

Digenean Trematodes of Fishes from Deep-sea Areas off the Pacific Coast of Northern Honshu, Japan

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Abstract: Thirty-two species plus nine unidentified forms of digenean trematodes from 10 families, Bucephalidae, Fellodistomidae, Lepocreadiidae, Acanthocolpidae, Opcoelidae, Zoogonidae, Hemiuridae, Accacoelidae, Derogenidae and Lecithasteridae were recognized from 31 species of fishes collected in deep-sea areas off the Pacific coast of northern Honshu, Japan. They are listed and several taxonomic and zoogeographic remarks are given. A new combination, *Tellervotrema katadara* is also proposed.

Key words: fish parasites, Digenea, deep-sea fishes, the Pacific coast, Japan

Introduction

“Study on Deep-Sea Fauna and Conservation of Deep-Sea Ecosystem” organized by the National Museum of Nature and Science, Tokyo (NSMT) has been conducted since 1993. For digenean parasites of fishes, Machida and Kamegai (1997) reported 22 species of fish digeneans, including two new species, from deep-sea fishes caught in Suruga Bay, off the Pacific coast of central Japan, as the first phase of the investigation, followed by Kuramochi (2001) which recorded 12 species from anguilliform and gadiform fishes from deep-sea areas of Tosa Bay off the Pacific coast of western Japan as the second phase and by Kuramochi (2005) which recorded 14 species from fishes caught in deep-sea area off the Ryukyu Islands, the East China Sea, southern Japan.

This study is based on fish parasite collections during the surveys between 2005 and 2007 off the Pacific coast of northern Honshu, Japan as the fourth phase of the project. A total of 403 specimens of fishes of 107 species from 56 families were examined for parasite, of which 52 species of fishes were infested by digenean trematodes. In the present paper, a total of 145 materials from 31 species of fishes are examined, identified and listed.

Materials and Methods

Fishes from varying depths between 150 and 1500 m were collected by otter trawl operated by the R/V *Wakataka-maru* of the Fisheries Research Agency (FRA) during a period of 18 Oct.–5 Nov. 2005, 5–20 Oct. 2006 and 22 Oct.–6 Nov. 2007. The survey areas are shown in Fig.1. Fishes were identified to species and examined for parasites in the laboratory of the research vessel. Digeneans were washed in saline, fixed in AFA under cover-slip pressure, later stained with Heidenhain’s hematoxylin and finally mounted in Canada balsam. The specimens were deposited in the collection of NSMT (NSMT-PI).

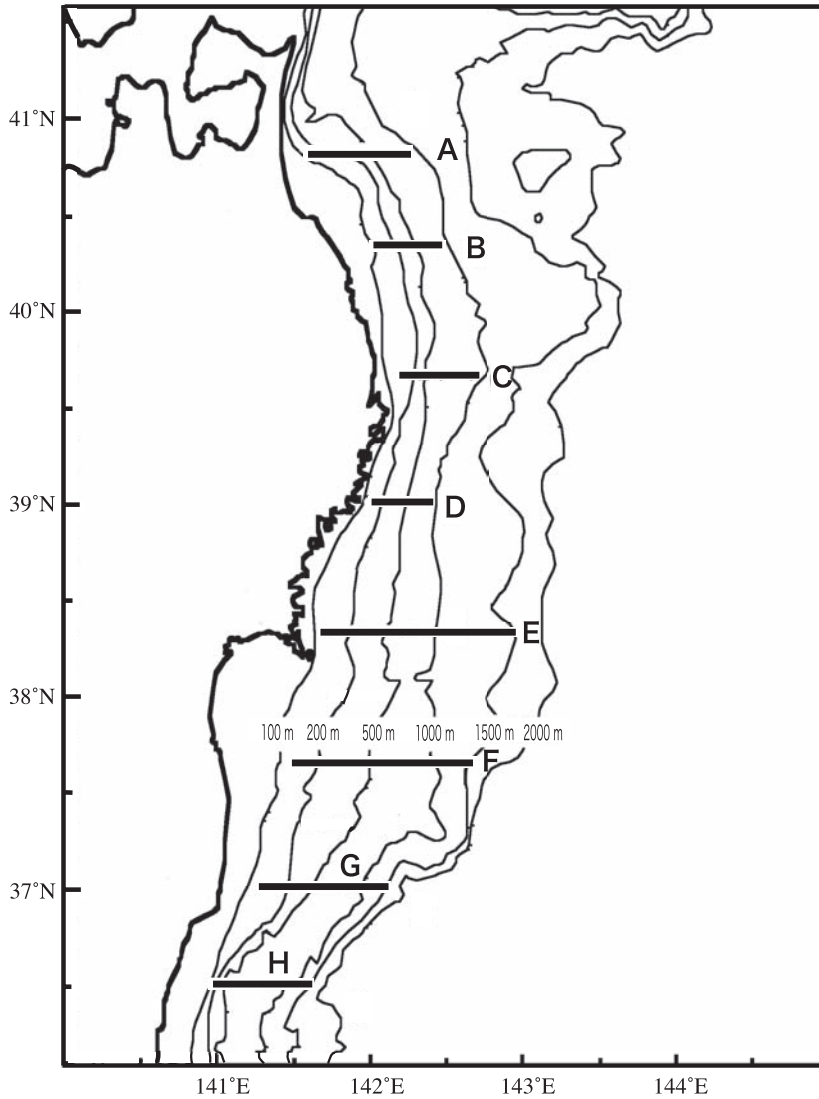


Fig. 1. Survey areas off the Pacific coast of northern Honshu, Japan. Otter trawls were operated along the survey lines A-H in the depths of 150-900 m. In addition, the operations were also carried out in 1200 m and 1500 m deep along the lines E-H. A precise location and depth of every station is given in the text.

Results and Discussion

A total of 41 forms were recognized, of which 32 were identified to species but nine were limited to generic level identification.

Superfamily Bucephaloidea Poche, 1907

Family Bucephalidae Poche, 1907

Subfamily Bucephalinae Poche, 1907

1. *Bucephalus* sp.

Material. Single gravid specimen from the stomach of *Sebastolobus macrochir* (Günther,

1880) (Scorpaenidae) [Japanese name: Kichiji] caught at the St. WA-07-E510 (38°23.82'N, 142°5.78'E-38°22.73'N, 142°6.10'E, 506-506 m in depth) on 25 Oct. 2007, NSMT-PI 5696.

2. *Rhipidocotyle* sp.

Materials. Eleven gravid specimens from the pyloric caeca of *Ruvettus pretiosus* Cocco, 1833 (Gempylidae) [Jn.: Baramutsu] caught at the St. WA-06-C450 (39°42.34'N, 142°18.21'E-39°40.66'N, 142°17.69'E, 482-454 m in depth) on 16 Oct. 2006, NSMT-PI 5699.

Remarks. This form was also collected from the same host fish caught in Sagami Bay (Kuramochi, 2006).

Superfamily Gymnophalloidea Odhner, 1905

Family Fellodistomidae Nicoll, 1909

Subfamily Fellodistominae Nicoll, 1909

3. *Steringophorus congeri* Shen, 1987

Materials. Single gravid specimen from the intestine of *Bathylagus pacificus* Gilbert, 1890 (Bathylagidae) [Jn.: Yasesokoiwashi] caught at the St. WA-06-A750 (41°7.76'N, 141°50.01'E-41°7.50'N, 141°50.06'E, 751-749 m in depth) on 11 Oct. 2006, NSMT-PI 5641, four gravid specimens from the intestine of *Pseudobathylagus milleri* (Jordan and Gilbert, 1898) (Bathylagidae) [Jn.: Kurosokoiwashi] caught at the St. WA-06-C900 (39°35.4'N, 142°32.00'E-39°36.14'N, 142°32.76'E, 893-909 m in depth) on 5 Oct. 2006, NSMT-PI 5645 and two gravid specimens from the stomach of *Leuroglossus schmidti* Rass, 1955 (Bathylagidae) [Jn.: Togariichimonjiwashi] caught at the St. WA-05-H650 (36°30.84'N, 140°11.47'E-36°31.63'N, 141°12.55'E, 661-647 m in depth) on 2 Nov. 2005, NSMT-PI 5688.

Remarks. Present large trematode with 4.04-7.90×1.66-2.81 mm body is most similar to *S. congeri*, which was originally described based on materials from *Conger japonicus* Bleeker, 1879 (Congridae) [Jn.: Kuroanago] caught in the East China Sea, although eggs in the present specimens, 50.5-58.1×25.3-29.0 µm are larger than those in the original description, 39-48×21-27 µm (Shen, 1987). *Steringophorus magnus* Manter, 1934 from an unidentified eel-like fish caught off Tortugas, Florida and *S. blackeri* Bray, 1973 from the *Xenodermichthys copei* (Gill, 1884) and *Xenodermichthys* sp. (Alepocephalidae) in the Northeastern Atlantic are also large species having 6.08-7.22×2.66-1.00 mm and 2.2-9.0×0.8-2.1 mm body, respectively (Manter, 1934; Bray, 1973; Bray and Gibson 1980), but present specimens differs in sucker ratio from the former and in the distribution of gonads from the latter.

Piriforminae Skrjabin and Koval, 1957

4. *Piriforma macrorhamphosi* Yamaguti, 1938

Materials. Ten gravid specimens from the intestine of *Macroramphosus scolopax* (Linnaeus, 1758) (Macroramphosidae) [Jn.: Sagifue] caught at the St. WA-07-E210 (38°21.78'N, 141°51.15'N-38°23.31'N, 141°51.39'E, 207-210 m in depth) on 23 Nov. 2007, NSMT-PI 5694.

Superfamily Lepocreadioidea Odhner, 1905

Family Lepocreadiidae (Odhner, 1905)

Subfamily Lepidapedinae, Yamaguti, 1958

5. *Lepidapedon coelorhynchi* Yamaguti, 1938

Materials. Five gravid specimens from the stomach and intestine of *Caelorinchus gilberti*

Jordan and Hubbs, 1925 (Macrouridae) [Jn.: Onihige] caught at the St. WA-07-F510 (37°38.29'N, 142°1.09'E-37°39.22'N, 142°1.15'E, 506-508 m in depth) on 4 Nov. 2007, NSMT-PI 5630 and single gravid specimen from the intestine of *Coryphaenoides pectoralis* (Gilbert, 1892) (Macrouridae) [Jn.: Munedara] caught at the St. WA-05-F650 (37°42.81'N, 142°09.71'E-37°43.93'N 142°09.15'E, 652-649 m in depth) on 28 Oct. 2005, NSMT-PI 5650.

Remarks. Present specimens from *C. gilberti* measured 9.15-14.6×1.77-2.42 mm are far larger than those 2.6-3.6×0.38-0.56 mm from *Caelorinchus* sp. caught off Maisaka, Shizuoka, Japan in the original description (Yamaguti, 1938) and 5.55×1.33 mm from *C. pectoralis* in this study.

6. *Lepidapedon elongatum* (Lebour, 1908)

Materials. Two gravid specimens from the intestine of *Physiculus maximowiczi* (Herzenstein, 1896) (Moridae) [Jn.: Ezoisoainame] caught at the St. WA-06-A310 (40°48.98'N, 141°55.54'E-40°49.93'N, 141°53.97'E, 306-298 m in depth) on 6, Oct. 2006, NSMT-PI 5625, two gravid specimens from the stomach of *Caelorinchus gilberti* Jordan and Hubbs, 1925 (Macrouridae) [Jn.: Onihige] at the St. WA-07-F510 (37°38.29'N, 142°1.09'E-37°39.22'N, 142°1.15'E, 506-508 m in depth) on 4 Nov. 2007, NSMT-PI 5629, and single gravid specimen from the intestine of *Antimora microlepis* Bean, 1890 (Moridae) [Jn.: Kanadadara] caught at the St. WA-06-A1200 (40°56.04'N, 142°15.72'E, 40°55.8'N, 142°16.08'E, 1182-1188 m in depth) on 12 Oct. 2006, NSMT-PI 5636.

7. *Lepidapedon genge* Yamaguti, 1938

Material. Single gravid specimen from the intestine of *Careproctus marginatus* Kido, 1988 (Liparidae) [Jn.: Hiregurokonnyakuuo] caught at the St. WA-07-E1500 (38°32.20'N, 142°48.04'E-38°34.72'N, 142°48.02'E, 1499-1502 m in depth) on 26 Oct. 2007, NSMT-PI 5676.

8. *Lepidapedon microcotyleum* Dollfus, 1953

Materials. Six gravid specimens from the intestine of *Physiculus maximowiczi* (Herzenstein, 1896) (Moridae) [Jn.: Ezoisoainame] caught at the St. WA-07-E350 (38°20.39'N, 142°1.67'E-38°21.82'N, 142°1.02'E, 351-351 m in depth) on 24 Oct. 2007, NSMT-PI 5624b.

Remarks. Srivastava (1966) mentioned that this species was suppressed as a synonym of *L. gadi* (Yamaguti, 1934), because difference between these two species was only limited in the egg size. However, my specimens are not identical with *L. gadi* which possesses spherical ovary and testes (Yamaguti, 1934) but agree well with *L. microcotyleum* those of which are horizontally long.

9. *Lepidapedon sebastisci* Yamaguti, 1938

Material. Single gravid specimen from the stomach of *Helicolenus hilgendorfi* (Steindachner and Döderlein, 1884) (Scorpaenidae) [Jn.: Yumekasago] caught at the St. WA-07-F210 (37°36.90'N, 141°35.85'E-37°38.55'N, 141°36.09'E, 141 mm in depth) on 29 Oct. 2007, NSMT-PI 5637.

Family Acanthocolpidae Lühe, 1906

10. *Gissutrema pterothrissi* Machida and Kamegai, 1997

Materials. A total of 25 gravid specimens from the stomach and intestine of *Pterothrissus gissu* Hilgendorf, 1877 (Pterothrissidae) [Jn.: Gisu] caught at the St. WA-05-H350 (36°28.11'N, 140°59.64'E-36°29.16'N, 141°00.34'E, 352-352 m in depth) on 31 Oct. 2005, NSMT-PI 5677, 5678 and a total of 18 gravid, rather degenerated specimens of the stomach and intestine of *P. gissu* at the St. WA-07-F350 (37°37.44'N, 141°47.36'E-37°39.11'N, 141°47.31'E, 356-352 m in depth) on 30 Oct. 2007, NSMT-PI 5679, 5680.

Remarks. The genus *Gissutrema* Machida and Kamegai, 1997 is transferred to the family Acanthocolpidae mainly due to having large eggs, extensive vitellarium, pretesticular uterus and uterine seminal receptacle by Bray (2005) from Fellodistomidae: Stenakrinae where it was originally placed (Machida and Kamegai, 1997).

11. *Neophasis oculatus* (Levinsen, 1881)

Materials. Six gravid specimens from the stomach of *Bothrocara tanakae* (Jordan and Hubbs, 1925) (Zoarcidae) [Jn.: Kantengenge] caught at the St. WA-05-E450 (38°23.56'N, 142°3.98'E-38°25.15'N, 142°3.66'E, 448-452 m in depth) on 25 Oct. 2005, NSMT-PI 5662 and a total of 38 gravid specimens from the stomach and intestine of *B. tanakae* and *B. molle* Bean, 1890 (Zoarcidae) [Jn.: Shirogenge] caught at the St. WA-07-E480 (38°23.46'N, 142°4.88'E-38°22.88'N, 142°5.19'E, 450-478 m in depth) on 27 Oct. 2007, NSMT-PI 5660b, 5663a, 5664 and 5665a.

12. *Stephanostomum ganko* Machida, 1984

Materials. Four gravid and young specimens each from the stomach of *Dasycottus setiger* Bean, 1890 (Psychrolutidae) [Jn.: Ganko] caught at the St. WA-07-E650 (38°23.16'N, 142°10.67'E-38°22.13'N, 142°10.59'E, 656-656 m in depth) on 25 Oct. 2007, NSMT-PI 5668 and single gravid and young specimens each from the intestine of *Psychrolutes phrictus* Stein and Bond, 1978 (Psychrolutidae) [Jn.: Uranaikajika] caught at the St. WA-07-E750 (38°22.24'N, 142°13.95'E-38°23.09'N, 142°14.38'E, 753-754 m in depth) on 25 Oct. 2007, NSMT-PI 5693.

13. *Stephanostomum japonicum* (Yamaguti, 1934)

Materials. Single gravid specimen from the intestine of *Bothrocara tanakae* (Jordan and Hubbs, 1925) (Zoarcidae) [Jn.: Kantengenge] caught at the St. WA-05-E450 (38°23.56'N, 142°3.98'E-38°25.15'N, 142°3.66'E, 448-452 m in depth) on 25 Oct. 2005, NSMT-PI 5666, one gravid and one immature specimen each from the intestine of *B. molle* Bean, 1890 (Zoarcidae) [Jn.: Shirogenge] caught at the St. WA-07-E480 (38°23.46'N, 142°4.88'E-38°22.88'N, 142°5.19'E, 450-478 m in depth) on 27 Oct. 2007, NSMT-PI 5663b and one young specimen from the intestine of *B. molle* caught at the St. WA-05-H480 (36°32.27'N, 141°6.17'E-36°33.09'N, 141°7.32'E, 481-476 m in depth) on 1 Nov. 2005, NSMT-PI 5661b.

14. *Stephanostomum* sp.

Material. Single gravid, highly damaged specimen from the intestine of *Hemilepidotus gilberti* Jordan and Starks, 1904 (Cottidae) [Jn.: Yokosujikajika] caught at the St. WA-07-E380 (38°23.48'N, 142°1.58'E-38°21.99'N, 142°2.41'E, 377-382 m in depth) on 24 Oct. 2007, NSMT-PI 5635b.

Superfamily Allocreadioidea Looss, 1902

Family Opecoelidae Ozaki, 1925

Subfamily Opecoelinae Stunkard, 1931

15. *Opecoelus sphaericus* Ozaki, 1925

Materials. Six gravid specimens from the pyloric caeca of *Physiculus maximowiczi* (Herzenstein, 1896) (Moridae) [Jn.: Ezoisoainame] caught at the St. WA-07-G150 (36°59.63'N, 140°17.4'E-37°0.51'N, 141°17.66'E, 151-151 m in depth) on 2 Nov. 2007, MSMT-PI 5623.

16. *Opecoelus xenistii* Manter, 1940

Material. Single specimen with rather degenerated eggs from the intestine of *Physiculus*

maximowiczi (Herzenstein, 1896) (Moridae) [Jn.: Ezoisoainame] caught at the St. WA-07-E350 (38°20.39'N, 142°1.67'E-38°21.82'N, 142°1.02'E, 351-351 m in depth) on 24 Oct. 2007, NSMT-PI 5624a.

Remarks. This species was originally described based on the materials from *Xenistius californiensis* (Steindachner, 1877) (Haemulidae) caught off Galapagos (Manter, 1940). I distinguished this species from *O. sphaericus* by smaller and wider body with closely tandem position of ovary and testes.

17. *Anomalotrema putjatini* Zhukov, 1957

Material. Single gravid specimen from the intestine of *Ebinania vermiculata* Sakamoto, 1932 (Psychrolutidae) [Jn.: Akadonko] caught at the St. WA-05-G350 (36°58.26'N, 141°30.86'E-36°57.96'N, 141°31.48'E, 373-356 m in depth) on 3 Nov. 2005, NSMT-PI 5620.

18. *Anomalotrema* sp.

Material. Single gravid, rather contracted specimen from the intestine of *Hemilepidotus gilberti* Jordan and Starks, 1904 (Cottidae) [Jn.: Yokosujikajika] caught at the St. WA-07-E380 (38°23.48'N, 142°1.58'E-38°21.99'N, 142°2.41'E, 377-382 m in depth) on 24 Oct. 2007, NSMT-PI 5635a.

Remarks. The genus *Anomalotrema* contains only two species i.e. *A. putjatini* Zhukov, 1957, which is represented also in this study, and the North Atlantic species *A. koiae* Gibson and Bray, 1984. According to Gibson and Bray (1984), both species are distinguishable mainly by sucker ratio, 1:1.47-1.6 in the former, while 1:1.8-2.4 in the latter. My only specimen (sucker ratio, 1:1.89) seems to be more close to *A. koiae*, but differs from it in having wider body (2.43×0.93 mm).

19. *Pseudopecoelus japonicus* (Yamaguti, 1938)

Materials. Single gravid specimens from the pyloric caeca of *Neoscopelus macrolepidotus* Johnson, 1863 (Neoscopelidae) [Jn.: Sotooriwashi] caught at the St. WA-05-G550 (36°58.17'N, 141°37.95'E-36°59.05'N, 141°38.63'E, 560-557 m in depth) on 3 Nov. 2005, NSMT-PI 5622, one gravid specimen from the intestine of *Bothrocara molle* Bean, 1890 (Zoarcidae) [Jn.: Shirogenge] caught at the St. WA-07-E480 (38°23.46'N, 142°4.88'E-38°22.88'N, 142°5.19'E, 450-478 m in depth) on 27 Oct. 2007, NSMT-PI 5664, one young and one immature specimen each from the intestine of *B. molle* caught at the St. WA-05-H480 (36°32.27'N, 141°6.17'E-36°33.09'N, 141°7.32'E, 481-476 m in depth) on 1 Nov. 2005, NSMT-PI 5661c and 12 gravid specimens from the intestine of *Careproctus marginatus* Kido, 1988 (Liparidae) [Jn.: Hiregurokonnyakuu] caught at the St. WA-07-E1500 (38°32.20'N, 142°48.04'E-38°34.72'N, 142°48.02'E, 1499-1502 m in depth) on 26 Oct. 2007, NSMT-PI 5675.

Remarks. Metacercariae of *P. japonicus* were frequently found from *Euphausia similis* G. O. Sars, 1885 in Suruga Bay (Shimazu, 1982).

Subfamily Plagioporidae Manter, 1947

20. *Pseudoplagioporus* sp.

Material. Single gravid specimen from the intestine of *Coryphaenoides pectoralis* (Gilbert, 1892) (Macrouridae) [Jn.: Munedara] caught at the St. WA-05-F650 (37°42.81'N, 142°09.71'E-37°43.93'N-142°09.15'E, 652-649 m in depth) on 28 Oct. 2005, NSMT-PI 5651.

21. *Tellervotrema katadara* (Kuramochi, 2001) n. comb.

Materials. Eight gravid specimens from the intestine of *Coryphaenoides longifilis* Günther

1877 (Macrouridae) [Jn.: Himodara] caught at the St. WA-05-F1200 (37°47.60'N, 142°37.12'E-37°47.4'N, 142°37.17'E, 1196-1196 m in depth) on 28 Oct. 2005, NSMT-PI 5672.

Remarks. This species was originally described under the name of *Plagioporus katadara* based on the materials from *Gadomus colletti* Jordan and Gilbert, 1904 (Macrouridae) [Jn.: Katadara] caught in Tosa Bay (Kuramochi, 2001). On the other hand, the genus *Tellervotrema* Gibson and Bray, 1982 is characterized by the absence of vitelline follicles dorsally to the caeca containing only two species *T. armstrongi* Gibson and Bray, 1982 known from *Nezumia awqualis* (Günther, 1878) (Macrouridae) caught off Northwestern Scotland and *T. beringi* (Mamaev, 1965) from *Coryphaenoides* sp. caught in the Bering Sea (Gibson and Bray, 1982).

Present specimens (3.00-3.18×1.16-1.35 mm) are identified to be *P. katadara* [*sic*] and a re-examination of type specimens of *P. katadara* (NSMT-PI 5143) revealed that both possess the major characteristics of the genus *Tellervotrema*. Thus, a new combination *T. katdara* is proposed, although *T. katdara* may be closely related to *T. beringi* so far measurements are concerned.

Subfamily Stenakrinae Yamaguti, 1970

22. *Stenakron vetustum* Stafford, 1904

Materials. Two gravid specimens from the intestine of *Hemilepidotus gilberti* Jordan and Starks, 1904 (Cottidae) [Jn.: Yokosujikajika] caught at the St. WA-05-E480 (38°22.64'N, 142°5.29'E-38°20.92'N, 142°5.97'E, 482-483 m in depth) on 25 Oct. 2005, NSMT-PI 5633, a total of 26 gravid specimens from the intestine of *Bothrocara tanakae* (Jordan and Hubbs, 1925) (Zoarcidae) [Jn.: Kantengenge] caught at the St. WA-05-E450 (38°23.56'N, 142°3.98'E-38°25.15'N, 142°3.66'E, 448-452 m in depth) on 25 Oct. 2005, NSMT-PI 5659 and the St. WA-07-E480 (38°23.46'N, 142°4.88'E-38°22.88'N, 142°5.19'E, 450-478 m in depth) on 27 Oct. 2007, NSMT-PI 5660a, and 24 gravid specimens from the intestine of *B. molle* Bean, 1890 (Zoarcidae) [Jn.: Shirogenge] caught at the St. WA-05-H480 (36°32.27'N, 141°6.17'E-36°33.09'N, 141°7.32'E, 481-476 m in depth) on 1 Nov. 2005, NSMT-PI 5661a.

Superfamily Zoogonoidea

Family Zoogonidae Odhner, 1902

Subfamily Lepidophyllinae Stossich, 1903

23. *Brachyenteron campbelli* Bray and Gibson, 1986

Material. Single gravid specimen from the intestine of *Polyacanthonotus challengerii* (Vailant, 1888) (Notacanthidae) [Jn.: Sokogisu] caught at the St. WA-07-H1500 (36°35.82'N, 140°36.04'E-36°36.14'N, 140°35.86'E, 1473-1433 m in depth) on 1 Nov. 2007, NSMT-PI 5683.

Remarks. This species was originally described based on the only material from *Polyacanthonotus rissoanus* (De Filippi and Verany, 1857) caught in northwest off Scotland 1300-1320 m in depth (Bray and Gibson, 1986). Although in the present specimen the caeca extend a little longer reaching in the region between postacetabular and preovarian zone, and the vitellarium distributes in a slightly wider portion, those seem to correspond to maturity. The uterine region in the present specimen is limited to the posterior third of body, while that in the original description occupies over the half of body.

24. *Lepidophyllum* sp.

Materials. Seven gravid specimens from the urinary bladder of *Coryphaenoides longifilis* Günther 1877 (Macrouridae) [Jn.: Himodara] caught at the St. WA-07-E1200 (38°23.52'N, 142°31.76'E-38°24.05'N, 142°31.78'E, 1198-1204 m in depth) on 26 Oct. 2007, NSMT-PI 5673.

Remarks. I make present large trematodes (11.3-21.0×7.63-15.0 mm) tentatively belong to the genus *Lepidophyllum* in terms of the features of vitellarium, ovary and testis and the site of infestation according to Bray (1987), however they differ from previously known eight species in having a median genital pore and caeca extending to near the posterior extremity (Yamaguti, 1934; Zhukov, 1957; Kulikov *et al.* 1968; Arai, 1969; Bray and Gibson, 1986; Machida *et al.*, 2006). It will be needed to slightly modify the diagnosis of the genus *Lepidophyllum* or to establish a new genus.

25. *Panopula spinosa* (Zubchenko, 1978)

Materials. Thirty-four gravid specimens from the intestine of *Notacanthus chemnitzii* Bloch, 1788 (Notacanthidae) [Jn.: Kurosokogisu] caught at the St. WA-05-E550 (38°22.62'N, 142°07.26'E-38°23.64'N, 142°07.55'E, 545-561 m in depth) on 26 Oct. 2005, NSMT-PI 5686.

Remarks. This species has been recorded only from *N. chemnitzii* caught off southwestern Iceland and in the northwestern North Atlantic (Bray and Gibson, 1986).

Superfamily Hemiuroidea Looss, 1899

Family Hemiuridae Looss, 1899

Subfamily Hemiurinae Looss, 1899

26. *Parahemiurus seriolae* Yamaguti, 1934

Material. Single gravid specimen from the stomach of *Zenopsis nebulosa* (Temminck and Schlegel, 1846) (Zeidae) [Jn.: Kagamidai] caught at the St. WA-07-F150 (37°35.3'N, 141°33.25'E-37°36.85'N, 141°33.92'E, 141-141 m in depth) on 29 Oct. 2007, NSMT-PI 5632.

Remarks. The large seminal vesicle of my specimen locates in preacetabular zone, however it seems to be due to that ecsoma is completely retracted. A ventrocervical groove is observed.

Subfamily Lecithochiriinae Lühe, 1901

27. *Brachyphallus crenatus* (Rudolphi, 1802)

Materials. Four gravid specimens from the stomach of *Coryphaenoides cinereus* (Gilbert, 1896) (Macrouridae) [Jn.: Karafutosokodara] caught at the St. WA-06-D1500 (39°12.12'N, 142°42.05'E-39°11.93'N, 142°42.19'E, 1492-1509 m in depth) on 17 Oct. 2006, NSMT-PI 5656.

Subfamily Opisthadeninae Yamaguti, 1970

28. *Genolinea laticauda* Manter, 1925

Materials. Two gravid specimens from the stomach of *Coryphaenoides nasutus* Günther, 1877 (Macrouridae) [Jn.: Hanasokodara] caught at the St. WA-07-H900 (36°30.91'N, 141°21.09'E-36°30.55'N, 141°20.51'E, 901-899 m in depth) on 1 Nov. 2007, NSMT-PI 5691b.

Subfamily Pleurinae Gibson and Bray, 1979

29. *Dinosoma lophiomi* Toman, 1973

Materials. Single gravid specimen from the stomach of *Caelorinchus gilberti* Jordan and Hubbs, 1925 (Macrouridae) [Jn.: Onihige] caught at the St. WA-07-F510 (37°38.29'N, 142°1.09'E-37°39.22'N, 142°1.15'E, 506-508 m in depth) on 4 Nov. 2007, NSMT-PI 5631, single gravid specimen from the stomach of *Coryphaenoides pectoralis* (Gilbert, 1892) (Macrouridae) [Jn.: Munedara] caught at the St. WA-07-G1200 (36°51.78'N, 141°47.86'E-36°51.42'N, 141°

47.57°E, 1202-1202 m in depth) on 31 Oct. 2007, NSMT-PI 5652, one gravid and immature specimen each from the stomach of *Cory. cinereus* (Gilbert, 1896) [Jn.: Karafutosokodara] caught at the St. WA-06-D1500 (39°12.12'N, 142°42.05'E-39°11.93'N, 142°42.19'E, 1492-1509 m in depth) on 17 Oct. 2006, NSMT-PI 5658, five gravid specimens from the stomach of *Cory. longifilis* Günther 1877 [Jn.: Himodara] caught at the St. WA-05-F1200 (37°47.60'N, 142°37.12'E-37°47.4'N, 142°37.17'E, 1196-1196 m in depth) on 28 Oct. 2005, NSMT-PI 5669, three gravid specimens from the stomach of *Dasycottus setiger* Bean, 1890 (Psychrolutidae) [Jn.: Ganko] caught at the St. WA-07-E650 (38°23.16'N, 142°10.67'E-38°22.13'N, 142°10.59'E, 656-656 m in depth) on 25 Oct. 2007, NSMT-PI 5667 and single gravid specimen from the stomach of *Sebastolobus macrochir* (Günther, 1880) (Scorpaenidae) [Jn.: Kichiji] caught at the St. WA-05-E510 (38°23.82'N, 142°5.78'E-38°22.73'N, 142°6.10'E, 506-506 m in depth) on 25 Oct. 2007, NSMT-PI 5697.

Remarks. This species has been recorded from *Lophiomus setigerus* (Vahl, 1797) (Lophiidae) [Jn. Anko] caught in Suruga Bay (280-530 m in depth) (Toman, 1973), *Zeus faber* Linnaeus, 1758 (Zeidae) [Jn.: Matoudai] caught in Sagami Bay (94-146 m in depth) (Kuramochi, 2006) and in addition, from *Lophius piscatorius* Linnaeus, 1758 (Lophiidae) in the Mediterranean Sea (Bartoli and Gibson, 2006).

30. *Dinosoma manteri* Yamaguti, 1938

Materials. A total of 42 gravid specimens from the stomach of *Coryphaenoides pectoralis* (Gilbert, 1892) (Macrouridae) [Jn.: Munedara] caught at the St. WA-05-F650 (37°42.81'N, 142°09.71'E-37°43.93'N, 142°09.15'E, 652-649 m in depth) on 28 Oct. 2005, NSMT-PI 5653, St. WA-06-A900 (41°09.47'N, 141°53.69'E-41°09.23'N, 141°53.75'E, 883-882 m in depth) on 12 Oct. 2006, NSMT-PI 5654 and St. WA-07-E1500 (38°32.20'N, 142°48.04'E-38°34.72'N, 142°48.02'E, 1499-1502 m in depth) on 26 Oct. 2007, NSMT-PI 5655, and three gravid specimens from the stomach of *Coryphaenoides nasutus* Günther, 1877 (Macrouridae) [Jn.: Hanasokodara] caught at the St. WA-07-H900 (36°30.91'N, 141°21.09'E-36°30.55'N, 141°20.51'E, 901-899 m in depth) on 1 Nov. 2007, NSMT-PI 5691a.

31. *Dinosoma triangulata* Campbell and Munroe, 1977

Materials. Twenty-one gravid specimens from the stomach of *Pterothrissus gissu* Hilgendorf, 1877 (Pterothrissidae) [Jn.: Gisu] caught at the St. WA-05-H350 (36°28.11'N, 140°59.64'E-36°29.16'N, 141°00.34'E, 352-352 m in depth) on 31 Oct. 2005, NSMT-PI 5681.

Remarks. This species is also recorded from *Congriscus megastomus* (Günther, 1880) (Congridae) [Jn.: Okianago] caught in Tosa Bay (Kuramochi, 2001).

32, 33. *Dinosoma* spp.

Materials. Twenty-four immature and slightly macerated specimens from the stomach of *Paraliparis meridionalis* Kido, 1985 (Liparidae) [Jn.: Ryukyuinkiuo] caught at the St. WA-05-G480 (36°50.18'N, 141°27.92'E-36°51.29'N, 141°29.24'E, 481-484 m in depth) on 3 Nov. 2005, NSMT-PI 5627 and two immature specimens from the stomach of *Sebastolobus macrochir* (Günther, 1880) (Scorpaenidae) [Jn.: Kichiji] caught at the St. WA-07-H900 (36°30.91'N, 141°21.09'E-36°30.55'N, 141°20.51'E, 901-899 m in depth) on 1 Nov. 2007, NSMT-PI 5698.

Family Accacoelidae Odhner, 1911

Subfamily Paraccacladiinae Bray and Gibson, 1977

34. *Paraccacladium* sp.

Materials. Single gravid specimen from the intestine of *Pseudobathylagus milleri* (Jordan

and Gilbert, 1898) (Bathylagidae) [Jn.: Kurosokoiwashi] caught at the St. WA-06-C900 (39°35.4'N, 142°32.00'E-39°36.14'N, 142°32.76'E, 893-909 m in depth) on 5 Oct. 2006, NSMT-PI 1560, single damaged specimen from the intestine of *Bathylagus pacificus* Gilbert, 1890 (Bathylagidae) [Jn.: Yasesokoiwashi] caught at the St. WA-05-H900 (36°30.90'N, 141°21.03'E-36°30.38'N, 141°20.25'E, 900-899 m in depth) on 2 Nov. 2005, NSMT-PI 1561 and single damaged specimen from the intestine of *Lipolagus ochotensis* (Schmidt 1938) (Bathylagidae) [Jn.: Sokoiwashi] caught at the St. WA-06-B900 (40°22.35'N, 142°24.28'E-40°22.14'N, 142°24.34'E, 910-908 m in depth) on 13 Oct. 2006, NSMT-PI 5684.

Remarks. The genus *Paraccacladium* consists of only species *P. jamiesoni* Bray and Gibson, 1977, a slender worm (3.08-6.40×0.64-0.71 mm) with a peduncular acetabulum originally described based on the materials from *Coryphaenoides rupestris* Gunnerus, 1765 (Macrouridae), caught off west coast of Great Britain, the Northeastern Atlantic (560-1050 m in depth) (Bray and Gibson, 1977). While the present specimens have wider body (3.59-3.90×1.14-1.30 mm) and a possibly sessile acetabulum. Bray and Gibson (1977) also recorded several immature forms of *Paraccacladium* sp. from deep-sea fishes related to the host fishes in the present study.

Family Derogenidae Nicoll, 1910
Subfamily Derogeninae Nicoll, 1910

35. *Derogenes macrostoma* Yamaguti, 1938

Materials. Two gravid specimens from the stomach of *Physiculus maximowiczi* (Herzenstein, 1896) (Moridae) [Jn.: Ezoisoainame] caught at the St. WA-07-G150 (36°59.63'N, 140°17.4'E-37°0.51'N, 141°17.66'E, 151-151 m in depth) on 2 Nov. 2007, MSMT-PI 5626, four gravid specimens from the stomach of *Zenopsis nebulosa* (Temminck and Schlegel, 1846) (Zeidae) [Jn.: Kagamidai] caught at the St. WA-07-F150 (37°35.3'N, 141°33.25'E-37°36.85'N, 141°33.92'E, 141-141 m in depth) on 29 Oct. 2007, NSMT-PI 5633a, ten slightly macerated specimens from the stomach of *Careproctus marginatus* Kido, 1988 (Liparidae) [Jn.: Hiregurokonnyakuu] caught at the St. WA-07-E1500 (38°32.20'N, 142°48.04'E-38°34.72'N, 142°48.02'E, 1499-1502 m in depth) on 26 Oct. 2007, NSMT-PI 5674, single gravid specimen from the stomach of *Coryphaenoides pectoralis* (Gilbert, 1892) (Macrouridae) [Jn.: Munedara] caught at the St. WA-06-A900 (41°09.47'N, 141°53.69'E-41°09.23'N, 141°53.75'E, 833-882 m in depth) on 12 Oct. 2006, NSMT-PI 5649b and two gravid specimens from the stomach of *C. longifilis* Günther 1877 [Jn.: Himodara] caught at the St. WA-05-F1200 (37°47.60'N, 142°37.12'E-37°47.4'N, 142°37.17'E, 1196-1196 m in depth) on 28 Oct. 2005, NSMT-PI 5671.

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

Materials. Single gravid specimen from the stomach of *Zenopsis nebulosa* (Temminck and Schlegel, 1846) (Zeidae) [Jn.: Kagamidai] caught at the St. WA-07-F150 (37°35.3'N, 141°33.25'E-37°36.85'N, 141°33.92'E, 141-141 m in depth) on 29 Oct. 2007, NSMT-PI 5633b, single gravid specimen from the stomach of *Halargyreus johnsonii* Günther, 1862 (Moridae) [Jn.: Karasudara] at the St. WA-07-E1200 (38°23.52'N, 142°31.76'E-38°24.05'N, 142°31.78'E, 1198-1204 m in depth) on 26 Oct. 2007, NSMT-PI 5640, single gravid specimen from the stomach of *Tactostoma macropus* Bolin, 1939 (Melanostomiidae) [Jn.: Hadakahoteieso] caught at the St. WA-07-G1500 (36°51.10'N, 141°51.14'E-36°51.37'N, 141°51.58'E, 1514-1513 m in depth) on 31 Oct. 2007, NSMT-PI 5689, three gravid specimens from the stomach of *Coryphaenoides nasutus* Günther, 1877 (Macrouridae) [Jn.: Hanasokodara] caught at the St. WA-07-H900 (36°30.91'N, 141°21.09'E-36°30.55'N, 141°20.51'E, 901-899 m in depth) on 1 Nov. 2007, NSMT-PI 5690, single gravid specimen from the stomach of *Psychrolutes phrictus* Stein and Bond, 1978 (Psychrolutidae) [Jn.:

Uranaikajika] caught at the St. WA-07-E750 (38°22.24'N, 142°13.95'E-38°23.09'N, 142°14.38'E, 753-754 m in depth) on 25 Oct. 2007, NSMT-PI 5692 and seven gravid specimens from the intestine of *Macroramphosus scolopax* (Linnaeus, 1758) (Macroramphosidae) [Jn.: Sagifue] caught at the St. WA-07-E210 (38°21.78'N, 141°51.15'N-38°23.31'N, 141°51.39'E, 207-210 m in depth) on 23 Nov. 2007, NSMT-PI 5695.

Subfamily Gonocercinae Skrjabin and Guschanskaja, 1955

37. *Gonocerca crassa* Manter, 1934

Materials. A total of three gravid specimens from the stomach of *Coryphaenoides pectoralis* (Gilbert, 1892) (Macrouridae) [Jn.: Munedara] caught at the St. WA-05-E900 (38°28.88'N, 142°21.93'E-38°29.69'N, 142°21.61'E, 900-904 m in depth) on 26 Oct. 2005, NSMT-PI 5648 and at the St. WA-06-A900 (41°09.47'N, 141°53.69'E-41°09.23'N, 141°53.75'E, 883-882 m in depth) on 12 Oct. 2006, NSMT-PI 5649a, three gravid specimens from the stomach of *C. cinereus* (Gilbert, 1896) [Jn.: Karafutosokodara] caught at the St. WA-06-D1500 (39°12.12'N, 142°42.05'E-39°11.93'N, 142°42.19'E, 1492-1509 m in depth) on 17 Oct. 2006, NSMT-PI 5657 and five gravid specimens from the stomach of *C. longifilis* Günther 1877 [Jn.: Himodara] caught at the St. WA-05-F1200 (37°47.60'N, 142°37.12'E-37°47.4'N, 142°37.17'E, 1196-1196 m in depth) on 28 Oct. 2005, NSMT-PI 5670.

38. *Gonocerca phycidis* Manter, 1925

Materials. Single gravid specimen from the stomach of *Ebinania vermiculata* Sakamoto, 1932 (Psychrolutidae) [Jn.: Akadonko] caught in the St. WA-05-G550 (36°58.17'N, 141°37.95'E-36°59.05'N, 141°38.63'E, 560-557 m in depth) on 3 Nov. 2005, NSMT-PI 5621 and *Caelorinchus gilberti* Jordan and Hubbs, 1925 (Macrouridae) [Jn.: Onihige] caught in the St. WA-07-F510 (37°38.29'N, 142°1.09'E-37°39.22'N, 142°1.15'E, 506-508 m in depth) on 4 Nov. 2007, NSMT-PI 5628.

Family Lecithasteridae Odhner, 1905

Sybfamily Lecithasterinae Odhner, 1905

39. *Aponurus argentini* Poljansky, 1952

Materials. Twelve gravid specimens from the stomach of *Oneirodes bulbosus* Chapman, 1939 (Ceratiidae) [Jn.: Yumeanko] caught at the St. WA-06-C750 (39°33.45'N, 142°22.26'E-39°34.17'N, 142°22.50'E, 150-149 m in depth) on 5 Oct. 2006, NSMT-PI 5638, eight gravid specimens from the stomach of *Halargyreus johnsonii* Günther, 1862 (Moridae) [Jn.: Karasudara] caught at the St. WA-07-E1200 (38°23.52'N, 142°31.76'E-38°24.05'N, 142°31.78'E, 1198-1204 m in depth) on 26 Oct. 2007, NSMT-PI 5639, 16 young gravid specimens from the stomach of *Polyacanthonotus challengerii* (Vaillant, 1888) (Notacanthidae) [Jn.: Sokogisu] caught at the St. WA-07-H1500 (36°35.82'N, 140°36.04'E-36°36.14'N, 140°35.86'E, 1473-1433 m in depth) on 1 Nov. 2007, NSMT-PI 5682b, two gravid specimens from the stomach of *Pseudobathylagus milleri* (Jordan and Gilbert, 1898) (Bathylagidae) [Jn.: Kurosokoiwashi] caught at the St. WA-06-C900 (39°35.4'N, 142°32.00'E-39°36.14'N, 142°32.76'E, 893-909 m in depth) on 5 Oct. 2006, NSMT-PI 5643 and St WA-07-H1500 (36°35.82'N, 141°36.04'E-36°36.14'N, 141°35.86'E, 1473-1433 m in depth) on 1 Nov. 2007, NSMT-PI 5644, four gravid specimens from the stomach of *Bathylagus pacificus* Gilbert, 1890 (Bathylagidae) [Jn.: Yasesokoiwashi] caught at the St. WA-05-H900 (36°30.90'N, 141°21.03'E-36°30.38'N, 141°20.25'E, 900-899 m in depth) on 2 Nov. 2005, NSMT-PI 5642, single gravid specimen from the intestine of *Lipolagus ochotensis* (Schmidt 1938) (Bath-

ylagidae) [Jn.: Sokoiwashi] caught at the St. WA-06-B900 (40°22.35'N, 142°24.28'E-40°22.14'N, 142°24.34'E, 910-908 m in depth) on 13 Oct. 2006, NSMT-PI 5685 and eight gravid specimens from the stomach of *Leuroglossus schmidti* Rass, 1955 (Bathylagidae) [Jn.: Togariichimonjiwashi] caught at the St. WA-05-H650 (36°30.84'N, 140°11.47'E-36°31.63'N, 141°12.55'E, 661-647 m in depth) on 2 Nov. 2005, NSMT-PI 5687.

40. *Lecithaster gibbosus* (Rudolphi, 1802)

Material. Single gravid, slightly damaged specimen from the intestine of *Zenopsis nebulosa* (Temminck and Schlegel, 1846) (Zeidae) [Jn.: Kagamidai] caught at the St. WA-07-F150 (37°35.3'N, 141°33.25'E-37°36.85'N, 141°33.92'E, 141-141 m in depth) on 29 Oct. 2007, NSMT-PI 5634.

41. *Lecithophyllum fuscum* Yamaguti, 1938

Materials. Five gravid specimens from the stomach of *Polyacanthonotus challengeri* (Vaillant, 1888) (Notacanthidae) [Jn.: Sokogisu] caught at the St. WA-07-H1500 (36°35.82'N, 140°36.04'E-36°36.14'N, 140°35.86'E, 1473-1433 m in depth) on 1 Nov. 2007, NSMT-PI 5682a.

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