

Digenean Trematodes of Fishes Caught in Sagami Bay, off Izu Islands and off Ogasawara Islands

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Abstract. A total of 30 species of digenean trematodes of 23 genera from 10 families were obtained from 19 species of fishes caught in Sagami Bay, off Izu Island and off Ogasawara Islands. The species from Sagami Bay and off Izu Islands contained only four previously recorded species from the same areas and most of them are distributed widely including off northern Japan. In contrast, the species off Ogasawara Islands were consisted of tropical–subtropical species but some shared common species with those off southern and central Japan rather than those off Ryūkyū Islands. These results preliminarily suggest that advances of arctic–subarctic digenean species are attenuated in the waters around Izu Islands and fauna off Ogasawara Islands is composed both of temperate water and tropical–subtropical species.

Key words: Digenea, fish parasite, Sagami Bay, Izu Islands, Ogasawara Islands

Introduction

A research project entitled “Study on Environmental Changes in the Sagami Sea and Adjacent Coastal Area with Time Serial Comparison of Fauna and Flora” was carried out by the National Museum of Nature and Science, Tokyo in 2001–2005 to investigate bio-diversity of Sagami Bay and adjoining seas in early 21st century. For fish parasites, Kuramochi (2006) and Machida *et al.* (2006) reported a total of 37 species of digenean trematodes, including one new species, from 57 fish species. When I summarized previous records from the same areas, 91 digeneans species of 56 genera from 17 families have been recognized from 54 fish species to date (Goto and Ozaki, 1929; Ichihara *et al.*, 1963a, b, c, d, 1964a, b, 1965a, b, 1966, 1968; Kamegai *et al.*, 1961; Kato *et al.*, 1963a, b, c; Kuramochi, 2006; Machida *et al.*, 2006; Shimazu, 1989; Shimazu and Nagasawa, 1985a, b; Shimazu and Kamegai, 1990).

The research project was followed by new project “Studies on the Origin of Biodiversity in the Sagami Sea, Fossa Magna Element and the Izu–Ogasawara (Bonin) Arc” since 2006, and I

carried out several parasitological surveys on fishes in Sagami Bay, off Izu Islands and off Ogasawara Islands. A total of 156 individuals of 55 species from 28 families of fishes were examined, of which 38 species of fishes were infested by 98 lots of digenean trematodes. In the present study, 57 lots of specimens from 19 fish species were examined, identified and listed. Nothing has been known on digenean trematodes of fishes in Izu–Ogasawara arc, thus present paper is the first report on the matter.

Materials and Methods

Fishes from varying depth between 33 and 1061 m were collected by scientific research vessels (R/Vs). R/V *Tansei Maru* (Japan Agency for Marine–Earth Science and Technology) conducted a research cruise KT-07-31 on 24–30 Nov. 2007 and operated beam trawl in Sagami Bay and off Izu Islands. R/V *Takunan* (Hachijō Branch, Tokyo Metropolitan Center for Agriculture, Forestry and Fisheries on Izu Islands) carried out research cruises for *Beryx splendens* Lowe, 1834 (Berycidae) [Japanese name: Kinme-dai] by fishing off

Table 1. Catch localities and positions of digenean positive fishes examined in the present study.

Locality	Station	Vessel	Date	Position in		Position out		Depth (m)
				Latitude	Longitude	Latitude	Longitude	
Off Hatsushima Island, Sagami Bay								
	L-1-700	<i>Tansei Maru</i>	2007/11/25	35°03.811'N	139°12.224'E	35°04.818'N	139°12.593'E	699–754
	L-1-800	<i>Tansei Maru</i>	2007/11/25	35°03.412'N	139°12.552'E	35°02.726'N	139°13.733'E	563–756
Off Jōgashima Island, Sagami Bay								
	L-2-800	<i>Tansei Maru</i>	2007/11/25	35°03.204'N	139°33.014'E	35°02.830'N	139°31.975'E	969–1061
	L-2' -1000	<i>Tansei Maru</i>	2007/11/28	35°02.781'N	139°33.269'E	35°03.038'N	139°33.737'E	681–716
Off Toshima Island, Izu Islands								
	L-3-500	<i>Tansei Maru</i>	2007/11/27	34°39.889'N	139°12.191'E	34°40.030'N	139°13.866'E	644–828
Off Hachijōjima Island, Izu Islands								
	Kenken Yama	<i>Takunan</i>	2007/7/23	33°06.9'N	139°32.5'E			497
	Takunan 2	<i>Takunan</i>	2008/7/14	33°11.353'N	140°02.299'E			460
	Takunan 3–6	<i>Takunan</i>	2008/7/14	33°11.339'N	140°02.358'E	33°11.072'N	140°02.420'E	460
	Takunan 7	<i>Takunan</i>	2008/7/15	33°24.717'N	139°40.915'E			500
Near the coasts of Chichijima Island, Ogasawara Islands								
	Wentle 3–5	<i>Wentle</i>	2009/5/17	27°10.629'N	142°10.999'E	27°11.034'N	142°11.081'E	33
	Wentle 5–9	<i>Wentle</i>	2009/5/17	27°11.034'N	142°11.081'E	27°07.346'N	142°10.868'E	33–40
Off Chichijima Island, Ogasawara Islands								
	Koyo 12–13	<i>Koyo</i>	2009/5/19	27°14.615'N	142°11.454'E	27°14.639'N	142°11.440'E	100
	Koyo 18–19	<i>Koyo</i>	2009/5/21	27°18.890'N	142°17.938'E	27°18.919'N	142°17.977'E	300
	Koyo 22	<i>Koyo</i>	2009/5/24	26°58.126'N	142°01.233'E			374
	Koyo 27–30	<i>Koyo</i>	2009/5/24	27°01.815'N	142°13.936'E	27°01.772'N	142°13.888'E	100
Off Hahajima Island, Ogasawara Islands								
	Koyo 36	<i>Koyo</i>	2009/10/16	26°35.056'N	142°15.026'E			110
	Koyo 39–41	<i>Koyo</i>	2009/10/16	26°35.172'N	142°15.010'E	26°05.204'N	142°14.971'E	110–120
Off Nishinoshima Island, Ogasawara Islands								
	Koyo 54–63	<i>Koyo</i>	2009/10/20	27°13.965'N	140°53.295'E	27°13.938'N	140°53.348'E	130–138
	Koyo 56	<i>Koyo</i>	2009/10/20	27°13.934'N	140°53.281'E			120
	Koyo 64	<i>Koyo</i>	2009/10/21	27°14.847'N	140°51.801'E			95
	Koyo 67	<i>Koyo</i>	2009/10/21	27°16.012'N	140°52.481'E			200

Hachijōjima Island and kindly provided me of materials. R/V *Koyo* and *Wentle* (Tokyo Metropolitan Ogasawara Fisheries Center) also kindly fished materials off Chihijima Island, Hahajima Island and Nishnoshima Island, Ogasawara Islands. Fishes were preserved on ice until use, and identified to species, dissected and examined for parasite in the laboratory of R/V *Tansei Maru* or Tokyo metropolitan institutes in Hachijōjima Island and Chichijima Island. Catch localities of fishes examined are summarized in Table 1. Digeneans were washed in saline, fixed in AFA under cover-slip pressure, and later stained with Heidenhain's hematoxylin and mounted in balsam. The specimens were deposited in the Showa Me-

morial Institute, Tsukuba Research Center, National Museum of Nature and Science (NSMT-PI S).

Results

A total of 30 species of digenean trematodes of 23 genera from 10 families were recognized, of which 22 were identified to species but one was limited to generic level identification.

Order **Strigeida** La Rue, 1926
 Superfamily **Bivesiculoidea** Yamaguti, 1934
 Family **Bivesiculidae** Yamaguti, 1934

1. ***Bivesicula epinepheli*** Yamaguti, 1938

Materials examined. Single gravid specimen from the pyloric caeca and four immature highly damaged specimens from the intestine of *Epinephelus fasciatus* (Forsskål, 1775) (Serranidae) [Jn.: Akahata] caught at the St. Koyo 27–30 off Chichijima Island, NSMT-PI S75b and at the St. Wentle 5–9 near the coast of Chichijima Island, NSMT-PI S77, respectively. Three gravid specimens from the pyloric caeca and intestine of *Dentex abei* Iwatsuki, Akazaki and Taniguchi, 2007 (Sparidae) [Jn.: Kibire-akarenko] caught at the St. Koyo 18–19 off Chichijima Island, NSMT-PI S103. Two gravid, rather damaged specimens from the pyloric caeca of *Pristipomoides filamentosus* (Valenciennes, 1830) (Lutjanidae) [Jn.: Ōhime] caught at the St. Koyo 39–41 off Hahajima Island, NSMT-PI S86.

Remarks. This species was originally described based on the materials from *E. akaara* (Temminck and Schlegel, 1842) [Jn.: Kijihata] caught in the Inland Sea of Japan (Yamaguti, 1938a), and has also been recorded from *E. trimaculatus* (Valenciennes, 1828) [Jn.: Nominokuchi] caught off Tsushima Islands, Nagasaki (Machida *et al.*, 1970).

Superfamily **Bucephaloidea** Poche, 1907
 Family **Bucephalidae** Poche, 1907
 Subfamily **Bucephalinae** Poche, 1907

2. ***Bucephalus varicus*** Manter, 1940

Materials examined. Five gravid specimens from the intestine and one gravid from the heart (probably be incidental) of *Carangoides orthogrammus* (Jordan and Gilbert, 1882) (Carangidae) [Jn.: Nanyō-kaiwari] caught at the St. Koyo 64 and St. Koyo St. 56 off Nishinoshima Island, NSMT-PI S93 and 94, respectively.

Remarks. This species has been recorded wide variety of fish hosts including those of the family Carangidae in the Pacific, Atlantic and

Red Sea (cited from Yamaguti, 1971), and also has been recorded in Okinawa Island (Yamaguti, 1942).

Subfamily **Prosorhynchinae** Nicoll, 1914

3. ***Prosorhynchus crucibulum*** (Rudolphi, 1819)

Materials examined. Forty-six gravid specimens from the intestine and single gravid specimen from the stomach of *Variola louti* (Forsskål, 1775) (Serranidae) [Jn.: Bara-hata] caught at the St. Wentle 3–5 near the east of Chichijima Island, NSMT-PI S104 and 105, respectively.

Remarks. This species has been recorded from several host fishes caught in the waters of Mediterranean, Atlantic, Red Sea, Philippines and Peter the Great Bay (cited from Yamaguti (1971)), and also from Japanese waters, i.e. Inland Sea of Japan, East China Sea and Suruga Bay (Machida and Kamegai, 1997; Yamaguti, 1938a).

4. ***Prosorhynchus epinepheli*** Yamaguti, 1939

Materials examined. Two gravid specimens from the pyloric caeca of *Epinephelus fasciatus* (Forsskål, 1775) (Serranidae) [Jn.: Akahata] caught at the St. Koyo 27–30 off Chichijima Island, NSMT-PI S78.

Remarks. This species was originally described based on the materials from *E. akaara* (Temminck and Schlegel, 1842) [Jn.: Kijihata] caught in the Inland Sea of Japan (Yamaguti, 1939).

Superfamily **Gymnophalloidea** Odhner, 1905
 Family **Fellodistomidae** Nicoll, 1909
 Subfamily **Fellodistominae** Nicoll, 1909

5. ***Hypertrema ambovatum*** Manter, 1960

Materials examined. Single gravid specimen from the intestine of *Synaphobranchus kaupii* Johnson, 1862 (Synaphobranchidae) [Jn.: Irako-anago] caught at the St. L-1-800 off Hatsushima Island, NSMT-PI S98 and three gravid specimens from the intestine of *S. affinis* Günther, 1877 [Jn.: Hora-anago] caught at the St. L-3-500 off Toshima Island, NSMT-PI S99.

Remarks. This species has been frequently recorded from synphobranchid and congrid eels in the North Pacific off Japan, i.e. Suruga Bay (Machida and Kamegai, 1997; Machida *et al.*, 2007) and Tosa Bay (Kuramochi, 2001) since the original description from the New Zealand water (Manter, 1960). However, Kuramochi (2009) failed to find this species from *S. kaupii* caught off northern Honshū, Japan.

Subfamily **Piriforminae** Skrjabin and Koval,
1957

6. ***Piriforma macrorhamphosi*** Yamaguti, 1938

Material examined. Single gravid specimen from the intestine of *Nezumia proxima* (Smith and Radcliffe, 1912) (Macrouridae) [Jn.: Higo-sokodara] caught at the St. L-2-800 off Jōgashima Island, NSMT-PI S52.

Remarks. This species have been found only from the type host, *Macroramphosus scolopax* (Linnaeus, 1758) (Macroramphosidae) [Jn.: Sagifue] caught in the Japanese waters i.e. off Maisaka, Shizuoka, off Kochi, Suruga Bay and off the Pacific coast of northern Honshū (Yamaguti, 1938a; Machida and Kamegai, 1997; Kuramochi, 2009). A first record from a macrourid fish is represented.

Superfamily **Hemiuroidea** Looss, 1899

Family **Hemiuridae** Looss, 1899

Subfamily **Glomicirrinae** Yamaguti, 1958

7. ***Glomicirrus amadai*** Yamaguti, 1937

Materials examined. A total of four gravid specimens from the stomach of *Nezumia proxima* (Smith and Radcliffe, 1912) (Macrouridae) [Jn.: Higo-sokodara] caught at the St. L-1-800 off Hatsushima Island, NSMT-PI S55 and St. L-3-500 off Toshima Island, NSMT-PI S56a, and single gravid specimen from the stomach of *Ventrifossa garmani* (Jordan and Gilbert, 1904) (Macrouridae) [Jn.: Sagami-sokodara] caught at the St. L-3-500 off Toshima Island, NSMT-PI S61.

Remarks. This species was originally described based on the materials from *Branchioste-*

gus japonicus (Houttuyn, 1782) (Branchiostegidae) [Jn.: Aka-amadai] caught off Tokushima Japan (Yamaguti, 1937). On the other hand, *G. propositus* Yamaguti, 1938 differing from *G. amadai* in having preacetabular position of sinus sac has been described from a macrourid fish *Coryphaenoides* (now addressed in *Ventrifossa*) *garmani* which is one of the host fish examined here (Yamaguti, 1938a). However, Machida and Kamegai (1997) pointed *G. propositus* to be conspecific with *G. amadai* due to the fact that the position of sinus sac varied in individuals and placed their specimens from fishes of the family Congridae, Aulopodidae and Macrouridae provisionally in *G. amadai*. I followed Machida and Kamegai (1997) because the position of sinus sac varied between preacetabular and anterodorsal to the acetabulum also in the present materials.

Subfamily **Lecithochiriinae** Lühe, 1901

8. ***Lecithochirium priacanthi*** Yamaguti, 1953

Material examined. Single young gravid specimen from the stomach of *Epinephelus fasciatus* (Forsskal, 1775) (Serranidae) [Jn.: Akahata] caught at the St. Koyo 27–30 off Chichijima Island, NSMT-PI S80.

Remarks. This species has been recorded from the type host *Priacanthus hamrur* (Forsskal, 1775) (Priacanthidae) [Jn.: Hōseki-kintoki] caught in Celebes (Yamaguti, 1953) and from many fishes in Hawaii (Yamaguti, 1970).

Subfamily **Opisthadeninae** Yamaguti, 1970

9. ***Genolinea laticauda*** Manter, 1925

Materials examined. Single gravid and young gravid specimens each from the stomach of *Coryphaenoides nasutus* Günther, 1877 (Macrouridae) [Jn.: Hana-sokodara] caught at the St. L-1-800 off Hatsushima Island, and St. L-2'-1000 off Jōgashima Island, NSMT-PI S62 and 63, respectively.

Remarks. This species has been recorded in the waters around Japan, off Kushiro and Nemuro in the Pacific coasts of Hokkaido, Kitami-Yamato

Bank in Sea of Okhotsk (Machida & Araki, 1994), and in the Pacific coast off northern Honshū (Kuramochi, 2009).

Subfamily **Pleurinae** Gibson and Bray, 1979

10. *Dinosoma synphobranchi* Yamaguti, 1938

Material examined. Single gravid specimen from the stomach of *Nezumia proxima* (Smith and Radcliffe, 1912) (Macrouridae) [Jn.: Higo-sokodara], one young gravid specimen from the stomach of *Ventrifossa garmani* (Jordan and Gilbert, 1904) (Macrouridae) [Jn.: Sagami-sokodara] and five gravid specimens from the stomach of *Synphobranchius affinis* Günther, 1877 (Synphobranchidae) [Jn.: Hora-anago] caught at the St. L-3-500 off Toshima Island, NSMT-PI S56, 60 and 100, respectively.

11. *Dinosoma tortum* Yamaguti, 1938

Material examined. Single gravid specimen from the intestine of *Beryx mollis* Abe, 1959 (Berycidae) [Jn.: Fūsen-kinme] caught at the St. Takunan 7 off Hachijōjima Island, NSMT-PI S65.

Family **Derogenidae** Nicoll, 1910

Subfamily **Derogeninae** Nicoll, 1910

12. *Derogenes macrostoma* Yamaguti, 1938

Materials examined. Two gravid specimens from the stomach of *Coryphaenoides nasutus* Günther, 1877 (Macrouridae) [Jn.: Hana-sokodara] caught at the St. L-2'-1000 off Jōgashima Island, NSMT-PI S64.

13. *Derogenes varicus* (O.F. Müller, 1784)

Materials examined. Two gravid specimens from the stomach of *Nezumia proxima* (Smith and Radcliffe, 1912) (Macrouridae) [Jn.: Higo-sokodara] caught at the St. L-1-800 off Hatsushima Island, NSMT-PI S57, six gravid specimens from the stomach of *Bathygadus antrodes* (Jordan and Gilbert, 1904) (Macrouridae) [Jn.: Anadara] caught in the L-1-700 off Hatsushima Island, NSMT-PI S59 and three gravid specimens from the stomach of *Physiculus japonicus* Hilgendorf,

1879 (Moridae) [Jn.: Chigodara] caught at the St. Takunan St. 2 off Hachijōjima Island, NSMT-PI S107.

Subfamily **Gonocercinae** Skrjabin and Guschanskaja, 1955

14. *Gonocerca phycidis* Manter, 1925

Materials examined. Three gravid specimens found in the stomach of *Nezumia proxima* (Smith and Radcliffe, 1912) (Macrouridae) [Jn.: Higo-sokodara] caught at the St. L-2-800 off Jōgashima Island, NSMT-PI S58, two gravid specimens from the stomach of *Synphobranchius affinis* Günther, 1877 (Synphobranchidae) [Jn.: Hora-anago] caught at the St. L-3-500 off Toshima Island, NSMT-PI S101 and four gravid specimens from the stomach of *Physiculus japonicus* Hilgendorf, 1879 (Moridae) [Jn.: Chigodara] caught at the St. L-3-500 off Hachijōjima Island, NSMT-PI S106.

Family **Didymozoidae** Monticelli, 1888

Subfamily **Didymodiclininae** Pozdnyakov, 1993

15. *Didymodiclinus pacificus* (Yamaguti, 1938)

Materials examined. Three intact male worms and several female fragments from a cyst in the gill of *Epinephelus retouti* Bleeker, 1868 (Serranidae) [Jn.: Akahata-modoki] caught at the St. Koyo 54–63 caught off Nishinoshima Island, NSMT-PI S81, and several fragments from cysts in the gill of *E. cyanopodus* (Richardson, 1846) [Jn.: Tsuchihozeri] caught at the St. Koyo 36, off Hahajima Island, NSMT-PI S82, *Pristipomoides filamentosus* (Valenciennes, 1830) (Lutjanidae) [Jn.: Ōhime] caught at the St. Koyo 12–13 off Chichijima Island, NSMT-PI S83, and of the same host caught at the St. Koyo 39–41 off Hahajima Island, NSMT-PI S84. One intact male also from the pyloric caeca (probably be an incidental infestation) of *E. fasciatus* (Forsskål, 1775) [Jn.: Akahata] caught at the St. Koyo 27–30 off Chichijima Island, NSMT-PI S85.

Remarks. Yamaguti (1938b) described this species under the name of *Gonapodasmius pacifi-*

cus was based on the materials from the gills of epinephroid fish caught in the Pacific. Detailed catch locality is unknown.

Family **Lecithasteridae** Odhner, 1905
Subfamily **Lecithasterinae** Odhner, 1905

16. ***Lecithaster gibbosus*** (Rudolphi, 1802)

Material examined. Single gravid specimen from the pyloric caeca of *Nezumia proxima* (Smith and Radcliffe, 1912) (Macrouridae) [Jn.: Higo-sokodara] caught at the St. L-2'-1000 off Jōgashima Island, NSMT-PI S54.

Order **Plagiurcheiida** La Rue, 1957
Superfamily **Allocreadioidea** Looss, 1902
Family **Opecoelidae** Ozaki, 1925
Subfamily **Opecoelinae** Ozaki, 1925

17. ***Opecoelus minor*** Yamaguti, 1934

Materials examined. A total of nine gravid specimens from *Laemonema filodorsale* Okamura, 1982 (Moridae) [Jn.: Hotei-itohikidara], one from the intestine and seven from the pyloric caeca of the host caught near Kenken Yama off Hachijōjima Island, NSMT-PI S68b and NSMT-PI S70, respectively, and one from the intestine of the same host caught at the St. Takunan 3–6. off Hachijōjima Island, NSMT-PI S71.

Remarks. This species was originally described based on the specimens from the intestine of *Sebastes gūntheri* (Jordan et Starks) and *Sebastes mitsukurii* (Cramer) [sic] (both now probably be addressed in the genus *Sebastes* (Serranidae)) caught in Mutsu Bay, northern Japan (Yamaguti, 1934).

18. ***Pseudopecoelus elongatus*** (Yamaguti, 1938)

Materials examined. Two gravid specimens from the intestine of *Cookeolus japonicus* (Cuvier, 1829) (Priacanthidae) [Jn.: Chikame-kintoki] caught at the St. Koyo 67, off Nishinoshima Island, NSMT-PI S91.

Remarks. This species was originally described under the name of *Cymbephallus elongatus* based on the materials from the small intestine

of *Scombroproops boops* (Houttuyn, 1782) (Scombroproopsidae) [Jn.: Mutsu] caught off Maisaka, Shizuoka, Japan (Yamaguti, 1938a) and has been recorded from the same host with the original description caught off Okinawa Island, NSMT-PI 4801.

19. ***Pseudopecoelus japonicus*** (Yamaguti, 1938)

Material examined. Single gravid specimen from the intestine of *Beryx splendens* Lowe, 1834 (Berycidae) [Jn.: Kinme-dai] caught at the St. Takunan 7 off Hachijōjima Island, NSMT-PI S66.

Remarks. This species has been recorded from many deep-sea fishes caught off Maisaka, Shizuoka, Japan (type locality by Yamaguti (1938a)), Suruga Bay (Machida and Kamegai, 1997; Yamaguti, 1938a), off Wakayama, NSMT-PI 3312, off Kochi NSMT-PI 4079, 4091 and also off northern Honshū (Kuramochi, 2009).

Subfamily **Plagioporinae** Manter, 1947

20. ***Hamacreadium lethrinii*** Yamaguti, 1934

Materials examined. Four gravid specimens from the intestine of *Epinephelus fasciatus* (Forsskal, 1775) (Serranidae) [Jn.: Akahata] caught at the St. Wentle 7–9 near the coast of Chichijima Island, NSMT-PI S73b, 74.

Remarks. The original description of this species was made on the materials from the stomach and intestine of *Lethrinus haematopterus* Temminck and Schlegel, 1844 (Lethrinidae) [Jn.: Fuefukidai] caught off Wakayama, Japan (Yamaguti, 1934) and has been recorded from *L. harak* (Forsskal, 1775) [Jn.: Mato-fuefuki] and from *Lutjanus fulviflamma* (Forsskal, 1775) (Lutjanidae) [Jn.: Nise-kurohoshi-fuefuki] caught off Okinawa Island (Dyer *et al.*, 1988).

21. ***Helicometra epinepheli*** Yamaguti, 1934

Materials examined. Two and four gravid specimens from the pyloric caeca and intestine, respectively of *Epinephelus fasciatus* (Forsskal, 1775) (Serranidae) [Jn.: Akahata] caught at the St. Koyo 27–30 off Chichijima Island, NSMT-PI S75a, 76.

Remarks. This species was originally described based on the materials from *E. akaara* (Temminck and Schlegel, 1842) [Jn.: Kijihata] and *E. tsirimenara* (Temminck and Schlegel, 1842) [sic] (the same host in the present study) caught in the Inland Sea of Japan (Yamaguti, 1938a), and has also been recorded from *Thalassoma purpureum* (Forsskal, 1775) (Labridae) [Jn.: Kinubera] caught off Okinawa Island (Yamaguti, 1942).

22. *Podocotyle atomon* (Rudolphi, 1802)

Material examined. Single specimen with no egg from the intestine of *Laemonema filodorsale* Okamura, 1982 (Moridae) [Jn.: Hotei-itohikidara] caught near Kenken Yama off Hachijōjima Island, NSMT-PI S67.

Remarks. In the waters around Japan, this species has been recorded from *Askoldia variegata knipowitschi* Soldatov, 1927 (Stichaeidae) [Jn.: Doro-ginpo], *Sebastolobus macrochir* (Günther, 1880) (Scorpaenidae) [Jn.: Kichiji], *Platichthys stellatus* (Pallas, 1787) (Pleuronectidae) [Jn.: Numa-garei] and *Pleuronectes punctatissimus* (Steindachner, 1879) (Pleuronectidae) [Jn.: Sunagarei] caught off eastern Hokkaido, northern Japan (Machida and Araki, 1994).

23. *Tellervotrema beringi* (Mamaev, 1965)

Plagioporus katadara Kuramochi, 2001: 23–24, figs. 7–9.

Tellervotrema katadara Kuramochi, 2009: 30–31.

Materials examined. Ten gravid specimens found in the pyloric caeca of *Nezumia proxima* (Smith and Radcliffe, 1912) (Macrouridae) [Jn.: Higo-sokodara] caught at the St. L-2'-1000 off Jōgashima Island, NSMT-PI S53.

Remarks. This species was originally described under the name of *Plagioporus beringi* based on the material from *Coryphaenoides* sp. (Macrouridae) caught in the Bering Sea (Mamaev, 1965). On the other hand, Gibson and Bray (1982) established the genus *Tellervotrema* to include their new species *T. armstrongi* from *Nezumia aequalis* (Günther, 1878) (Macrouridae)

[Jn.: Onaji-nezumidara] caught off Northwestern Scotland, and then they transferred *P. beringi* to the genus *Tellervotrema*.

Kuramochi (2001) described a new species *P. katadara* based on the materials from *Gadomus colletti* Jordan and Gilbert, 1904 (Macrouridae) [Jn.: Katadara] caught in Tosa Bay, ignoring the presence of *T. beringi*, and later he proposed a new combination *T. katadara* suggesting that *T. katadara* might be closely related metrically with *T. beringi* (Kuramochi, 2009). And finally in the present study, *T. katadara* is considered synonymous with *T. beringi* due to the direct citation of the original description and figure of *T. beringi* by Mamaev (1965).

24. *Tellervotrema* sp.

Material examined. Single gravid specimen found in the intestine of *Nezumia proxima* (Smith and Radcliffe, 1912) (Macrouridae) [Jn.: Higo-sokodara] caught at the St. L-2-800 off Jōgashima Island, NSMT-PI S51.

Superfamily **Lepocreadioidea** Odhner, 1905

Family **Lepocreadiidae** (Odhner, 1905)

Subfamily **Lepocreadiinae** Odhner, 1905

25. *Opechona bacillaris* (Molin, 1859)

Materials examined. Twenty-four gravid specimens from the pyloric caeca and intestine, and 22 immature specimens from the intestine of *Evoxymetopon poeyi* Günther, 1887 (Trichiuridae) [Jn.: Hirenaga-yumetachi] caught at the St. Koyo 22 off Chichijima Island, NSMT-PI S96 and 97, respectively.

Remarks. This species has been recorded from wide variety of host fishes of the family Gadidae, Centrophidae, Caproidae, Scombridae and Cyclopteridae caught in North American and Russian coasts (cited from Yamaguti (1971)). Only record of this species from the waters around Japan was made by Zhukov (1960) in Peter the Great Gulf, Sea of Japan.

Subfamily **Lepidapedinae** Yamaguti, 1958

26. *Lepidapedon coelorhynchi* Yamaguti, 1938

Materials examined. Single gravid specimen each from the intestine of *Laemonema filodorsale* Okamura, 1982 (Moridae) [Jn.: Hotei-itohikidara] caught near Kenken Yama off Hachijōjima Island, NSMT-PI S68a and caught at the St. Takunan 3–6 off Hachijōjima Island, NSMT-PI S69.

Remarks. After the original description by Yamaguti (1938a) based on the material from *Coelorhynchus* sp. caught off Maisaka, Shizuoka, central Japan, this species has been frequently recorded from macrourid fishes caught off Ryūkyū Islands, the East China Sea (Kuramochi, 2005), in Sagami Bay (Kuramochi, 2006), central Japan and off the Pacific coast of northern Honshū (Kuramochi, 2009).

27. *Lepidapedoides kalikali* Yamaguti, 1970

Materials examined. Two gravid specimens from the pyloric caeca of *Pristipomoides filamentosus* (Valenciennes, 1830) (Lutjanidae) [Jn.: Ōhime] caught at the St. Koyo 12, 13 off Chichijima Island, NSMT-PI S87.

Remarks. This species has been recorded from the pyloric caeca of *P. sieboldii* (Bleeker, 1854) [Jn.: Himedai] caught off Hawaii (original description by Yamaguti (1970)) and *Pristipomoides auricilla* (Jordan, Evermann and Tanaka, 1927) (Lutjanidae) [Jn.: Kimadara-himedai] caught off Koror Island, Palau, NSMT-PI 4661 and 4695.

28. *Lepidapedoides querni* Yamaguti, 1970

Materials examined. Single gravid specimen each from the stomach and intestine of *Epinephelus fasciatus* (Forsskal, 1775) (Serranidae) [Jn.: Akahata] caught at the St. Wentle 7–9 near the coast of Chichijima Island, NSMT-PI S72 and 73a, respectively, and single gravid specimen from the pyloric caeca of *Pristipomoides filamentosus* (Valenciennes, 1830) (Lutjanidae) [Jn.: Ōhime] caught at the St. Koyo 12, 13 off Chichijima Island, NSMT-PI S88.

Remarks. This species originally described

based on the materials from the pyloric caeca of *Epinephelus* sp. (Serranidae) (type host) and *E. quernus* Seale 1901 caught off Hawaii (Yamaguti, 1970), and seems to have never been recorded from the waters around Japan.

Family **Acanthocolpidae** Lühe, 1906

29. *Stephanostomum carangis* (Yamaguti, 1951)

Materials examined. Ten gravid specimens from the intestine of *Carangoides orthogrammus* (Jordan and Gilbert, 1882) (Carangidae) [Jn.: Nanyō-kaiwari] caught at the St. Koyo 64 off Nishinoshima Island, NSMT-PI S95.

Remarks. This species was originally described based on the materials from *Caranx* [sic] (now being addressed in the genus *Kaiwarinus*) *equula* (Temminck and Schlegel, 1844) (Carangidae) [Jn.: Kaiwari] caught off Hamazima, Mie, Japan (Yamaguti, 1951) and has been recorded from the same host with the original description in the East China Sea (Kuramochi, 2005).

30. *Stephanostomum casum* (Linton, 1910)

Materials examined. Two gravid specimens from the intestine of *Epinephelus fasciatus* (Forsskal, 1775) (Serranidae) [Jn.: Akahata] caught at the St. Wentle St. 5–9 near the coast of Chichijima Island, NSMT-PI S79.

Remarks. This species has been recorded mainly from fishes of the genus *Lutjanus* (Lutjanidae) in the waters of Caribbean, Bermuda, Galápagos Islands, the Red Sea and New Caledonia (Duria and Manter, 1969), and also from fish of the genus *Epinephelus* (Manter, 1947).

Discussion

Thirty species of digenean trematodes obtained in this study can be divided into three groups by their hosts' catch localities i.e., 10 species obtained from Sagami Bay, 10 species off Izu Islands including four species common with those from Sagami Bay and 14 species off Ogasawara Islands (Table 2). Unexpectedly, the present species from Sagami Bay and off Izu Islands con-

Table 2. Summary of records on localities of 30 species obtained in the present study.

Species (families in parentheses) obtained in the present study	Localities in the present study				Localities in the previous records				
	Sagami Bay	Izu Islands	Ogasawara Islands	Southern Japan		Central Japan		Northern Japan	Other areas
				Ryūkyū Islands	Other areas in southern Japan	Sagami Bay	Suruga Bay	Other areas in central Japan	
<i>Piriforma macrohamphosi</i> (Fellodistomidae)	+								
<i>Genolinea laticauda</i> (Hemiuridae)	+								
<i>Derogenes macrostoma</i> (Derogenidae)	+								
<i>Lecithaster gibbosus</i> (Lecithasteridae)	+								
<i>Tellervotrema beringi</i> (Opcoelidae)	+								
<i>Tellervotrema</i> sp. (Opcoelidae)	+								
<i>Hyperstremia ambovatum</i> (Fellodistomidae)	+	+							
<i>Glomeritcirrus amadai</i> (Hemiuridae)	+	+							
<i>Derogenes varicus</i> (Derogenidae)	+	+							
<i>Gonocerca phycidis</i> (Derogenidae)	+	+							
<i>Dinosoma synaphobranchi</i> (Hemiuridae)	+	+							
<i>Dinosoma tortum</i> (Hemiuridae)	+	+							
<i>Opcoelus minor</i> (Opcoelidae)	+	+							
<i>Pseudopocoelus japonicus</i> (Opcoelidae)	+	+							
<i>Podocotyle atomon</i> (Opcoelidae)	+	+							
<i>Lepidapedon coelohynchi</i> (Lepocreadiidae)	+	+							
<i>Bivesicula epinepheli</i> (Bivesiculidae)		+							
<i>Proserhynchus crucibulum</i> (Bucephalidae)		+							
<i>Proserhynchus epinepheli</i> (Bucephalidae)		+							
<i>Stephanostomum carangis</i> (Acanthocolpidae)		+							
<i>Pseudopocoelus elongatus</i> (Opcoelidae)		+							
<i>Hamacreadium lehrni</i> (Opcoelidae)		+							
<i>Helicometra epinepheli</i> (Opcoelidae)		+							
<i>Bucephalus varicus</i> (Bucephalidae)		+							
<i>Lecithochirium priacanthi</i> (Hemiuridae)		+							
<i>Didymodictinus pacificus</i> (Didymozoidae)		+							
<i>Opechona bacillaris</i> (Lepocreadiidae)		+							
<i>Lepidapedoides kalikali</i> (Lepocreadiidae)		+							
<i>Lepidapedoides querni</i> (Lepocreadiidae)		+							
<i>Stephanostomum casum</i> (Acanthocolpidae)		+							

Data sources. 1, Duria and Manter (1969); 2, Dyer *et al.* (1988); 3, Kuramochi (2001); 4, Kuramochi (2005); 5, Kuramochi (2006); 6, Kuramochi (2009); 7, Machida and Araki (1994); 8, Machida and Kamegai (1997); 9, Machida *et al.* (1970); 10, Machida *et al.* (2007); 11, Mamaev (1965); 12, Manter (1960); 13, Yamaguti (1934); 14, Yamaguti (1938a); 15, Yamaguti (1938b); 16, Yamaguti (1939); 17, Yamaguti (1942); 18, Yamaguti (1951); 19, Yamaguti (1953); 20, Yamaguti (1970); 21, Zhukov (1960); 22, cited from Yamaguti (1971); 23, unpublished specimens of NSMT-PI.

tained only four previously recorded species from the same areas. This is probably due to that previous records contain species from shallow water fishes caught near the surface (Shimazu and Nagawasa, 1985a, b), instead between 497 m and 1061 m deep in the present study. Thus the present species composed of deep sea species, although lacking genus *Proctophantastes* and *Neosteganoderma* recorded by Kuramochi (2006). It is also stressed that many of present species from Sagami Bay and off Izu Islands (12 of 15 species, excluding *Tellervotrema* sp.) have previous records off northern Japan and/or those from cold northern waters (Table 2). This indicates that advances of arctic–subarctic species extend into the waters around Izu Islands.

There was no species common between those obtained off Ogasawara Islands and those from Sagami Bay–off Izu Islands, even though previous records from Sagami Bay and adjoining seas were included (Table 2). However, it should be noted that 14 species obtained off Ogasawara Islands contained seven species which previously recorded from southern and central Japan, suggesting close relation of fish digenean fauna between off Ogasawara Islands and off main islands of Japan. Four species were common between those off Ogasawara Islands and off Ryūkyū Islands but three of them also had records off southern and central Japan. This also indicates that digenean fauna off Ogasawara Islands more closely relates to that off main islands of Japan than off Ryūkyū Islands, although these two areas latitudinally quite similar. In addition, it should be also noted that the remaining six species, which were newly recorded in Japanese waters, probably have tropical–subtropical origins.

Present small collection failed to indicate close relation between digenean fauna in Sagami Bay, and those off Izu Islands and Ogasawara Islands, however it is preliminarily suggested that advances of arctic–subarctic digenean species are attenuated in the waters around Izu Islands and fauna off Ogasawara Islands is composed both of temperate water and tropical–subtropical species.

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相模湾および伊豆諸島・小笠原諸島産魚類の二生吸虫相

倉持利明

相模湾および伊豆諸島・小笠原諸島周辺海域で魚類を採集し、それらの寄生虫を調査したところ、19種の魚類から10科23属30種の二生吸虫類を得ることができた。これらのうち相模湾から伊豆諸島周辺から得られたものは、相模灘において既に記録されている種は4種にとどまり、多くが北日本を含む日本沿岸に広く分布する種であった。一方、小笠原諸島から得られた種は多くが熱帯・亜熱帯性の種であったが、北日本を除く日本本土各地から記録のある種も多く含んでいた。これらの結果は予察的ではあるが、寒帯・亜寒帯性の種は伊豆諸島近海まで進出していること、小笠原諸島産魚類の二生吸虫相は、熱帯・亜熱帯性の種に加えて温帯性の種も多く含むことを示している。