Trematodes of Marine Fishes from Moroiso Bay, Misaki, Kanagawa Prefecture, Japan

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Abstract. Twenty-three identified and 8 unidentified species in 9 families of trematodes were recorded from marine fishes representing 15 species in 12 families taken in Moroiso Bay, Misaki, on the Pacific coast of Kanagawa Prefecture, central Japan, from October 1977 to July 1983. Morphological characteristics of taxonomic importance of some of them are described and illustrated.

This study was initiated to gain some knowledge of the trematode fauna of marine fishes in Moroiso Bay, Misaki, prior to beginning ecological studies of relationships between trematodes and their fish hosts in the bay. We examined several small samples of fishes taken there for trematodes. However, the movement of the junior author from Tokyo to Hokkaido compelled us to give up continuing examination. This paper reports results of the examinations. Fish nomenclature has been based on the Ichthyological Society of Japan (1981).

Materials and Methods

Marine fishes representing 28 species in 23 genera in 17 families were collected, mainly at the *Zostera* bed, in Moroiso Bay, Misaki, on the Pacific coast of Kanagawa Prefecture, central Japan, from October 1977 to July 1983. They were examined fresh for trematodes at the Misaki Marine Biological Station, University of Tokyo, Misaki. The incidence and intensity of infection of each fish species with each parasite species were not recorded. Flukes found were flattened, fixed in Schaudinn's solution or AFA, stained with Heidenhain's iron hematoxylin or alum carmine and mounted in Canada balsam. They are deposited in the collection of the National Science Museum (Natural History), Tokyo. Some related specimens kindly given us by Dr. Shigeru Shimura were also studied.

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Results

The following are trematode species recovered. They are arranged alphabetically by family, genus and species.

Family Acanthocolpidae

Stephanostomum pagrosomi (Yamaguti, 1939) Manter, 1947

Host and location. *Ditrema viridis* (swim bladder).

Specimens. NSMT-Pl 2856 and 2857 (encysted metacercariae).

Because these metacercariae are morphologically similar to those of Yamaguti (1958), we follow him in identifying them. He found encysted metacercariae in the swim bladder of *D. temmincki* from the Inland Sea and referred them to *S. pagrosomi* owing to morphological resemblance. In the present specimens the intestinal ceca sometimes appeared to open into the excretory vesicle.

Family Accacoeliidae

Tetrochetus sp.

Host and location. *Rudarius ercodes* (intestine).

Specimen. NSMT-Pl 2858 (1 mature worm).

This specimen somewhat resembles *T. coryphaenae* Yamaguti, 1934

Family Bucephalidae

Bucephalus sp.

Host and location. *Pseudoblennius cottoides* (intestine).

Specimens. NSMT-Pl 2859 (several mature worms).

These specimens were poorly prepared. They are similar to *B. margaritae* Ozaki et Ishibashi, 1934.

Prosorhynchinae gen. sp.

Host and location. *Synodus hoshinonis* (intestine).

Specimens. NSMT-Pl 2860 (3 immature worms).

Family Fellodistomidae

Discogasteroides minor (Yamaguti, 1934) Skrjabin et Koval, 1957

(Figs. 1-2)

Host and location. *Lactoria cubicus* (intestine).

Specimens. NSMT-Pl 2861 (13 mature and 2 immature worms).

In the present material, the cirrus pouch was thin-walled in the anterior one-fifth part and thick-walled in the remaining parts (Fig. 1). The genital pore was median and just behind the intestinal bifurcation. Eggs in balsam measured 32-42 by 16-20 μm. The excretory vesicle was small, V-shaped and posterior to the

gonads (Fig. 2). The dorsal pouch was present and postovarian, opening in front of the aperture of Laurer's canal, for which Yamaguti (1934) mistook this organ. For the organ in this species, readers are referred to Kamegai (1985).

Proctoeces maculatus (Looss, 1901) Odhner, 1911

Host and location. Halichoeres poecilepterus (intestine).

Specimens. NSMT-Pl 2862 (1 mature and 1 immature worm).

An immature specimen (NSMT-Pl 2921) obtained by Dr. S. Shimura from the intestine of *Sebastes inermis* from Moroiso Bay on September 14, 1980, belongs to this species.

Steringotrema nakazawai Kobayashi, 1921

Host and location. Canthigaster rivulata (intestine).

Specimens. NSMT-Pl 2863 (2 immature worms).

Trigonocryptus conus Martin, 1958

Host and location. Canthigaster rivulata (intestine).

Specimens. NSMT-Pl 2864–2866 (10 mature and 4 immature worms).

Eggs (48–58 by 26–30 μm) in balsam in the present material are larger than those (37–46 by 22–25 μm) in Martin's (1958) one.

Family Hemiuridae

Hypohepaticola callionymi Yamaguti, 1934

(Figs. 3–4)

Host and location. Rudarius ercodes (liver).

Specimens. NSMT-Pl 2867–2874 (23 mature worms).

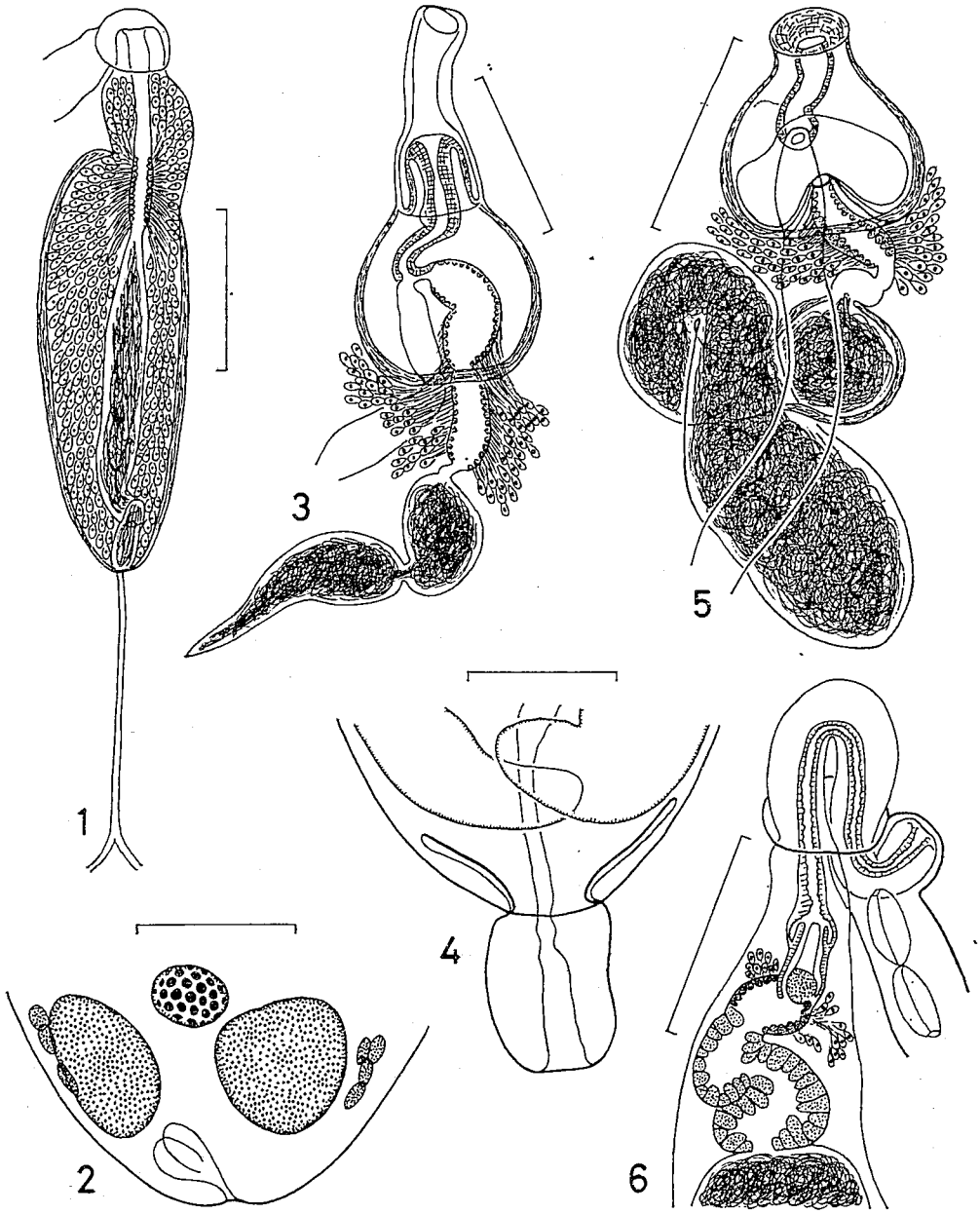
In the present material, the hermaphroditic duct was considerably long and undulating in the hermaphroditic pouch or sometimes evaginated to some extent into a tubular genital atrium (Fig. 3). The prostatic vesicle was present in the hermaphroditic pouch. Its gland cells appeared to be located outside the hermaphroditic pouch, massing together with those of the pars prostatica. A small ecsoma was rarely seen protruding (Fig. 4). We failed to confirm the presence of Juel's organ as suggested by Gibson and Bray (1979), due to lack of sectioned specimens. In the present whole-mounts, the vitellarium and ovary obscured the detailed anatomy of the ovarian complex.

Sterrhurus gymnothoracis Yamaguti, 1940

(Fig. 5)

Host and location. Phrynelox tridens (stomach).

Specimen. NSMT-Pl 2875 (1 mature worm).



Figs. 1 and 2. *Discogasteroides minor*. 1: Terminal genitalia, ventral view. 2: Posterior extremity of body, ventral view.

Figs. 3 and 4. *Hypohepaticola callionymi*. 3: Terminal genitalia, ventral view. 4: Posterior extremity of body, ventral view.

Fig. 5. *Sterrhurus gymnothoracis*, terminal genitalia, ventral view.

Fig. 6. *Bianium hemistoma*, part of terminal genitalia, ventral view.

Scale bars. 1, 2, 5, 6=0.2 mm; 3=0.1 mm; 4=0.4 mm.

Neither ventral groove nor presomatic pit was seen in the present specimen. A reversed heart-shaped ejaculatory vesicle lacking an epithelial lining was present in the hermaphroditic pouch (Fig. 5). The genital atrium was a shallow cuplike depression.

Family Lecithasteridae

Lecithaster stellatus Looss, 1907

Hosts and location. *Plotosus lineatus* and *Stephanolepis cirrhifer* (intestine).

Specimens. NSMT-Pl 2876 (from *P. lineatus*) and 2877 (from *S. cirrhifer*) (2 mature worms).

Family Lepocreadiidae

Bianium cryptostoma (Ozaki, 1928) Manter, 1940

Host and location. *Lactoria cubicus* (intestine).

Specimens. NSMT-Pl 2878 (3 mature worms).

Slightly colapsed eggs in balsam measured 60–72 by 36–42 μm.

Bianium hemistoma (Ozaki, 1928) Yamaguti, 1934

(Fig. 6)

Host and location. *Takifugu pardalis* (intestine).

Specimen. NSMT-Pl 2879 (1 mature worm).

This specimen had a hitherto undescribed pluglike structure in the sheathlike proximal portion of the ejaculatory duct (Fig. 6). A similar structure of unknown function occurs also in the following species.

Lepocreadium kamegaii Shimazu et Nagasawa, 1985

Hosts and location. *Rudarius ercodes* and *Stephanolepis cirrhifer* (intestine).

Specimens. NSMT-Pl 2650 and 2837–2852 (from *R. ercodes*) and 2853 and 2854 (from *S. cirrhifer*) (about 130 worms).

These specimens have been described as a new species by Shimazu and Nagasawa (1985).

Opechona sebastodis (Yamaguti, 1934) Yamaguti, 1938

Host and location. *Sebastes inermis* (intestine).

Specimens. NSMT-Pl 2880–2886 (about 100 worms).

Ten specimens (NSMT-Pl 2922) found by Dr. S. Shimura in the intestine of *S. inermis* from Moroiso Bay on May 25, 1980, belong to this species.

Family Opecoelidae

Decemtestis ditrematis Yamaguti, 1934

Host and location. *Ditrema viridis* (intestine).

Specimens. NSMT-Pl 2887–2891 (25 mature and 2 immature worms).

Decemtestis takanoha Yamaguti, 1951

Host and location. *Goniistius zonatus* (intestine).

Specimens. NSMT-Pl 2892 (3 mature worms).

Helicometra fasciata (Rudolphi, 1819) Odhner, 1902

Host and location. *Sebastes inermis* (intestine).

Specimens. NSMT-Pl 2893 and 2894 (4 mature worms).

Two (NSMT-Pl 2923) and one (2924) specimens found by Dr. S. Shimura in the intestine of *S. inermis* on September 14, 1980, and of *S. hubbsi* on August 12, 1980, respectively, from Moroiso Bay, are assigned to this species [=*H. pulchella* (Rudolphi, 1819) Odhner, 1902=*H. epinepheli* Yamaguti, 1934].

Opecoelus sebastodis Yamaguti 1934

Host and location. *Sebastes inermis* (intestine).

Specimens. NSMT-Pl 2884 and 2895 (2 mature worms).

Opegaster brevifistula Ozaki, 1928

Host and location. *Apogon semilineatus* (intestine).

Specimens. NSMT-Pl 2896 and 2915 (105 mature and 5 immature worms).

Opegaster ovata Ozaki, 1928

Host and location. *Helichoeres poecilepterus* (intestine).

Specimen. NSMT-Pl 2897 (1 mature worm).

Opegaster plotosi Yamaguti, 1940

Hosts and location. *Plotosus lineatus* and *Rudarius ercodes* (intestine).

Specimens. NSMT-Pl 2876 and 2898–2908 (from *P. lineatus*) and 2909–2912 (from *R. ercodes*) (about 300 mature and 40 immature worms).

Two immature specimens (NSMT-Pl 2913) found in the intestine of *Goniistius zonatus* seem to belong to this species.

Opegaster sp.

Host and location. *Synodus hoshinonis* (intestine).

Specimen. NSMT-Pl 2914 (1 mature worm).

This unidentified specimen has some resemblance to *O. parapristipomatis*

Yamaguti, 1934.

Plagioporus apogonichthydis Yamaguti, 1938

Host and location. *Apogon semilineatus* (intestine).

Specimens. NSMT-Pl 2915 (8 mature worms).

In the present material, the intestines terminated at the testicular level or in the posttesticular region. The ovary was rounded to trilobed. The vitellaria were confluent in the forebody and in the posttesticular region. The excretory vesicle reached to the ovary. Six mature specimens (NSMT-Pl 2916) found in the intestine of *Phrynelox tridens* are likely to belong to this species. The intestines in them were much atrophied, often ending between the ventral sucker and the ovary. The generic position of this species will be discussed later.

Plagioporus japonicus Yamaguti, 1938

Host and location. *Platosus lineatus* (intestine).

Specimens. NSMT-Pl 2898–2900 and 2905 (10 mature worms).

The intestines ended in the testicular zone or extended slightly into the posttesticular region. The ovary was entire. The vitelline follicles were always confluent in the forebody and in the posttesticular region. The excretory vesicle reached to the ovary. In one of the specimens, the uterine loop ran backward to the posterior testis. The generic position of this species will be discussed later.

Plagioporus kyusen Yamaguti, 1959

Hosts and location. *Halichoeres poecilepterus* and *H. tenuispinis* (intestine).

Specimens. NSMT-Pl 2862 (from *H. poecilepterus*) and 2917 (from *H, tenuispinis*) (12 mature worms).

The intestines ended in the testicular zone or in the posttesticular region. The ovary was triangular but not lobed. The vitellaria were confluent in the forebody and in the posttesticular region. The excretory vesicle reached to the ovary. Sixteen mature specimens (NSMT-Pl 2918) found in the intestine of *Canthigaster rivulata* and one mature specimen (NSMT-Pl 2919) found in the intestine of *Stephanolepis cirrhifer* are somewhat similar to this species.

The systematics of the genus *Plagioporus* Stafford, 1904, and related genera has long been a matter of contention and confusion (Gibson and Bray, 1982). *Plagioporus* was restricted by Gibson and Bray (1982) to freshwater forms with a ventrolateral genital pore and a short excretory vesicle which reaches forward at the most to the level of the posterior testis. In this genus the ovary is distinctly rounded or oval and the vitelline fields are confluent in the forebody (Gibson, 1976). The genus *Neolebouria* was erected by Gibson (1976) for some marine species of

the *Plagioporus*-complex with a ventrolateral genital pore, an irregularly lobed ovary, the vitelline fields confluent dorsally within the forebody and an excretory vesicle extending forward to the ovary. The genus *Macvicaria* was created by Gibson and Bray (1982) for marine species which had previously been allocated to *Plagioporus* (*sensu lato*) and had a ventrolateral genital pore, entire gonads, the ceca and vitellarium extending into the posttesticular region, the vitelline fields confluent or nearly so in the doral forebody and an excretory vesicle reaching at least to the anterior testis. Morphologically, *Macvicaria* seems to differ from *Neolebouria* only in the entire ovary. The present species *japonicus* and *kyusen* should be referred to *Macvicaria*. The generic position of the species *apogonichthydis* is problematical. The species can be assigned to both *Neolebouria* and *Macvicaria* because its ovary varies in shape from specimen to specimen (see above). This suggests that these two genera may be synonymous. The value of the shape of the ovary as a generic feature remains to be explained. Of freshwater species hitherto placed in *Plagioporus* (*sensu lato*), the type species, *P. serotinus* Stafford, 1904, and some others have an entire ovary and the rest have a lobed ovary. These species have yet to be critically restudied and compared with *P. serotinus*. This would show whether the posterior extent of the excretory vesicle is a valid criterion at the generic level. For the present, at any rate, we prefer to retain *Plagioporus* (*sensu lato*) and to allocate the present three species to it.

Family Zoogonidae

Lepidophyllum canthigastris Yamaguti, 1959

Host and location. *Canthigaster rivulata* (urinary bladder).

Specimens. NSMT-Pl 2866 and 2920 (38 mature and 10 immature worms).

In the present specimens, the tegumental spines were very thin. The seminal receptacle was well developed.

Fish species negative for trematodes were: *Acentrogobius pflaumi*, *Hippocampus coronatus*, *Hypodytes rubripinnis*, *Limanda yokohamae*, *Pseudoblennius marmoratus*, *P. percoides*, *Pseudolabrus japonicus*, *Pterogobius elapoides*, *Pt. zonoleucus*, *Sebastes hubbsi*, *Sebastiscus marmoratus*, *Sphyraena japonica* and *Vellitor centropomus*.

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References

1) Gibson, D. I. (1976): Monogenea and Digenea from fishes. Discovery Rep., 36: 179–266, pl. 18.

2) Gibson, D. I. and R. A. Bray (1979) : The Hemiuroidea: terminology, systematics and evolution. Bull. Br. Nat. Hist. (Zool.), 36: 35-146.
3) Gibson, D. I. and R. A. Bray (1982) : A study and reorganization of *Plagioporus* Stafford, 1904 (Digenea: Opecoelidae) and related genera, with special reference to forms from European Atlantic waters. J. Nat. Hist., 16: 529-559.
4) Ichthyological Society of Japan (1981): Dictionary of Japanese Fish Names and Their Foreign Equivalents. Sanseido, Tokyo, ii+vii+834 pp.
5) Kamegai, Sh. (1985): On the dorsal pouch of *Discogasteroides minor* (Yamaguti, 1934) from boxfish, *Ostracion tuberculatus*. Jap. J. Parasitol., 34(Suppl.): 37. (In Japanese.)
6) Martin, W. E. (1958): Hawaiian helminths. I. *Trigonocryptus conus* n. g., n. sp. (Fellodistomidae). Pac. Sci., 12: 251-254.
7) Shimazu, T. and K. Nagasawa (1985): *Lepocreadium kamegaii* sp. n. (Trematoda: Lepocreadiidae), a new parasite of marine fishes from Moroiso Bay, Misaki, Kanagawa Prefecture, Japan. Zool. Sci., 2: 817-819.
8) Yamaguti, S. (1934): Studies on the helminth fauna of Japan. Part 2. Trematodes of fishes, I. Jap. J. Zool., 5: 249-541.
9) Yamaguti, S. (1958): Studies on the helminth fauna of Japan. Part 52. Trematodes of fishes, XI. Publ. Seto Mar. Biol. Lab., 6: 369-384, pls. 14-15.

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