

First record of the fish parasite *Transversotrema patialense* (Trematoda: Digenea: Transversotrematidae) from Japan

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Abstract. The digenetic trematode *Transversotrema patialense* (Soparkar, 1924) was found beneath the scales of Mozambique tilapia *Oreochromis mossambicus* (Perciformes: Cichlidae) collected in an irrigation canal on Ishigaki-jima Island, Okinawa Prefecture, southern Japan. This discovery constitutes the first record of *T. patialense* from Japan as well as the northeasternmost geographical distribution record for the species.

Key words: *Transversotrema patialense*, Trematoda, Digenea, fish parasite, *Oreochromis mossambicus*, new country record, northeasternmost distribution record

Introduction

The digenetic trematode *Transversotrema patialense* (Soparkar, 1924) is found parasitic beneath the scales of estuarine and freshwater fishes (Cribb *et al.*, 1992). This parasite shows high biological variability in morphology, utilization of gastropod intermediate and fish definitive hosts, and geographical distribution (Cribb *et al.*, 1992). The species so far has been reported from Congo (as Zaïre) (Africa) (Brien, 1954), Israel (Ben-Ami *et al.*, 2005), India (Soparkar, 1924; Hanumantha & Ganapati, 1967; Murty & Hanumantha Rao, 1968; Nadakal *et al.*, 1969; Pandey, 1971; Pande & Shukla, 1972; Mohandas, 1973), Sri Lanka (as Ceylon) (Crusz, 1956; Crusz & Sathananthan, 1960; Crusz *et al.*, 1964), Thailand (Wongsawad *et al.*, 2004; Lerssutthichawal, 2008), Vietnam (Vo *et al.*, 2011), Malaysia (Betterton, 1979; Leong, 1988), Philippines (Velasquez, 1958, 1961), Australia (Cribb *et al.*, 1992) and the Solomon Islands (Olivier, 1947) (Fig. 1).

Mozambique tilapia *Oreochromis mossambicus* (Peter, 1852) examined in the present study is not native to Okinawa Prefecture, where it was introduced from Taiwan in 1954 and has been established since (Takehara *et al.*, 1997). In Okinawa Prefecture, this fish harbors a piscicolid leech *Zeylanicobdella arugamensis* de Silva, 1963 (Nagasawa & Uyeno, 2009) and three species of monogeneans, *Cichlidogyrus sclerosus* Paperna & Thurston, 1969, *C. halli* (Price & Kirk, 1967) and *C. tilapiae* Paperna, 1960 (Maneepitaksanti & Nagasawa, 2012). Currently, we collected specimens of *T. patialense* from *O. mossambicus* in Okinawa Prefecture, which represents the first record of this parasite from Japan.

Materials and Methods

Three specimens of *O. mossambicus* were collected using a cast net in an irrigation canal in Uratabaru (24°23'23"N, 124°9'6"E), Kabira on Ishigaki-jima Island, Okinawa Prefecture, southern Japan, on 15 May 2010. The fish were fixed in 10% formalin and transported to the laboratory for parasitological examination. The parasites were removed from beneath the scales under an Olympus SZX7 stere-

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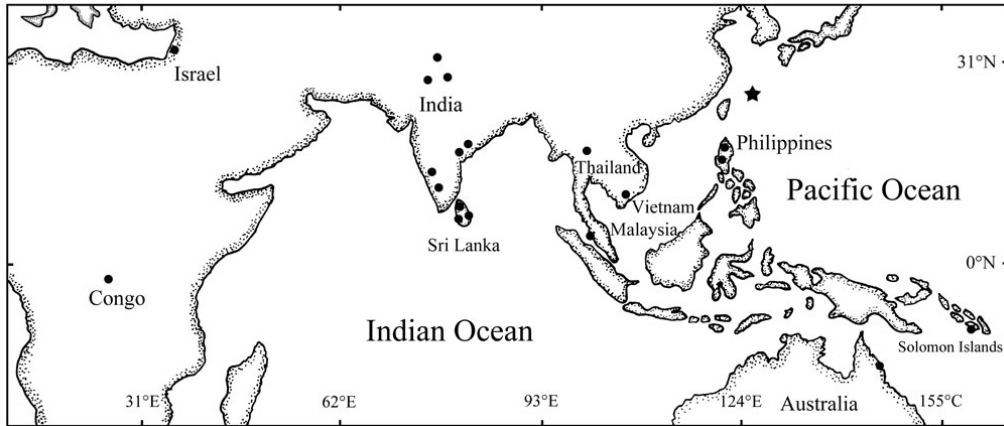


Fig. 1. Geographical distribution of *Transversotrema patialense* (Soparkar, 1924) based on the previous (closed circles) and present (closed asterisk) records.

oscopic microscope, flattened on slide glasses with slight cover-slip pressure and fixed in 10% formalin. They were stained with alum carmine, Heidenhain's iron hematoxylin or Delafield's hematoxylin, dehydrated through a graded ethanol series and mounted in Canada balsam. Ten adults and two eggs were measured. All measurements are given in micrometers as ranges with means in parentheses (Table 1). A drawing was made with the aid of a drawing tube attached to an Olympus BX51 compound microscope. The morphological terminology follows Cribb *et al.* (1992). Voucher specimens are deposited in the Platyhelminthes (Pl) collection at the National

Museum of Nature and Science, Tsukuba (NSMT-PI 5943–5953).

Results

All three fish examined were parasitized by adult *T. patialense* (Fig. 2), with a mean intensity of 30 (range: 18–47).

The specimens of *T. patialense* have a pyriform body that is dorsoventrally flattened, transversely elongated and bears prominent tegumental spines. Eye-spots are large and located slightly posterior to pharynx. Ventral sucker is present between eye-

Table 1. Measurements (in micrometers) of *Transversotrema patialense* (Soparkar, 1924) found in the previous and present studies.

Name used	<i>T. patialense</i>	<i>T. laruei</i>	<i>T. patialense</i>	<i>T. patialense</i>	<i>T. soparkari</i>	<i>T. chackai</i>	<i>T. patialense</i>	<i>T. patialense</i>
Country	Sri Lanka	Philippines	Sri Lanka	India	India	India	Australia	Japan
Reference	Crusz & Sathananthan (1960)	Velasquez (1961)	Crusz <i>et al.</i> (1964)	Murty & Hanumantha (1968)	Pande & Shukla (1972)	Mohandas (1973)	Cribb <i>et al.</i> (1992)	Present study
Body length	306-323	230-550 (390)*	368-560	312-375 (352)	375-675	400-460	361-503 (420)	300-405 (339)
width	612-700	460-900 (390)	640-1072	680-732 (720)	735-1437	625-950	789-947 (882)	640-870 (730)
Pharynx length	48-50	40-50 (45)	56-96	36-52	58-97	55-70	59-79 (68)	50-68 (58)
width	-	-	-	36-60	58-115	-	59-69 (64)	50-70 (56)
Ventral sucker length	102	70-90 (80)	96-112	60-84	119-141	100-135	119-151 (140)	90-120 (110)
width	-	-	-	-	-	-	131-156 (147)	97-118 (108)
Egg length	-	125-150 (138)	104-176	112-130 (120)	140-176	125-160	119-141 (129)	120-125 (123)
width	-	46-81 (64)	56-88	44-60 (56)	68-109	50-75	67-75 (73)	90-107 (99)

* Range (mean)

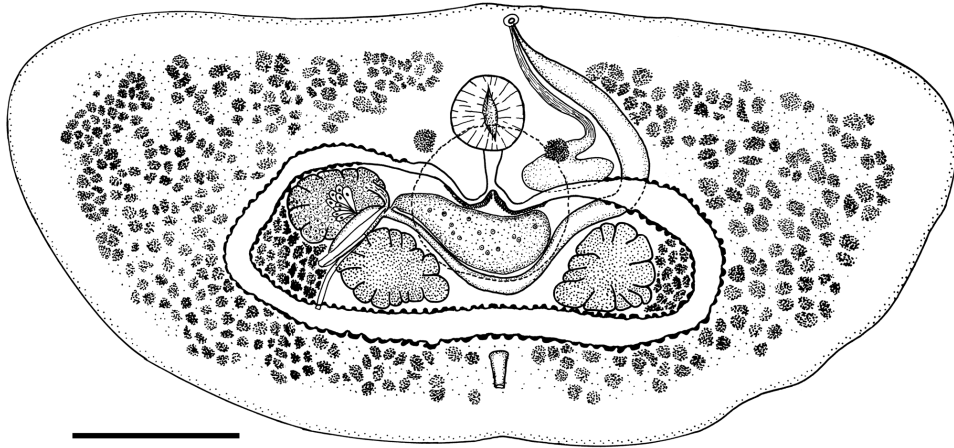


Fig. 2. *Transversotrema patialense* (Soparkar, 1924) from *Oreochromis mossambicus* (Peter, 1852) from Ishigaki-jima Island, Okinawa Prefecture, Japan, dorsal view. Scale bar: 100 μ m.

spots. Mouth opens mid-ventrally. Pharynx is well-developed between eye-spots. Esophagus is short. Ceca are bifurcated dorsal to ventral sucker and form a loop surrounding testes, ovary and some vitelline follicles. Glandular cells are seen at cecal bifurcation level. Testes are deeply lobed. Seminal vesicle overlaps with right eye-spot, coils anterior to ceca and proceeds anteriorly to become vas deferens which passes to genital pore. Ovary is slightly lobed and located between left testis and left cecal bend. Oviduct is short and conical. Mehlis' gland is present. Proximal portion of Laurer's canal is dilated whereas distal portion is stunted and zigzagged with its end running to posterior left cecal region. Vitelline reservoir is located between testes and connected to uterus. Vitelline follicles occupy almost entire extracecal space and some intercecal space. Uterus arises from ootype, bends downward at mid-intercecal region and ascends around right anterior cecal region to genital pore where it unites with vas deferens. Proximal portion of uterus forms seminal receptacle. Excretory bladder is sac-like with excretory pore opening in midline of posterior margin of body. Eggs are large and ovoid.

Discussion

The morphology and measurements of the speci-

mens from Okinawa Prefecture, southern Japan, are almost identical to those of *T. patialense* reported from other countries (Table 1). This parasite was originally described by Soparkar (1924) as *Cercaria patialense* from the gastropod *Melanoides tuberculatus* (O. F. Müller, 1774) in northern India. The species was later regarded as a species of the genus *Transversotrema* by Cruz & Sathanathan (1960). It was redescribed by Cribb *et al.* (1992) using specimens from Australia. A variety of fishes and two species of gastropods (*M. tuberculatus* and *M. anomala* (Dautzenberg & Germain, 1914)) serve as definitive and intermediate hosts, respectively, for the species (Cribb *et al.*, 1992).

The glandular cells at cecal bifurcation level and the Mehlis' gland have never been described before. This may have been caused by staining techniques used in the previous studies. In this study, the glandular cells can be clearly seen in the specimens stained in Heidenhain's iron hematoxylin.

This parasite has a wide distribution range from Congo (Africa) in the west to the Solomon Islands in the east (Fig. 1). In this paper, its geographical distribution in the western Pacific region is expanded from the Philippines (Velasquez, 1958, 1961) north to Okinawa Prefecture, Japan, which constitutes both a new country record and the northeasternmost record for the species.

As indicated by Cribb *et al.* (1992), *T. patialense* has a wide host range. In the present study, we collected this parasite from *O. mossambicus* on Ishigaki-jima Island, Okinawa Prefecture, but it will be found in other fishes from this island as well.

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