tilapia are also known to serve as a host for the leech in Sri Lanka (de Silva, 1963).

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