Taxonomy of Mesopelagic Fishes Collected around the Ogasawara Islands by the T/S Oshoro-Maru

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Contents

Abstract

A taxonomic examination of 3,108 specimens of mesopelagic fishes, collected around the Ogasawara Islands in December 2010 by a beam trawl net operated from the T/S Oshoro-maru, Hokkaido University, Japan, resulted in the recognition of 99 species representing 34 families and 65 genera. Descriptions are provided for all species, two of them〔a stomiid *Eustomias braueri* Zugmayer, 1911 and linophrynid *Haplophryne mollis* (Brauer, 1902)〕being new records for Japan. Three species, a stomiid *Eustomias* sp., trachipterid *Desmodema* sp. and oneirodid *Oneirodes* sp., could not be identified at the species level.

Key words: Taxonomy, Mesopelagic fishes, Ogasawara Islands, T/S Oshoro-maru, New Japanese records

Introduction

The Ogasawara Islands (or Bonin Islands, 20°25′-27°44′N, 136°05′-153°58′E), comprising about 30 small islands, are located about 1,000 km south of the Japan mainland, between the Izu and Mariana islands, and are surrounded by

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the North Equatorial and Kuroshio currents (Zama and Fujita, 1977). Many unique animals and plants have evolved on the islands, which have at no time been connected to continental land masses (e.g., Ito, 1998; Kato et al., 1999; Chiba, 2003).

The marine ichthyofauna around the Ogasawara Islands has been subjected to many taxonomic studies (e.g., Zama and Fujita, 1977; Aoki, 1984; Sato, 1991; Randall et al., 1997), although most treated only shallow water sea species. However, Zama and Yasuda (1979) investigated the taxonomy of deep-sea fishes around the Ogasawara Islands, identifying 105 species belonging to 27 families (e.g., Nemichthyidae, Stomiidae, Melanostomidae and Myctophidae) and 62 genera. Subsequently, Ogasawara deep-sea fishes have not been further considered.

A recent research cruise to investigate the biodiversity of deep-sea fishes around the Ogasawara Islands conducted by the T/S Oshoro-maru, Hokkaido University in December 2010, resulted in the recognition of 99 species (representing 34 families and 65 genera), following the detailed examination of 3,108 specimens. About 50% of these had not been reported by Zama and Yasuda (1979), including two species new to Japanese waters. Three species could not be identified at the specific level.

The purpose of this study was to provide further clarification of the taxonomy of mesopelagic fishes around the Ogasawara Islands.

Materials and Methods

Study materials were collected from mesopelagic waters around the Ogasawara Islands during a biodiversity research cruise (14-19 December, 2010), utilizing a beam trawl net at four sites (OSMTs) around the islands (Figs. 1, 2; Table 1).

Specimens examined were fixed in 10% formalin, then transferred to 50% isopropyl alcohol and eventually deposited in the Hokkaido University Museum, Hakodate (HUMZ). Specimens subjected to measurements and counts are listed

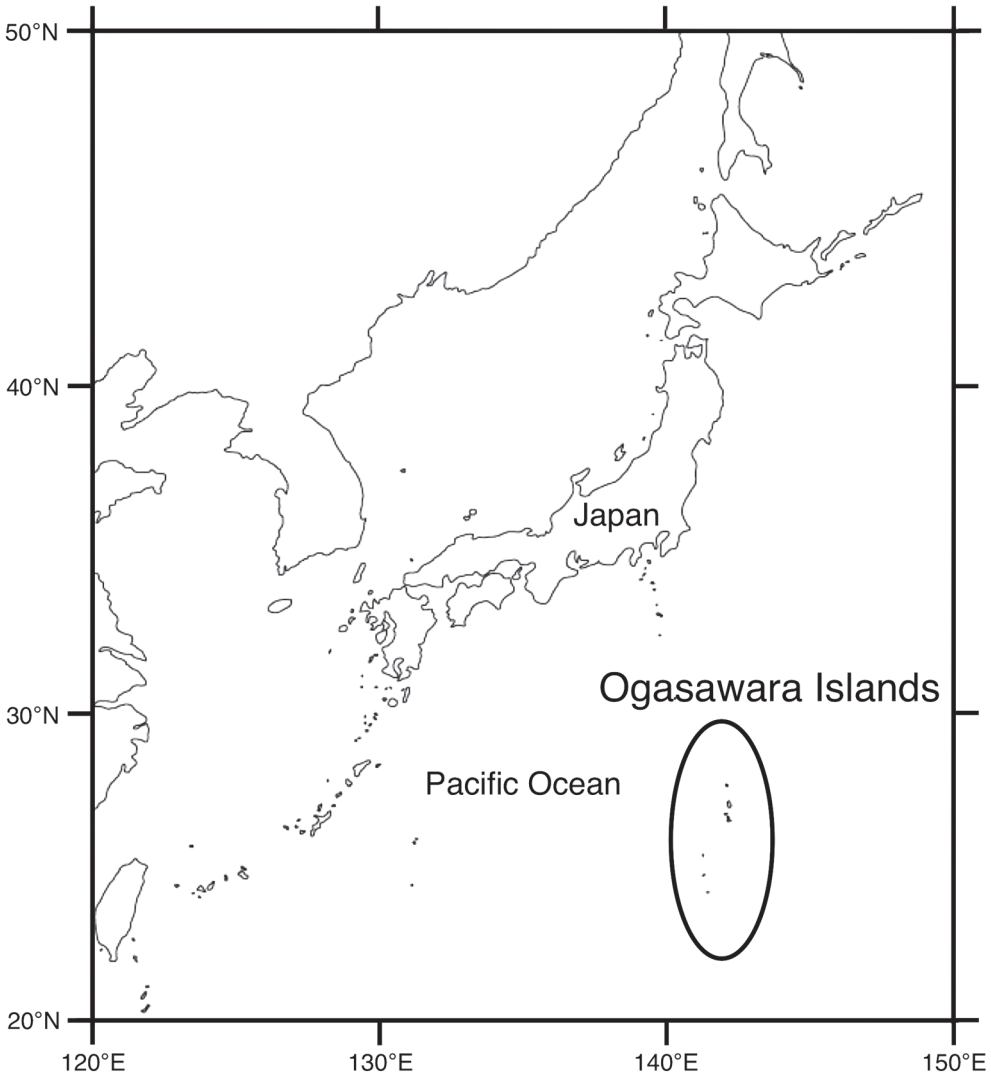

Fig. 1. Location of the Ogasawara Islands.

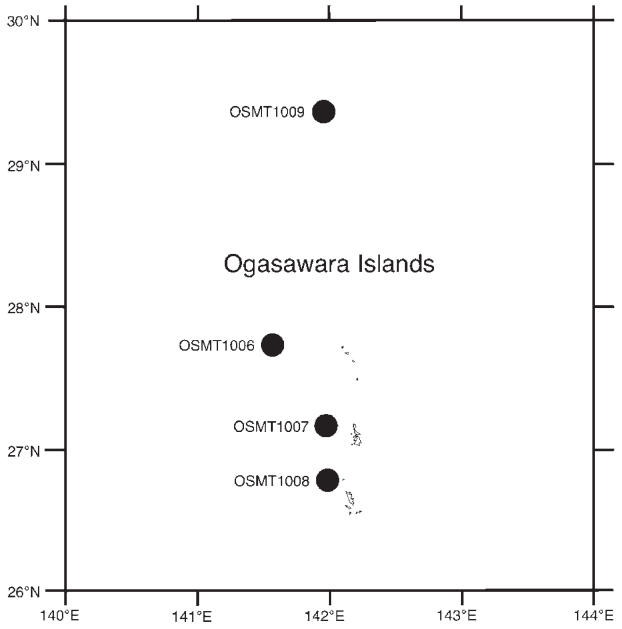

Fig. 2. Sampling stations (circular) in the Ogasawara Islands.

under "*Material examined*", those identified only being included in "*Other material*".

Methods of counting and measurements for Dalatiidae follow Compagno (1984), those for teleost fishes following Hubbs and Lagler (1958), except for snout vent length in Trachipteridae (following Rosenblatt and Butler, 1977). Abbreviations of major measurements and counts are as follows: standard length (SL); total length (TL); head length (HL); body depth (BD); dorsal fin rays (D); anal fin rays (A); pectoral fin rays (P_1); pelvic fin rays (P_2); caudal fin rays (C); gill rakers (GR); vertebrae (V); pored scales on lateral line (LLp); scales above lateral line (TRa); and scales below lateral line (TRb).

Measurements were made with calipers to the nearest 0.1 mm; to 1 mm for specimens larger than 500 mm SL. Counts of vertebrae and vertical fin rays of several species were taken from X-ray photographs. Numbers in parentheses after catalogue numbers in "*Material examined*" and "*Other material*" indicate number of specimens included.

Photophore terminology follows Nakaya et al. (2009) for Stomiiformes (Fig. 3), Sternoptychidae (Fig. 4) and Myctophidae (Fig. 5), Nafpaktitis (1977) for Neoscopelidae (Fig. 6),

Table 1. Sampling data of beam trawl surveys made by T/S Oshoro-maru.

Sampling station	Date	Position in	Position out	Depths (m)	Surface temperature (°C)
OSMT1006	14 Dec. 2010	27°45.2′ N, 141°31.6′ E	27°44.7′ N, 141°31.7′ E	320	24.2
OSMT1007	14–15 Dec. 2010	27°37.5′ N, 141°35.1′ E	27°10.0′ N, 141°57.3′ E	300–2,000	24.2
OSMT1008	15 Dec. 2010	26°46.6′ N, 141°57.9′ E	No data	570–730	24.2
OSMT1009	18–19 Dec. 2010	28°58.2′ N, 141°55.2′ E	29°21.4′ N, 141°56.2′ E	40–780	22.4

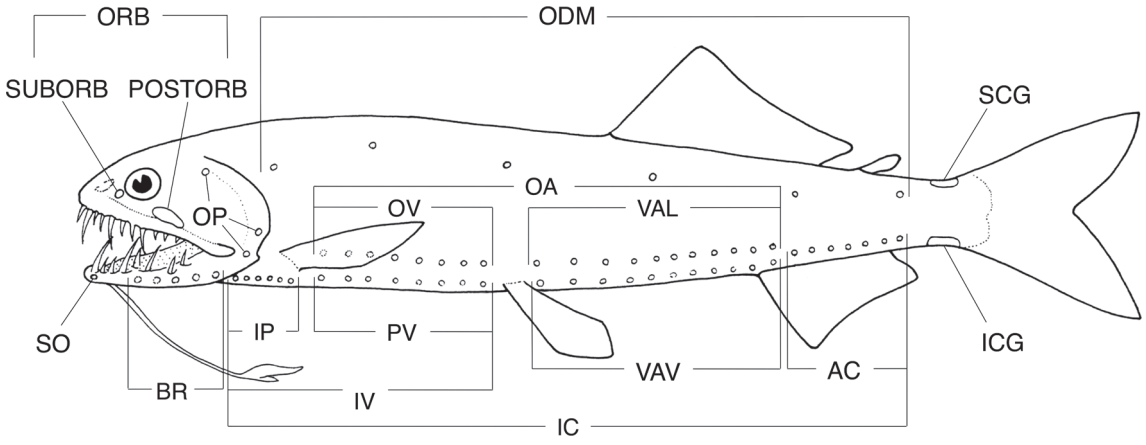

Fig. 3. Terms and localities of photophores in Stomiidae. AC, photophores from above anal fin to end of row if separated from VAV, or from anal origin to end of row if continuous with VAV; BR, branchiostegal photophores; IC, all photophores of ventral series; ICG, infracaudal luminous gland; IP, ventral series from isthmus to pectoral insertion; IV, ventral series from isthmus to pelvic insertion; OA, all photophores of lateral series; ODM, photophores along dorsal margin; OP, opercular photophores; ORB, orbital photophores; OV, lateral series from posterior portion of opercle to above pelvic insertion; POSTORB, postorbital luminous organ; PV, ventral series between pectoral and pelvic insertions; SCG, supracaudal luminous gland; SO, mental or symphyseal photophores; SUBORB, suborbital luminous organ; VAL, lateral series from pelvic insertion to end of row above anal fin; VAV, ventral series from pelvic insertion to anal origin if continuous with AC, or to end of row if separated from AC. Drawing after Nakaya et al. (2009).

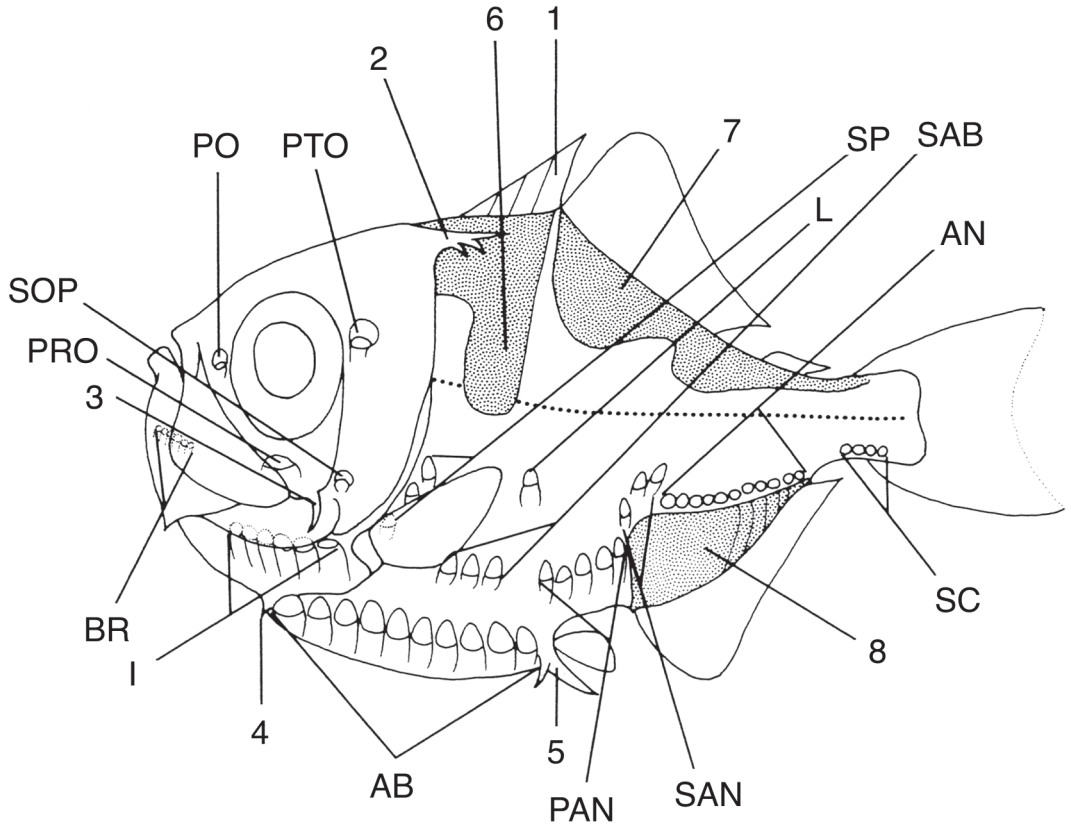

Fig. 4. Terms and localities of photophores and external features in Sternoptychidae. 1, dorsal blade; 2, posttemporal spines; 3, preopercular spine; 4, preabdominal spine; 5, postabdominal spine; 6, predorsal dark marking area; 7, subdorsal dark marking area; 8, anal transparent membrane; AB, abdominal photophores; AN, anal photophores; BR, branchiostegal photophores; I, isthmus photophores; L, lateral photophore; PAN, preanal photophores; PO, preorbital photophore; PRO, preopercular photophore; PTO, postorbital photophore; SAB, subcaudal photophores; SAN, supranal photophores; SC, subcaudal photophores; SOP, subopercular photophores; SP, suprapectoral photophores. Drawing after Nakaya et al. (2009).

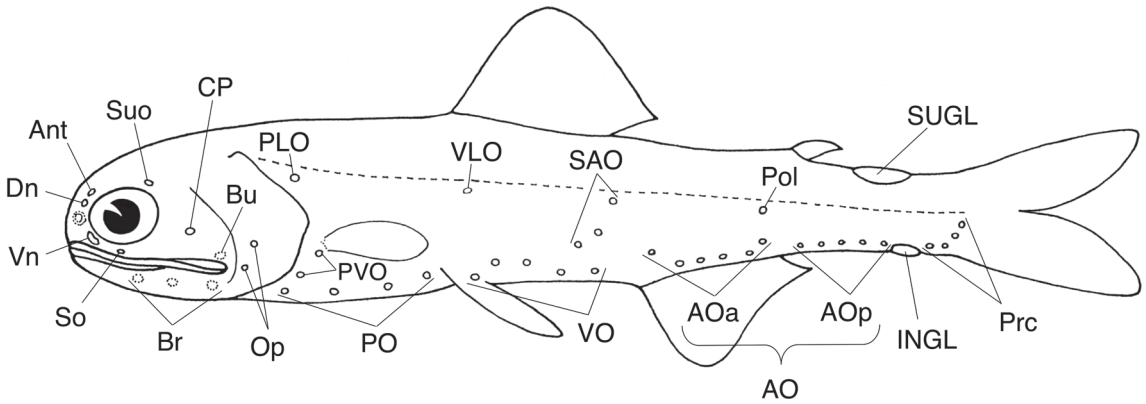

Fig. 5. Terminology of photophores in Myctophidae. Ant, antorbital organ; AO, anal organ; AOa, anterior anal organs; AOp, posterior anal organs; Br, branchiostegal organs; Bu, buccal organ; CP, cheek photophores; Dn, dorsonasal organ; INGL, infracaudal luminous gland; Op, opercular organs; PLO, suprapectoral organ; PO, thoracic organs or pectoral organs; Pol, postero-lateral organ; Prc, precaudal organs; PVO, subpectoral organs; SAO, supraanal organs; So, suborbital organ; Suo, supraorbital organ; SUGL, supracaudal luminous gland; VLO, supraventral organ; Vn, ventronasal organ; VO, ventral organs. Drawing after Nakaya et al. (2009).

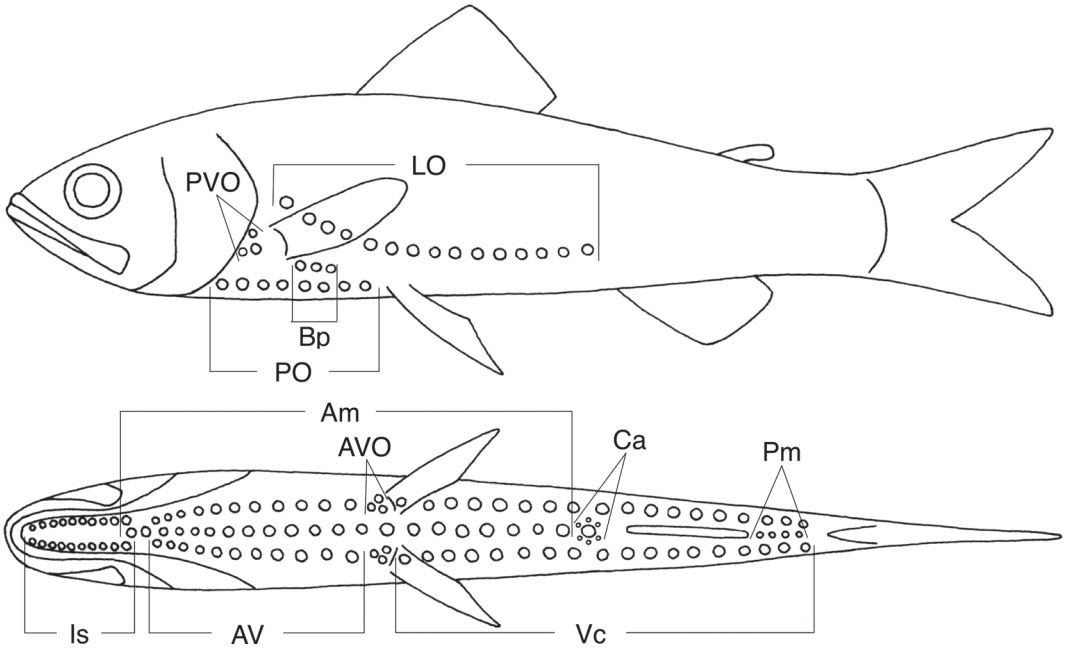

Fig. 6. Terminology of photophores in Neoscopelidae. Am, anteromedial photophores; Av, anteroventral photophores; AVO, accessory ventral photophores; Bp, basipectoral photophores; Ca, circumanal; Is, isthmus organs; LO, lateral photophores; Pm, posteromedian; PO, thoracic photophores; PVO, prepectoral photophores; Vc, ventrocaudal photophores.

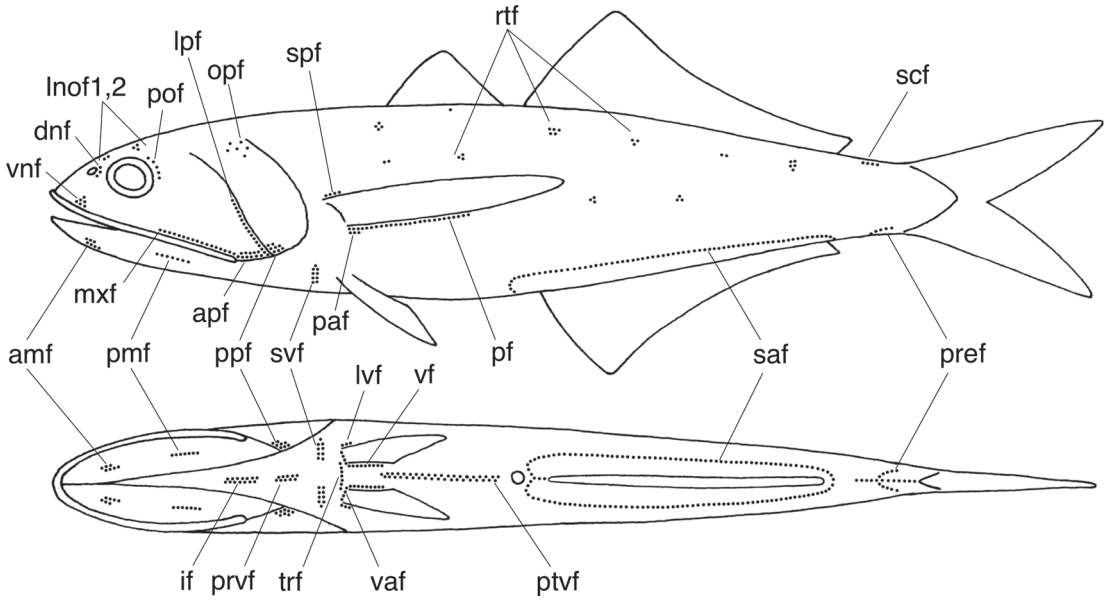

Fig. 7. Terminology of photophores in chiasmodontid *Pseudoscopelus*. amf, anteromaxillary photophores; apf, anteropreopercular photophores; dnf, dorsonasal photophores; if, isthmus photophores; inof 1, 2, interorbital photophores; lpf, longitudinal preopercular photophores; lvf, lateral pelvic fin photophores; mxf, maxillary photophores; opf, opercular photophores; paf, pectoral fin photophores; pf, pectoral fin photophores; pmf, posteromandibular photophores; pof, postorbital photophores; ppf, posteropreopercular photophores; prcf, precaudal fin photophores; prvf, prepelvic fin photophores; ptvf, postpelvic fin photophores; rtf, random trunk photophores; saf, anal fin photophores; scf, supracaudal fin photophores; spf, suprapectoral fin photophores; svf, suprapelvic fin photophores; trf, transverse pelvic fin photophores; vaf, pelvic fin axillary photophores; vf, pelvic fin photophores; vnf, ventro-nasal photophores.

and Melo (2010) for the chiasmodontid *Pseudoscopelus* (Fig. 7). The higher classification generally follows Nelson (2006).

Results

Order Squaliformes
Family Dalatiidae

1. *Isistius brasiliensis* (Quoy and Gaimard, 1824)
(Japanese name: Daruma-zame)
(Fig. 8)

Material examined. One specimen, 531 mm TL: HUMZ 211104, OSMT1007.

Diagnosis. Gill openings 5; lower jaw teeth 25; pre-first dorsal length 62.7% TL; pre-second dorsal length 74.6%; preanal length 69.5%; prepectoral length 16.9%; eye diameter 1.7%; body moderately slender; snout short, about equal to eye diameter; first and second dorsal fin heights about equal; pelvic fin larger than both dorsal fins; caudal peduncle short; caudal fin large, upper and lower lobes nearly symmetrical; body brown; a dark collar around throat and gill slits.

Remarks. Identification followed Compagno (1984), Nakaya and Shirai (1984) and McEachran and Fechhelm (1998). This species occurs worldwide in tropical to temperate waters in depths of 85-3,500 m (Compagno, 1984; McEachran and Fechhelm, 1998).

2. *Isistius plutodus* Garrick and Springer, 1964
(Japanese name: Kohire-daruma-zame)
(Fig. 9)

Material examined. One specimen, 331 mm TL: HUMZ 210817, OSMT1009.

Diagnosis. Gill openings 5; lower jaw teeth 17; pre-first dorsal length 62.2% TL; pre-second dorsal length 73.1%; preanal length 69.3%; prepectoral length 20.8%; eye diameter 3.8%; body moderately slender; snout extremely short, shorter than eye diameter; second dorsal fin notably higher than first dorsal fin; caudal peduncle short; caudal fin small, lower lobe about half length of upper lobe; body brown; dark collar absent.

Remarks. Identification followed Garrick and Springer (1964), Compagno (1984) and Meng et al. (1985). This species is widely but patchily distributed in the North and South Atlantic, and western Pacific oceans (Compagno et al., 2005).

Order Anguilliformes
Family Nemichthyidae

3. *Nemichthys scolopaceus* Richardson, 1848
(Japanese name: Shigi-unagi)
(Figs. 10, 11)

Material examined. Four specimens, 409-481 mm TL: HUMZ 210991, OSMT1009; HUMZ 211076, OSMT1007; HUMZ 211638-211639, OSMT1008.

Diagnosis. D 278-293; A 272-295; P_1 10; predorsal length 3.8-11.1% TL; preanal length 7.0-12.9%; eye diameter 1.0-1.3%; both jaws short in mature males, prolonged and nonocclusible in females and immature males; no sensory ridges on head; teeth small (absent in mature males); three lateral lines formed by five pores in each segment on body; caudal filament present; body strongly pigmented. Lateral lines on body formed by three rows of pores (5 in each segment).

Remarks. Identification followed Nielsen and Smith (1978) and Smith (1999a). This species is distributed worldwide in tropical to temperate waters (Nielsen and Smith, 1978) in depths of 300-2,000 m (Machida, 1984a).

One of the specimens examined (HUMZ 211639) was a mature male, characterized by short jaws, teeth absent, a posteriorly positioned pectoral fin and a well developed tubular anterior nostril (Fig. 11). The first Japanese record, by Yamada and Tabeta (1991), was of a metamorphosed male from waters off the Okinotori Islands (Okinotori-shima).

Family Serrivomeridae

4. *Serrivomer lanceolatoides* (Schmidt, 1916)
(Japanese name: Nokoba-unagi)
(Fig. 12)

Material examined. Five specimens, 341-652 mm TL: HUMZ 210798, OSMT1009; HUMZ 210868, HUMZ

Fig. 8. *Isistius brasiliensis*, HUMZ 211104, 531 mm TL.

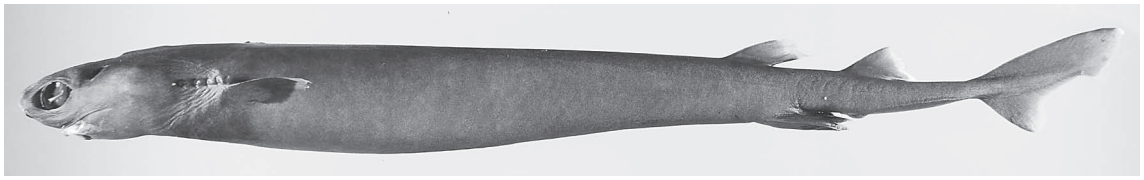

Fig. 9. *Isistius plutodus*, HUMZ 210817, 331 mm TL.

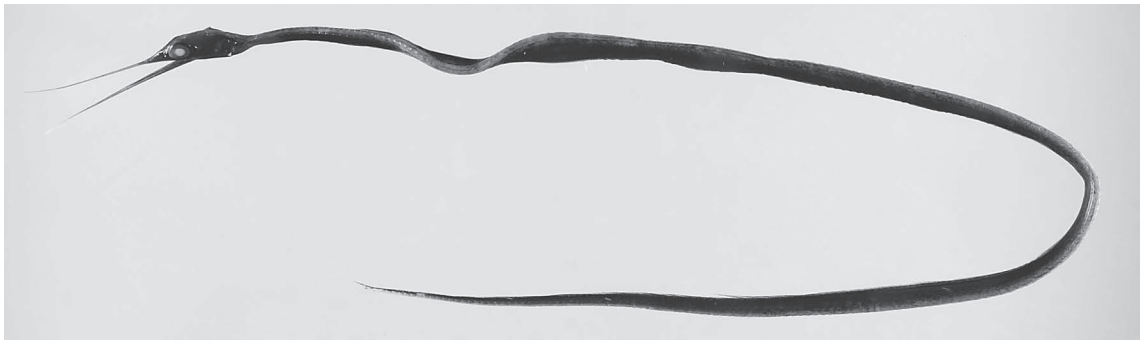

Fig. 10. *Nemichthys scolopaceus*, HUMZ 211638, female, 493 mm TL.

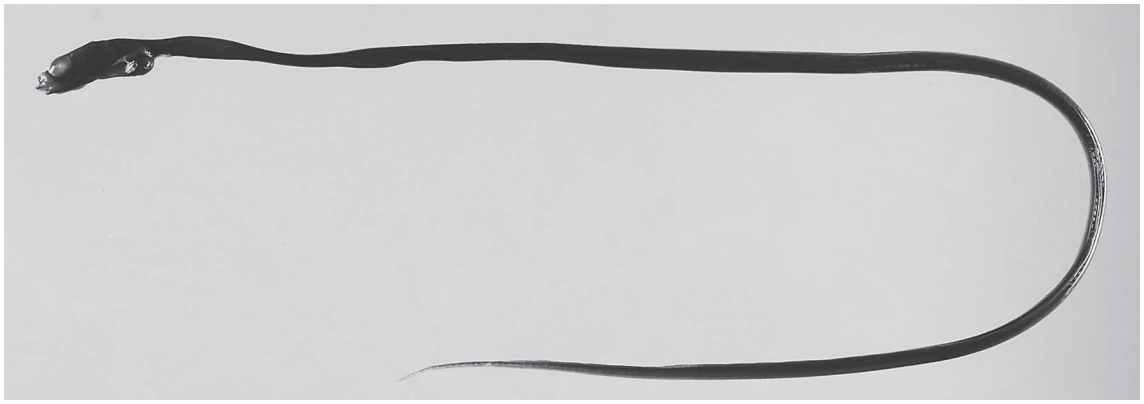

Fig. 11. *Nemichthys scolopaceus*, HUMZ 211639, male, 390 mm TL.

Fig. 12. *Serrivomer lanceolatoides*, HUMZ 211107, 392 mm TL.

Fig. 13. *Stemonidium hypomelas*, HUMZ 211646, 236 mm TL.

211682, OSMT1008; HUMZ 211107, HUMZ 211109, OSMT1007.

Other material. 20 specimens: HUMZ 210866, HUMZ 210867, HUMZ 211640, OSMT1008; HUMZ 211092 (13), HUMZ 211108, HUMZ 211123 (3), OSMT1007.

Diagnosis. D 162–210; A 158–190; predorsal length 33–34% TL; preanal length 27–29%; eye diameter 0.8–1.2%; body slightly laterally compressed; both jaws extremely prolonged; vomerine teeth relatively large, close together and "saw-like"; dorsal fin origin behind anal fin origin; lateral line reduced, sensory pores on body absent, those on head limited to three small pores between anterior and posterior nostrils; body uniformly blackish.

Remarks. Identification followed Tighe (1989), Karmovskaya (1996) and Hatooka (2013a). This species is known from the Atlantic and northwestern Pacific, including the Japanese Archipelago, in depths of 200–1,500 m (Parin et al., 1977; Tighe, 1989; Karmovskaya, 1996; Hatooka, 2013a).

5. *Stemonidium hypomelas* Gilbert, 1905
(Japanese name: Hime-nokoba-unagi)
(Fig. 13)

Material examined. One specimen, 236 mm TL; HUMZ 211646, OSMT1008.

Diagnosis. D 155; A 145; predorsal length 26.1% TL; preanal length 26.5%; eye diameter 0.8%; body slightly laterally compressed; both jaws extremely prolonged; vomerine teeth small, granular, arranged in several rows; dorsal fin originating slightly anterior to anus; lateral line reduced, sensory pores on body absent, those on head limited to three small pores between anterior and posterior nostrils; body uniformly blackish.

Remarks. Identification followed Asano (1984), Tighe (1989) and Smith (1999b). This species is distributed in the South Atlantic and Indo-Pacific (Parin et al., 1977; Saldanha and Karmovskaya, 1990) in depths of 550–1,200 m (Tighe, 1989).

Order Argentiniformes
Family Opisthoproctidae

6. *Winteria telescopa* Brauer, 1901
(Japanese name: Kuro-deme-nigisu)
(Fig. 14)

Material examined. Two specimens, 73.2–99.0 mm SL: HUMZ 210992, HUMZ 211044, OSMT1009.

Diagnosis. D 8; A 7–9; P_1 11–13; P_2 9–10; BR 3; GR 24–25; V 34–36; body compressed; eye tubular, directed anterodorsally; snout short, about equal to orbital diameter; length between pectoral and pelvic fin origins much greater than that between pelvic and anal fin origins.

Remarks. Identification followed Fujii (1984a) and Carter and Hartel (2003b). This species is distributed worldwide in tropical to temperate waters (Fujii, 1984a) in depths of 400–2,500 m, although mainly between 500 and 700 m (Quéro, 1990).

Family Microstomatidae

7. *Dolicholagus longirostris* (Maul, 1948)
(Japanese name: Gin-soko-iwashi)
(Fig. 15)

Material examined. Seven specimens, 57.3–172 mm

SL: HUMZ 210799, HUMZ 211020–211022, OSMT1009; HUMZ 211081, OSMT1007; HUMZ 211645, HUMZ 211666, OSMT1008.

Other material. Seven specimens: HUMZ 210934 (3), OSMT1009; HUMZ 211127 (4), OSMT1007.

Diagnosis. D 10–12; A 13–20; P_1 7–10; P_2 7–10; BR 20–24; V 48–50; body slender, compressed; eye diameter greater than snout length; dorsal end of gill slit reaching above midline along body; adipose fin present; anal fin base longer than dorsal fin base and caudal peduncle length; head and body silver when fresh.

Remarks. Identification followed Uyeno (1984a), Kobylyanskiy (1985) and Carter and Hartel (2003a). This species occurs worldwide in tropical to temperate waters (Kobylyanskiy, 1985).

Family Platytroctidae

8. *Sagamichthys abei* Parr, 1953
(Japanese name: Haname-iwashi)
(Fig. 16)

Material examined. Two specimens, 152–191 mm SL: HUMZ 211106, OSMT1007; HUMZ 211656, OSMT1008.

Diagnosis. D 15–19; A 13; P_1 14–16; P_2 8; GR 22–23; V 48–49; body elongate, compressed; snout blunt; posterior end of upper jaw extending beyond posterior margin of

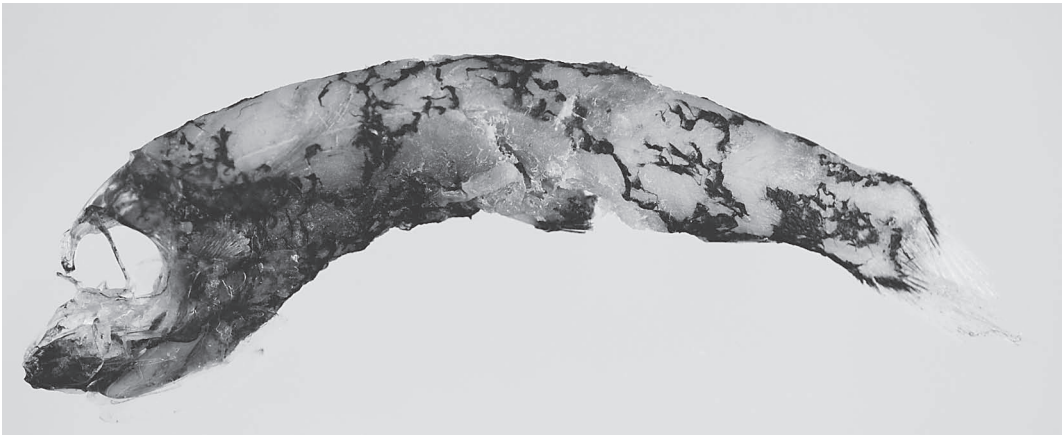

Fig. 14. *Winteria telescope*, HUMZ 211044, 99.0 mm SL.

Fig. 15. *Dolicholagus longirostris*, HUMZ 211020, 126 mm SL.

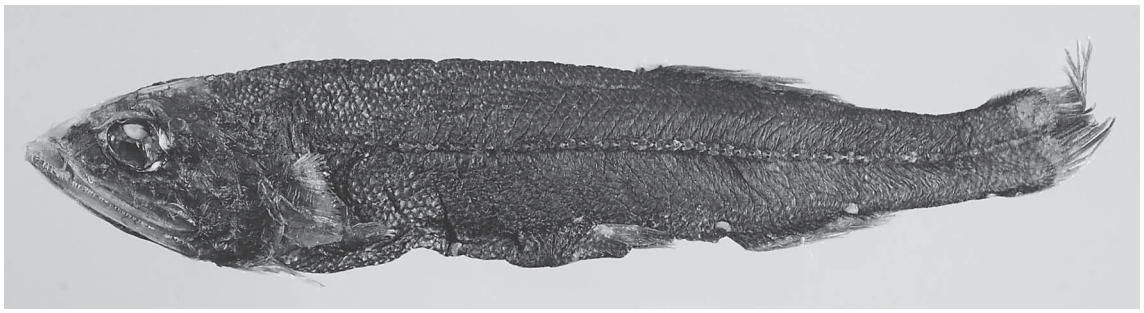

Fig. 16. *Sagamichthys abei*, HUMZ 211656, 152 mm SL.

eye; luminous gland with tubular opening present above pectoral fin; luminous organs present on lower portion of body, including three large organs crossing abdomen; dorsal and anal fins situated near caudal fin.

Remarks. Identification followed Parr (1953), Uyeno (1984b) and Matsui and Rosenblatt (1987). This species is known only from the Pacific Ocean, including southern Japan, Peru to Chile, British Columbia to Baja California, and the Hawaiian Ridge (Matsui and Rosenblatt, 1987; Pequeño, 1989; McAllister, 1990; Mundy, 2005). It occurs in depths of 200–1,000 m, mainly between 300–900 m (Uyeno, 1984b; Matsui and Rosenblatt, 1987).

Family Alepocephalidae

9. *Talismania antillurum* (Goode and Bean, 1896)
(Japanese name: Nokoba-iwashi)
(Fig. 17)

Material examined. Two specimens, 132–136 mm SL: HUMZ 211093, OSMT1007; HUMZ 211657, OSMT1008.

Diagnosis. D 16–18; A17–20; P_1 16; P_2 8; GR 27–28; V 48; body rather short, strongly compressed; dorsal profile of head gently curved above eye, concave on snout; snout short, rounded anteriorly in dorsal view; teeth nearly uniserial on both jaws and palatine; lower edge of maxilla serrated; dorsal and anal fins nearly opposite.

Remarks. Identification followed Okamura (1984a), Sazonov and Markle (1999) and Carter and Hartel (2003c). This species occurs worldwide in tropical to temperate waters in depths of 455–1,460 m (Markle and Sazonov, 1990).

Order Stomiiformes
Family Gonostomatidae

10. *Diplophos taenia* Günther, 1873
(Japanese name: Nettai-yumehadaka)
(Fig. 18)

Material examined. Six specimens, 106–145 mm SL: HUMZ 210805, HUMZ 210967–210968, OSMT1009; HUMZ 210827, HUMZ 210900, HUMZ 211636, OSMT1008.

Other material. 50 specimens: HUMZ 211015 (2), OSMT1009; HUMZ 211071 (33), HUMZ 211128 (15), OSMT1007.

Diagnosis. D 8–12; A 55–63; P_1 8–10; P_2 8; GR 12–15; BR; 10–12; IP 16–19; PV 26–32; VAV 15–18; AC 43–53; IC 103–118; OA 66–73; body elongate, strongly compressed; mouth large; dorsal fin base short; anal fin base extremely long, its origin slightly behind posterior end of dorsal fin base; uninterrupted small serial photophores present on body.

Remarks. Identification followed Badcock (1984a), Machida (1984b) and Harold (1999a). This species occurs worldwide in tropical to temperate waters (Fujii, 1984b) in depths of 300–800 m (Badcock, 1984a).

11. *Sigmops elongatum* (Günther, 1878)
(Japanese name: Ô-yoko-eso)
(Fig. 19)

Material examined. Nine specimens, 147–216 mm SL: HUMZ 211018, HUMZ 215435 (2), OSMT1009; HUMZ 211685, OSMT1008; HUMZ 215424 (5), OSMT1007.

Diagnosis. D 13–15; A 29–33; P_1 8–12; P_2 7–8; GR 20–22; BR 9–10; IV 15–16; VAV 5; AC 18–22; IC 38–42; OA 11–14; body elongate, strongly compressed; mouth large, nearly horizontal; lower jaw longer than upper; two rows of distinctly separated photophores along body; dorsal fin origin above anal fin origin; adipose fin present; SCG and ICG present; body uniformly blackish.

Remarks. Identification followed Fujii (1983a), Machida (1984b) and Miya and Nishida (2000). This species occurs worldwide in tropical to temperate waters (Quéro et al., 1990a) in depths of 60–3,292 m (Machida, 1984b).

12. *Sigmops gracilis* (Günther, 1878)
(Japanese name: Yoko-eso)
(Fig. 20)

Material examined. 10 specimens, 44.3–156 mm SL: HUMZ 210806, HUMZ 210910–210912, HUMZ

Fig. 17. *Talismania antillurum*, HUMZ 211657, 132 mm SL.

210924, HUMZ 210932–210933, HUMZ 210983, HUMZ 211017, OSMT1009; HUMZ 210857, OSMT1008.

Other material. 129 specimens: HUMZ 210909 (3), HUMZ 210930–210931 (3, 24), HUMZ 211016 (17), HUMZ 211059 (2), OSMT1009; HUMZ 211070 (47), HUMZ 211122, HUMZ 211129 (27), HUMZ 211133–211134 (4, 1), OSMT1007.

Diagnosis. D 10–12; A 26–31; P_1 10–12; P_2 7–8; GR 19–21; BR 8–10; IV 15–16; VAV 4–5; AC 19–22; IC 39–42; OA 11–15; body elongate, strongly compressed; mouth large, nearly horizontal; lower jaw longer than upper; two rows of distinctly separated photophores along body; dorsal fin origin posterior to anal fin origin; adipose fin absent; ODM, SCG and ICG present; body uniformly blackish.

Remarks. Identification followed Machida (1984b), Miya and Nishida (2000) and Mecklenburg et al. (2002). This species occurs in the North Pacific, including Taiwan to the Aleutian Islands, Alaska and the southern Hancock Seamount, in depths of 20–2,300 m (Yamamoto, 1982a; Fujii, 1984b; Randall and Lim, 2000a; Mecklenburg et al., 2002; Mundy, 2005).

Family Sternoptychidae

13. *Argyropelecus aculeatus* Valenciennes, 1850
(Japanese name: Togari-mune-eso)
(Fig. 21)

Material examined. 10 specimens, 17.0–68.9 mm SL: HUMZ 210842, HUMZ 211659, OSMT1008; HUMZ 210916–210917, HUMZ 211026, HUMZ 211029, HUMZ 211031–211033, OSMT1009; HUMZ 211692, OSMT1006.

Other material. 19 specimens: HUMZ 210919 (3), HUMZ 211030 (8), OSMT1009; HUMZ 215422 (2), OSMT1009; HUMZ 25423 (6), OSMT1007.

Diagnosis. D 8–10; A 7 + 5 = 12; P_1 10–11; P_2 6; GR 15–19; BR 6; I 6; AB 12; SP 3; SAB 6; PAN 4; SAN 1; AN 6; SC 4; body extremely deep, strongly compressed; mouth large, oblique; eye large, tubular; large dorsal blade present; photophores present on head and body; abdominal keel well developed; two large post-abdominal spines present; adipose fin present; anal fin divided into two parts; spines present on lower margin of body between anal fins, and that of SC; body uniformly silver when fresh.

Remarks. Identification followed Schultz (1961), Yamamoto (1982b) and Harold (1999b). This species occurs in tropical to subtropical regions in the Atlantic and Indo-Pacific in depths of 100–950 m (Yamamoto, 1982b; Uyeno and Aizawa, 1983).

14. *Argyropelecus affinis* Garman, 1899
(Japanese name: Naga-mune-eso)
(Fig. 22)

Material examined. Two specimens, 38.8–45.5 mm SL: HUMZ 210915, HUMZ 215426, OSMT1009.

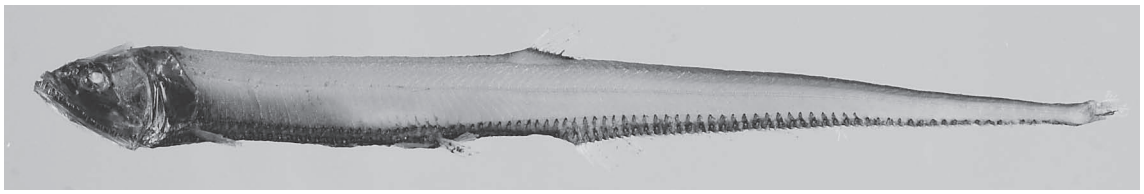

Fig. 18. *Diplophos taenia*, HUMZ 210827, 106 mm SL.

Fig. 19. *Sigmops elongatum*, HUMZ 211685, 216 mm SL.

Fig. 20. *Sigmops gracilis*, HUMZ 210933, 79.0 mm SL.

Fig. 21. *Argyropelecus aculeatus*, HUMZ 210842, 54 mm SL.

Fig. 22. *Argyropelecus affinis*, HUMZ 210915, 45.5 mm SL.

Diagnosis. D 9; A 11–14; P_1 10–12; P_2 6; GR 16–17; BR 6; I 6; AB 12; SP 3; SAB 6; PAN 4; AN 6; SC 4; body strongly compressed; mouth large, oblique; eye large, tubular; small dorsal blade present; photophores present on head and body; abdominal keel well developed; two small post-abdominal spines present; adipose fin present; anal fin single; SAN, AN and SC arranged almost continuously; body uniformly silver when fresh.

Remarks. Identification followed Schultz (1961), Uyeno and Aizawa (1983) and Harold (1999b). *Argyropelecus affinis* occurs worldwide in tropical to temperate waters in depths of 170–910 m (Uyeno and Aizawa, 1983; Badcock, 1984b).

15. *Polyipnus matsubarai* Schultz, 1961
(Hoshi-hônen-eso)
(Fig. 23)

Material examined. One specimen, 76.0 mm SL: HUMZ 211681, OSMT1008.

Diagnosis. D 12; A 16; P_1 13; P_2 7; GR 23; BR 6; I 6; AB 10; SP 3; SAB 3; PAN 5; SAN 3; AN 9; SC 4; body rhombic, greatly compressed; mouth large, extremely

oblique; eye large; post-temporal spine small; small dorsal blade present; photophores present on head and body; abdominal keel well developed; position of SAN elevated; adipose fin present; body silver when fresh; predorsal dark marking acute, extending ventrad beyond midline of body.

Remarks. Identification followed Schultz (1961), Yamamoto (1982b) and Harold (1994). This species is known from the western and central Pacific, including the Japanese Archipelago, Philippines and Hawaiian Emperor Seamounts (Harold, 1994), in depths of 20–500 m, mainly between 80–130 m (Mundy, 2005).

16. *Sternoptyx diaphana* Hermann, 1781
(Japanese name: Mune-eso)
(Fig. 24)

Material examined. 10 specimens, 15.2–35.3 mm

Fig. 23. *Polyipnus matsubarai*, HUMZ 211681, 76.0 mm SL.

Fig. 24. *Sternoptyx diaphana*, HUMZ 210843, 35.3 mm SL.

SL: HUMZ 210843, HUMZ 210865 (8), OSMT1008; HUMZ 215672, OSMT1009.

Other material. 77 specimens: HUMZ 210841 (19), HUMZ 210892 (2), OSMT1008; HUMZ 210976 (5), HUMZ 211034 (13), OSMT1009; HUMZ 211082 (18), HUMZ 211138 (20), OSMT1007.

Diagnosis. D 9–10; A 13–14; P_1 10–11; P_2 5; GR 13–14; BR 6; I 6; AB 10; SP 3; PAN 3; SAN 1; AN 3; SC 4; body extremely deep, strongly compressed; mouth large, oblique; eye large; photophores present on head and body; large dorsal blade present; abdominal keel well developed; triangular transparent membrane present above anal fin base; position of SAN lowered; posterior margin of AN and ventral margin of anal fin base forming narrow V shape; adipose fin present; body uniformly silver when fresh.

Remarks. Identification followed Schultz (1961), Baird (1971) and Machida (1984c). This species occurs worldwide in tropical to temperate waters in depths of 300–1,100 m (Fujii, 1984c; McEachran and Fechhelm, 1998).

17. *Sternoptyx pseudobscura* Baird, 1971
(Japanese name: Mune-eso-modoki)
(Fig. 25)

Material examined. One specimen, 57.4 mm SL: HUMZ 215671, OSMT1007.

Diagnosis. D 11; A 13; P_1 10; P_2 5; GR 13; BR 6; I 6; AB 10; SP 3; PAN 3; SAN 1; AN 3; SC 4; body extremely deep, strongly compressed; mouth large, oblique; eye large; photophores present on head and body; large dorsal blade present; abdominal keel well developed; triangular transparent membrane present above anal fin base; position of SAN elevated; posterior margin of AN and ventral margin of anal fin base forming broad V shape; adipose fin present; body uniformly silver when fresh.

Remarks. Identification followed Baird (1971), Uyeno and Aizawa (1983) and McEachran and Fechhelm (1998). This species occurs worldwide in tropical to temperate waters in depths of 800–1,500 m (Fujii, 1984c; McEachran and Fechhelm, 1998).

Family Phosichthyidae

18. *Vinciguerria nimbaria* (Jordan and Williams, 1895)
(Japanese name: Yabe-ukieso)
(Fig. 26)

Material examined. Six specimens, 27.6–39.3 mm

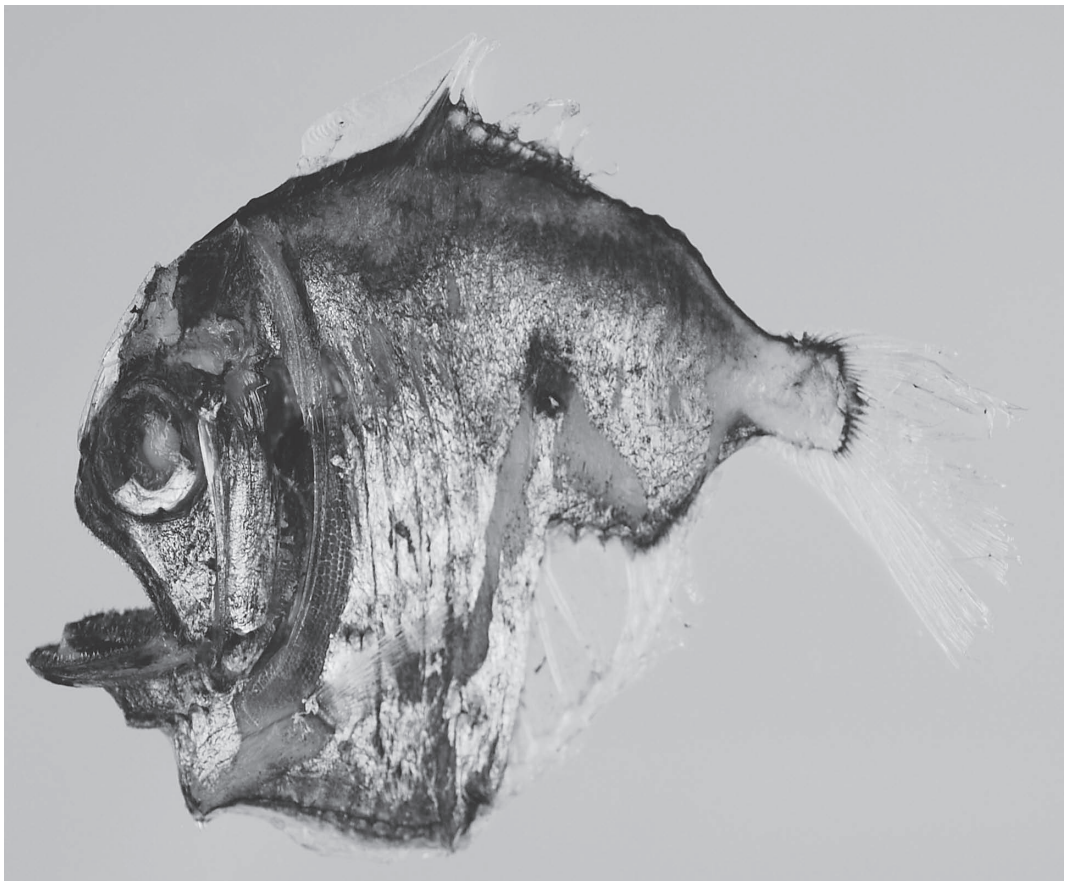

Fig. 25. *Sternoptyx pseudobscura*, HUMZ 215671, 57.4 mm SL.

SL: HUMZ 210918, HUMZ 215439, OSMT1009; HUMZ 211085 (3), HUMZ 215738, OSMT1007.

Diagnosis. D 12–15; A 12–16; P_1 9–10; P_2 7; GR 17–21; BR 8; IP 9–10; PV 13–14; VAV 10; AC 13–15; IC 45–49; OV 13–14; VAL 8–10; OA 21–23; body elongate; mouth large, nearly horizontal; SO, PRO and PTO present; small uninterrupted serial photophores along body; anal fin origin well behind posterior end of dorsal fin base; adipose fin present.

Remarks. Identification followed Badcock (1984c), Fujii (1984b) and Harold (1999c). This species occurs worldwide in tropical to warm temperate waters in depths of 20–5,000 m, usually between 200–400 m (Quéro et al., 1990b; McEachran and Fechhelm, 1998).

Family Stomiidae

19. *Borostomias elucens* (Brauer, 1906)
(Japanese name: Sukiba-tokagegisu)
(Fig. 27)

Material examined. Four specimens, 205–307 mm SL: HUMZ 210880, OSMT1008; HUMZ 211063–211064, OSMT1007; HUMZ 215428, OSMT1009.

Diagnosis. D 14–16; A 14–17; P_1 7–8; P_2 7; GR 14–18; BR 16–21; IP 12–13; PV 20–22; VAV 10–15; AC 10–11; IC 53–60; OA 34–36; body relatively deep; mouth extremely large; maxillary teeth canine, sparsely aligned; barbel present, its terminal bulb without filaments; two rows of distinctly separated photophores along

Fig. 26. *Vinciguerria nimbaria*, HUMZ 215738, 39.3 mm SL.

Fig. 27. *Borostomias elucens*, HUMZ 211064, 205 mm SL.

Fig. 28. *Stomias nebulosus*, HUMZ 215739, 91.0 mm SL.

body; anal fin origin well behind posterior end of dorsal fin base; adipose fin present.

Remarks. Identification followed Gibbs (1964a), Fujii (1983b) and Harold (2003a). *Borostomias elucens* is widely known from tropical seas in the Atlantic and Indo-Pacific in depths of 250–1,650 m (McEachran and Fechhelm, 1998).

20. *Stomias nebulosus* Alcock, 1889
(Japanese name: Yoroi-hoshieso)
(Fig. 28)

Material examined. Two specimens, 91.0-92.4 mm SL: HUMZ 210836, HUMZ 215739, OSMT1008.

Diagnosis. D 15-16; A 19-24; P_1 6; P_2 5; BR 11-12; IP 9-11; PV 32-35; VAV 7; AC 14; IC 64-65; OV 32; VAL 7-8; OA 39-40; body elongate, compressed; mouth large, oblique; short barbel present on lower jaw; most mandibular teeth longer than longest premaxillary teeth; body covered with five longitudinal rows of scale-like hexagonal patterns; small uninterrupted serial photophores along body; dorsal fin located well posteriorly, opposite anal fin.

Remarks. Identification followed Fujii (1984e), Fink and Fink (1986) and Gibbs (1986a). This species is found in the Indo-Pacific, including southern Africa, the South China Sea, and the Japanese and Hawaiian Archipelagos, in depths of 640–730 m (Fujii, 1984e; Gibbs, 1986a; Randall and Lim, 2000a; Mundy, 2005).

21. *Macrostomias pacificus* Fedorov and Mel'chikova, 1971
(Japanese name: Hoso-wani-tokagegisu)
(Fig. 29)

Material examined. Four specimens, 221-299 mm SL: HUMZ 210905, HUMZ 210929, HUMZ 211052, OSMT1009; HUMZ 211130, OSMT1007.

Diagnosis. D 12-14; A 13-15; P_1 5-6; P_2 4; BR 17-19; IP 8-9; PV 70-73; VAV 55-58; AC 19-21; IC 155-161; OV 69-75; VAL 56-59; OA 121-134; body remarkably elongate; mouth large, oblique; extremely long barbel present on lower jaw; body covered with five longitudinal rows of scale-like hexagonal patterns; small uninterrupted serial photophores along body; pelvic fin rays extremely long; dorsal fin located well posteriorly, opposite anal fin.

Remarks. Identification followed Fedorov and Mel'chikova (1971), Fujii (1984e) and Fink and Fink (1986). This species is known from the western and central Pacific, including southern Japan to the Hawaiian Emperor Seamounts, in depths of 100-600 m (Fedorov and Mel'chikova, 1971; Fujii, 1984e; Mundy, 2005; Aizawa and Doiuchi, 2013a).

22. *Chauliodus sloani* Bloch and Schneider, 1801
(Japanese name: Hôraieso)
(Fig. 30)

Material examined. 10 specimens, 133-243 mm SL: HUMZ 210837-210840, HUMZ 210846-210848, OSMT1008; HUMZ 210906, HUMZ 210925, HUMZ 210927, OSMT1009.

Other material. 43 specimens: HUMZ 210926 (12), HUMZ 210928, HUMZ 210979-210982 (1, 3, 1, 1), HUMZ 211035-211036 (1, 7), HUMZ 211055, OSMT1009; HUMZ 211077 (11), HUMZ 211122 (4), OSMT1007.

Diagnosis. D 5; A 12-14; P_1 12-14; P_2 7-8; BR 14-16; IP 8-11; PV 19-20; VAV; 24-27; AC 8-9; IC 59-65; OV 19-20; VAL 25-26; OA 44-45; body elongate, strongly compressed; mouth extremely large, oblique; premaxilla with four teeth, second longest, third shorter than fourth; PTO circular; dorsal fin located just behind head and well in advance of pelvic fin; body covered with five longitudinal rows of scale-like hexagonal patterns; two rows of photophores along body; two adipose fins present, situated above and in front of anal fin, respectively.

Remarks. Identification followed Morrow (1964a), Gibbs (1984a) and Machida (1984d). This species occurs in warm Atlantic and Indo-Pacific waters in depths of 200-4,700 m, usually between 500-1,000 m (Fujii, 1984d; Shinohara et al., 1994; Yang et al., 1996).

23. *Echiostoma barbatum* Lowe, 1843
(Japanese name: Murasaki-hoshieso)
(Fig. 31)

Material examined. Five specimens, 133-295 mm SL: HUMZ 210797, OSMT1009; HUMZ 211137, OSMT1007; HUMZ 211651, HUMZ 211669, HUMZ 211687, OSMT1008.

Diagnosis. D 10-12; A 14-16; P_1 1 + 3; P_2 7-8; BR 10-12; IP 8-11; PV 26-30; VAV 16-18; AC 11-13; IC 65-68; OV 24-27; VAL 15-20; OA 39-45; body elongate, compressed; mouth large, nearly horizontal; short barbel present on lower jaw; uppermost pectoral fin ray long, isolated from others; two rows of distinctly separated photo-

Fig. 29. *Macrostomias pacificus*, HUMZ 210905, 242 mm SL.

phores along body; dorsal fin origin above anal fin origin; body uniformly blackish.

Remarks. Identification followed Fujii (1982a), Gibbs (1984b) and Harold (2003b). *Echiostoma barbatum* occurs in tropical regions of the Atlantic and Indo-Pacific in depths of 30–4,200 m (Gibbs and Barnett, 1990; Mundy, 2005).

24. *Eustomias bifilis* Gibbs, 1960
(Japanese name: Hosohige-hoshieso)
(Fig. 32)

Material examined. One specimen, 126 mm SL: HUMZ 210850, OSMT1008.

Diagnosis. D 22; A 33; P_1 3; P_2 7; BR 9; IP 7; PV 26; VAV 8; AC 23; IC 64; OV 26; VAL 14; OA 40; body elongate, compressed; mouth large; upper jaw protrusible; barbel present on lower jaw; stem of lower jaw barbel with one branch, ovoid body present on tips of stem and branch; two rows of distinctly separated photophores along body; dorsal fin origin well behind anal fin origin; body uniformly blackish.

Remarks. Identification followed Gibbs (1960), Fujii (1982a) and Harold (1999d). *Eustomias bifilis* is known from the tropical Indo-Pacific, including the Japanese and Hawaiian Archipelagos, Baja California, Australia and New Caledonia, in depths of 200–800 m (Gibbs, 1960; Fujii, 1982a, 1984f; Mundy, 2005; Paxton et al., 2006a; Fricke et al., 2011).

25. *Eustomias braueri* Zugmayer, 1911
(New Japanese name: Tama-hoshieso)
(Fig. 33)

Material examined. One specimen, 114 mm SL: HUMZ 210855, OSMT1008.

Description. Counts: D 24; A 43; P_1 11; P_2 5; C

Fig. 30. *Chauliodus sloani*, HUMZ 210925, 213 mm SL.

Fig. 31. *Echiostoma barbatum*, HUMZ 211687, 295 mm SL.

Fig. 32. *Eustomias bifilis*, HUMZ 210850, 126 mm SL.

Fig. 33. *Eustomias braueri*, HUMZ 210855, 114 mm SL.

24; BR 8; V 65; IP 7; PV 27; VAV 10; AC 21; IC 65; OV 23; VAL 13; OA 36; teeth on premaxilla 16; teeth on mandible 24. Proportions (% SL): HL 16.2; BD 8.7; snout length 9.1; upper jaw length 11.1; lower jaw length 12.0; eye diameter 1.9; interorbital length 4.2; predorsal length 82.7; postdorsal length 18.5; preanal length 68.9; postanal length 32.9; preventral length 51.9; pectoral fin length 18.7; length of dorsal fin base 16.0; length of anal fin base 29.5; caudal peduncle length 3.4; caudal peduncle depth 6.2; length of barbel on lower jaw 18.3; length of terminal bulb of barbel 3.3.

Body elongate, compressed, tapering from anal fin origin. Head and body lacking scales. Mouth large, slightly oblique; posterior end of upper jaw extending well beyond posterior margin of eye. Upper jaw protrusible. Lower jaw extending anteriorly slightly beyond upper jaw. Third and seventh teeth on premaxilla fixed; other teeth on premaxilla depressible; third and seventh teeth longest; fourth and eighth teeth shortest. Teeth on maxilla comb-like, densely aligned. All teeth on mandible depressible; especially third, sixth, 10th, 12th and 14th (completely depressed medially). Vomerine and palatine teeth absent. Eye circular, small. POSTORB vertically elongate, oval, situated below center of eye. Short barbel present on lower jaw. Single ovoid terminal bulb present on tip of barbel; two short filaments on base of terminal bulb. Very wide gill opening, reaching dorsal margin of head. Gill rakers absent. Two rows of distinctly separated photophores along body. Small photophores scattered over most regions of head and body. Lateral line absent. Dorsal fin origin situated well behind anal fin origin, above 15th anal fin ray. Anal fin base about twice as long as dorsal fin base. Pectoral fin relatively long, without free soft rays. Pelvic fin short, located at midpoint of ventral body margin. Caudal peduncle short. Elliptical luminous organ absent on soft rays of upper lobe of caudal fin. Head, body, pectoral fin rays and stem of barbel blackish. Terminal bulb and photophores white. Filaments of terminal bulb, and dorsal, anal, pelvic and caudal fin rays unpigmented.

Distribution. Known from mesopelagic waters of the Atlantic and Indo-Pacific, including off Gibraltar, the Gulf of Mexico, Caribbean Sea, and off New Guinea and the Ogasawara Islands (e.g., Morrow and Gibbs, 1964; Parin and Pokhil'skaya, 1974; Gibbs, 1984b; McEachran and Fechhelm, 1998; this study).

Remarks. Characterized by a protrusible upper jaw, two rows of photophores on the body, absence of free pectoral fin rays and the dorsal fin origin situated well behind the anal fin origin (Fujii, 1984f), the present specimen belongs to the genus *Eustomias* Vaillant, 1888, currently including 115 species (Sutton and Hartel, 2004; Nelson, 2006). It is most similar to *Eustomias braueri* in having 11 pectoral fin rays, a relatively large head (16.2% SL vs. 12.5-16.6% in *E. braueri*) a deep body (8.7% SL vs. 7.7-11%), a short barbel on the lower jaw (18.3% SL vs. 12-17%), a single ovoid terminal bulb on the tip of the barbel and two short filaments on the base of the terminal bulb (Zugmayer, 1911; Morrow and Gibbs, 1964; Parin and Pokhil'skaya, 1974; Gibbs, 1984b; McEachran and Fechhelm, 1998). Although it differs from *E. braueri* in having a greater number of teeth on the premaxilla and mandible (16 and 24, respectively, vs. 8-10 and 12-13, respectively, in *E. braueri*) (Morrow and Gibbs, 1964; Parin and Pokhil'skaya, 1974), it is well known that tooth numbers in these series are widely variable in several congeneric species (e.g., 14-21 on mandible in *Eustomias arborifer* Parr 1927, 7-15 on premaxilla in *Eustomias leptobolus* Regan and Trewavas, 1930, 7-15 on premaxilla and 9-18 on mandible in *Eustomias macrophthalmus* Parr, 1927 and 11-20 on mandible in *Eustomias obscurus* Vaillant, 1888; see Morrow and Gibbs, 1964; Gibbs et al., 1983; Gomon and Gibbs, 1985; McEachran and Fechhelm, 1998). In this study, the present specimen was identified as *E. braueri*, recognizing the greater numbers of teeth on the premaxilla and mandible as intraspecific variations in the species.

Eustomias braueri has previously been recorded from New Guinea in the western Pacific. The present specimen represents the first record of the species from Japanese waters and is also the northernmost record for the Pacific Ocean.

26. *Eustomias orientalis* Gibbs, Clarke and Gomon, 1983
(Japanese name: Dainichi-hoshieso)
(Fig. 34)

Material. Two specimens, 94.3–131 mm SL: HUMZ 210913, HUMZ 215742, OSMT1009.

Diagnosis. D 20–22; A 35–36; P_1 3; P_2 7; BR 10–11; IP 7; PV 29–31; VAV 7–10; AC 21–25; IC 67–70; OV 27–32; VAL 17–19; OA 46–49; body elongate, compressed; mouth large; upper jaw protrusible; barbel present on lower jaw; tip of lower jaw barbel with two separated ovoid bodies; two rows of distinctly separated photophores along body; dorsal fin origin well behind anal fin origin; body uniformly blackish.

Remarks. Identification followed Gibbs et al. (1983), Fujii (1984f) and Harold (1999d). This species has been recorded from north of New Guinea to southern Japan in depths of 100–700 m (Gibbs et al., 1983; Aizawa and Doiuchi, 2013b).

27. *Eustomias* sp.
(Fig. 35)

Material examined. One specimen, 185 mm SL: HUMZ

Fig. 34. *Eustomias orientalis*, HUMZ 210913, 131 mm SL.

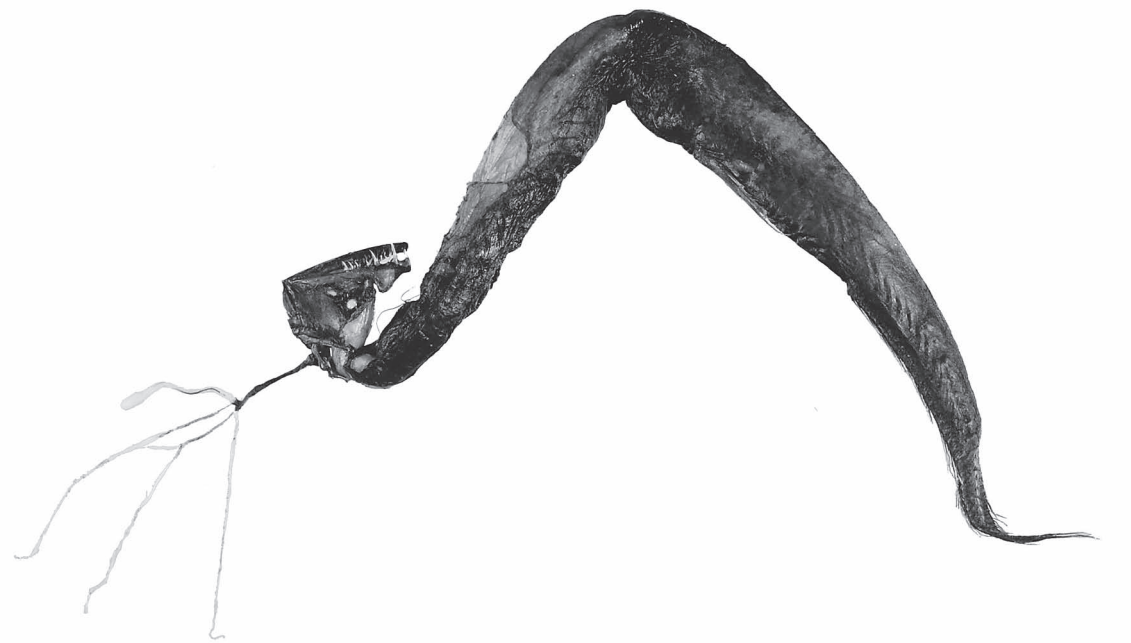

Fig. 35. *Eustomias* sp., HUMZ 215743, 185 mm SL.

215743, OSMT1009.

Description. Counts: D 23; A 40; P_1 5; P_2 6; C 20; PV 24; VAV 8; AC 22; VAL 14; teeth on premaxilla 9; teeth on mandible 11. Proportions (% SL): HL 10.8; BD 7.6; snout length 4.9; upper jaw length 9.7; lower jaw length 9.1; eye diameter 1.2; interorbital length 1.9; predorsal length 83.9: postdorsal length 13.3; preanal length 68.9; postanal length 27.8; preventral length 55.6; pectoral fin length 5.4; length of dorsal fin base 10.4; length of anal fin base 21.0; caudal peduncle length 2.2; caudal peduncle depth 1.5; length of main stem of lower jaw barbel 19.0; length of filament of barbel 21.1; length of terminal bulb of barbel 2.7.

Body elongate, compressed, tapering from anal fin origin. Head and body lacking scales. Mouth large, slightly oblique; posterior end of upper jaw extending far beyond posterior margin of eye. Upper jaw protrusible. Lower jaw extending slightly beyond upper jaw anteriorly. Sixth tooth on premaxilla fixed; other teeth on premaxilla depressible; fifth tooth longest. Maxilla smooth, teeth absent. Fifth and eighth teeth on mandible fixed; other teeth on mandible depressible; ninth tooth longest. Vomerine and palatine teeth absent. Eye circular, small. POSTORB oval, situated below eye. Barbel present on lower jaw, with three long branches bearing many filaments but lacking bulbs arising together from near midpoint of main barbel stem; middle and posterior branches extending beyond single ovoid terminal bulb lacking filaments, on main stem. Gill opening extremely wide, reaching dorsal margin of head. Gill rakers absent. Two rows of distinctly separated photophores along body. Small photophores scattered over most regions of head and body. Lateral line absent. Dorsal fin origin far behind anal fin origin, situated above 24th anal fin ray. Anal fin base about twice as long as dorsal fin base. Pectoral fin relatively long, without free soft rays. Pelvic fin short, located on middle of ventral margin of body. Caudal peduncle short. Head, body and pectoral fin rays uniformly blackish. Photophores white. Basal half of main stem of barbel blackish; remainder of barbel white. Terminal bulb of barbel white. Three long branches of barbel, and dorsal, anal, pelvic and caudal fin rays unpigmented.

Remarks. The present specimen is considered to belong to the genus *Eustomias* Vaillant, 1888, as characterized above under *Eustomias braueri*. It is most similar to *Eustomias furcifer* Regan and Trewavas, 1930, widely known from the Atlantic and Indo-Pacific (e.g., Hartel et al., 2008), in having the main stem of the lower jaw barbel with three branches lacking bulbs arising together from near the midpoint, and a single oval terminal bulb lacking filaments. The barbel stem is blackish basally, otherwise white (Regan and Trewavas, 1930; Morrow and Gibbs, 1964). However, the specimen differs from *E. furcifer* in having five pectoral fin rays (vs. six in *E. furcifer*) and the posterior branch of the barbel beyond the terminal bulb (vs. not reaching it in *E. furcifer*; see Regan and Trewavas, 1930: fig. 83). In *Eustomias*, intraspecific variation in the number of pectoral fin rays is known in several species, but has not been reported for others. In addition, configuration of the barbel, including branches and terminal bulb, has been considered an important taxonomic character (e.g., McEachran and Fechhelm, 1998; Aizawa, 2002a). However, because previous studies of *E. furcifer* have been based on a small number of specimens (e.g., one specimen in Regan and Trewavas, 1930, one in Hartel et al., 2008), it is unclear at present whether or not the differences between the present specimen and *E. furcifer* represent interspecific variation. Therefore, specific identification of the present specimen was inconclusive.

28. *Leptostomias multifilis* Imai, 1941
(Japanese name: Yari-hoshieo)
(Fig. 36)

Material examined. One specimen, 206 mm SL: HUMZ 211049, OSMT1009.

Diagnosis. D 19; A 30; P_1 9; P_2 7; BR 13; IP 10; PV 41; VAV 17; AC 16; IC 84; OV 40; VAL 21; OA 61; body extremely elongate, compressed; mouth large, nearly horizontal; long barbel present on lower jaw, stem and terminal bulb of barbel with many filaments; two rows of distinctly separated photophores along body; dorsal fin origin above anal fin origin; body uniformly blackish.

Remarks. Identification followed Imai (1941), Fujii (1984f) and Aizawa (2002a). This species has been recorded from the Japanese Archipelago and southern Kuril Islands in depths of 200-600 m (Imai, 1941; Fujii, 1984f; Savinykh et al., 2004; Aizawa and Doiuchi, 2013b).

Fig. 36. *Leptostomias multifilis*, HUMZ 211049, 206 mm SL.

29. *Melanostomias melanops* Brauer, 1902
(Japanese name: Shirohige-hoshieso)
(Fig. 37)

Material examined. 12 specimens, 177-225 mm SL: HUMZ 210832-210833, HUMZ 210856, HUMZ 210859, HUMZ 211650, OSMT1008; HUMZ 210907, HUMZ 210922-210923, HUMZ 211056 (4), OSMT1009.

Diagnosis. D 12-14; A 14-16; P_1 5; P_2 7; BR 10-13; IP 8-10; PV 26-29; VAV 11-14; AC 9-14; IC 58-61; OV 26-29; VAL 12-15; OA 40-43; body elongate, compressed; mouth large, nearly horizontal; barbel present on lower jaw, with one terminal bulb at tip of stem; terminal bulb of lower jaw barbel not greatly expanded, with single filament at tip; two rows of distinctly separated photophores along body; dorsal fin origin above anal fin origin; body uniformly blackish; base of lower jaw barbel stem black, remainder white.

Remarks. Identification followed Parin and Pokhil'skaya (1978), Fujii (1982a) and Machida (1984e). *Melanostomias melanops* is known worldwide in tropical to temperate waters, except in the eastern Pacific, in depths of 300-1,024 m (Fujii, 1984f; Machida, 1984e).

30. *Melanostomias paucilaternatus* Parin and Pokhil'skaya, 1978
(Japanese name: Kanten-hoshieso)
(Fig. 38)

Material examined. Two specimens, 170-234 mm SL: HUMZ 210920, HUMZ 215446, OSMT1009.

Diagnosis. D 13-14; A 15-17; P_1 4-6; P_2 7; BR 12-13; IP 8-10; PV 27-29; VAV 11-13; AC 11-13; IC 59-63; OV 26-28; VAL 10-12; OA 36-40; body elongate, compressed; mouth large, nearly horizontal; barbel present on lower jaw, its terminal bulb with two ovoid luminous bodies; two rows of distinctly separated photophores along body; dorsal fin origin above anal fin origin; body uniformly blackish.

Remarks. Identification followed Parin and Pokhil'skaya (1978), Fujii (1984f) and Harold (1999d). *Melanostomias paucilaternatus* is known from the eastern Atlantic and Indo-West Pacific, including southern Africa, the Japanese Archipelago and Australia, in depths of 150-500 m (Gibbs, 1986b; Gibbs and Barnett, 1990; Paxton et al., 2006a; Aizawa and Doiuchi, 2013b).

Fig. 37. *Melanostomias melanops*, HUMZ 210922, 194 mm SL.

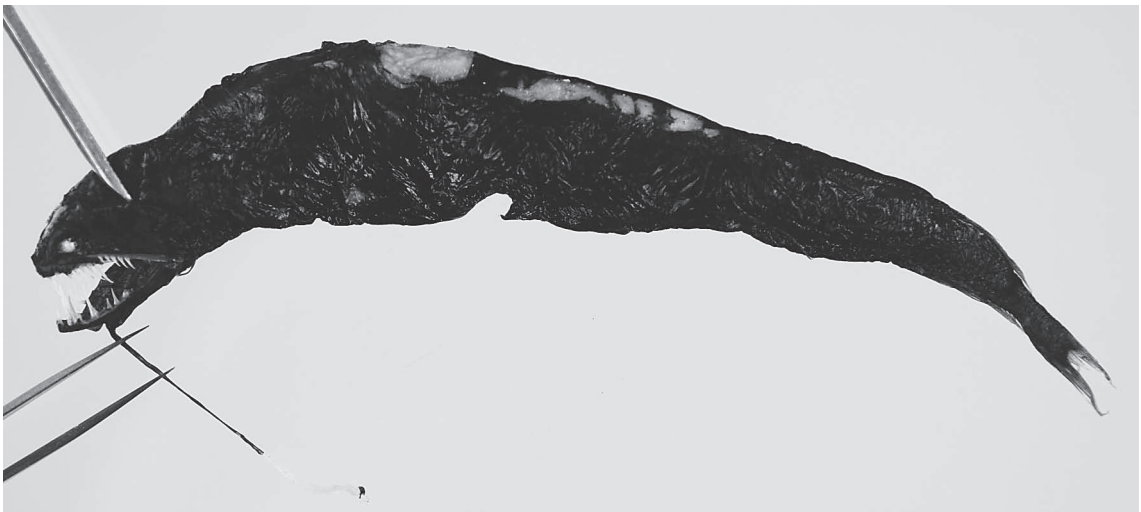

Fig. 38. *Melanostomias paucilaternatus*, HUMZ 215446, 170 mm SL.

31. *Melanostomias pauciradius* Matsubara, 1938
(Japanese name: Kanten-tokagegisu)
(Fig. 39)

Material examined. Seven specimens, 156-209 mm SL: HUMZ 210971-210973, HUMZ 215443 (3), HUMZ 215741, OSMT1009.

Diagnosis. D 13-15; A 15-18; P_1 5-6; P_2 7; BR 10-12; IP 8-10; PV 26-30; VAV 10-12; AC 11-13; IC 58-61; OV 23-28; VAL 11-13; OA 36-41; body elongate, compressed; mouth large, nearly horizontal; barbel present on lower jaw, ovoid luminous bodies of terminal bulb enclosed by melanistic region; two rows of distinctly separated photophores along body; dorsal fin origin above anal fin origin; body uniformly blackish.

Remarks. Identification followed Matsubara (1938), Fujii (1984f) and Harold (1999d). *Melanostomias pauciradius* is known from the Atlantic and western Pacific, including the Japanese and Hawaiian Archipelagos, and Australia, in depths of 100-300 m (Gibbs and Barnett, 1990; Mundy, 2005; Paxton et al., 2006a; Aizawa and Doiuchi, 2013b).

32. *Melanostomias pollicifer* Parin and Pokhil'skaya, 1978
(Japanese name: Namida-hoshieso)
(Fig. 40)

Material examined. Two specimens, 195-212 mm SL: HUMZ 215444, HUMZ 215740, OSMT1009.

Diagnosis. D 14; A 14-16; P_1 4-5; P_2 6; BR 12; IP 9-10; PV 26-32; VAV 8-9; AC 11-13; IC 55-63; OV 28-30; VAL 8-9; OA 36-39; body elongate, compressed; mouth large, nearly horizontal; barbel present on lower jaw, its terminal bulb with slender luminous organ; two rows of distinctly separated photophores along body; dorsal fin origin

Fig. 39. *Melanostomias pauciradius*, HUMZ 215741, 185 mm SL.

Fig. 40. *Melanostomias pollicifer*, HUMZ 215740, 195 mm SL.

above anal fin origin; body uniformly blackish.

Remarks. Identification followed Parin and Pokhil'skaya (1978), Fujii (1982a) and Harold (1999d). This species occurs in tropical regions in the Indo-West Pacific in depths of 350-700 m (Fujii, 1982a, 1984f; Aizawa and Doiuchi, 2013b).

33. *Melanostomias tentaculatus* (Regan and Trewavas, 1930)
(Japanese name: Kurohige-hoshieso)
(Fig. 41)

Material examined. Two specimens, 204-205 mm SL: HUMZ 210861, OSMT1008; HUMZ 215449, OSMT1009.

Diagnosis. D 12-14; A 17-18; P_1 4; P_2 7-8; BR 9-13; IP 10; PV 29; VAV 10; AC 11-13; IC 60-62; OV 27; VAL 10-11; OA 37-38; body elongate, compressed; mouth large, nearly horizontal; barbel present on lower jaw, its terminal bulb with a single finger-like filament; two rows of distinctly separated photophores along body; dorsal fin origin above anal fin origin; body uniformly blackish.

Remarks. Identification followed Parin and Pokhil'skaya (1978), Gibbs (1984b) and Harold (2003b). This species is found in the Atlantic and Indo-West Pacific, including southern Japan, Australia and the Gulf of Mexico, in depths of 30-950 m (Morrow, 1973; Fujii, 1984f; Gibbs, 1984b; Paxton et al., 1989; McEachran and Fechhelm, 1998).

34. *Photonectes albipennis* (Döderlein, 1882)
(Hoteieso)
(Fig. 42)

Material examined. One specimen, 150 mm SL: HUMZ 210800, OSMT1009.

Diagnosis. D 11; A 14; P_2 7; BR 5; IP 8; PV 29; VAV 14; AC 11; IC 62; OV 23; VAL 14; OA 37; body elongate, compressed; mouth large; lower jaw strongly curved upwards; barbel present on lower jaw, its terminal bulb with single black terminal filament; pectoral fin absent; two rows of distinctly separated photophores along body; dorsal fin origin above anal fin origin; body uniformly blackish.

Remarks. Identification followed Fujii (1982a), Machida (1984e) and Klepadlo (2011). This species is known from the Indo-West Pacific, including the South China Sea, Japanese and Hawaiian Archipelagos, Australia and New Caledonia, in depths of 120-1,100 m (Fujii, 1984f; Machida, 1984e; Randall and Lim, 2000a; Mundy, 2005; Paxton et al., 2006a; Fricke et al., 2011; Aizawa and Doiuchi, 2013b).

35. *Idiacanthus antrostomus* Gilbert, 1890
(Japanese name: Mitsumatayariuo)
(Fig. 43)

Material examined. One specimen, 418 mm SL: HUMZ 210802, OSMT1009.

Diagnosis. D 69; A 32; P_2 6; BR 16; IP 9; PV 24; VAV 22; AC 10; IC 65; OV 24; VAL 33; OA 57; body extremely elongate, slightly compressed; mouth large; barbel present on lower jaw, with one terminal bulb at tip of stem; pectoral fin absent; two rows of photophores along body; bases of dorsal and anal fins extremely long; anal fin origin well behind dorsal fin origin; length between pelvic and anal fin origins longer than anal fin base length; body and stem of lower jaw barbel blackish.

Fig. 41. *Melanostomias tentaculatus*, HUMZ 210861, 205 mm SL.

Fig. 42. *Photonectes albipennis*, HUMZ 210800, 150 mm SL.

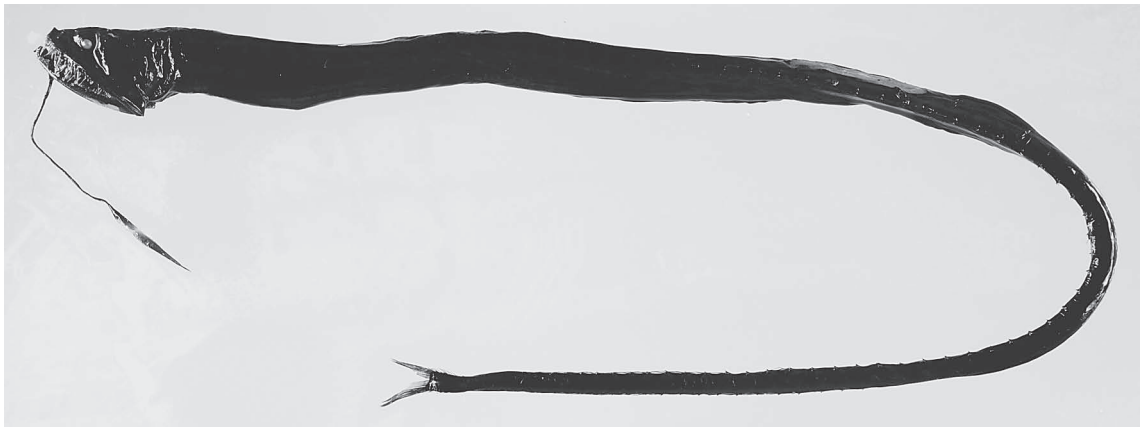

Fig. 43. *Idiacanthus antrostomus*, HUMZ 210802, 418 mm SL.

Remarks. Identification followed Gibbs (1964b), Yamamoto (1983) and Harold (1999e). *Idiacanthus antrostomus* occurs in the Pacific Ocean, including the Japanese Archipelago, and Chilean and Colombian waters, in depths of 400–1,500 m (Eschmeyer et al., 1983; Yamamoto, 1983; Fujii, 1984g; Pequeño, 1989; Castellanos-Galindo et al., 2006; Aizawa and Doiuchi, 2013d).

36. *Idiacanthus fasciola* Peters, 1877
(Japanese name: Nanyô-mitsumatayariuo)
(Fig. 44)

Material examined. 13 specimens, 213–279 mm SL: HUMZ 210831,
HUMZ 210849, HUMZ 211667, HUMZ 211672–211679, OSMT1008; HUMZ 211072 (2), OSMT1007.

Diagnosis. D 62–70; A 44–48; P_2 6; BR 11–16; IP 9–12; PV 23–27; VAV 15–16; AC 23–25; IC 75–76; OV 20–25; VAL 34–37; OA 57–61; body extremely elongate, slightly compressed; mouth large; barbel present on lower jaw, with one terminal bulb at tip of stem; pectoral fin absent; two rows of photophores present on body; bases of dorsal and anal fins extremely long; anal fin origin well behind dorsal fin origin; length between pelvic and anal fin origins shorter than anal fin base length; body and stem of lower jaw barbel blackish.

Remarks. Identification followed Gibbs (1964b), Fujii (1982b) and Nakamura (1986). This species occurs worldwide in tropical to temperate waters in depths of 250–2,000 m (Gibbs, 1964b; Krueger, 1990; McEachran and Fechhelm, 1998).

37. *Malacosteus niger* Ayres, 1848
(Japanese name: Ôkuchi-hoshieso)
(Fig. 45)

Material examined. 11 specimens, 97.7–151 mm SL: HUMZ 210828–210830, HUMZ 210852–210854, HUMZ 211686, OSMT1008; HUMZ 210914, HUMZ 210975, HUMZ 211058 (2), OSMT1009.

Diagnosis. D 14–20; A 14–20; P_1 3; P_2 6; body elongate, compressed; mouth extremely large; lower jaw symphysis and hyoid connected only by single muscular cord; body covered with many small photophores not serially arranged; dorsal fin origin above anal fin origin; dorsal and anal fins covered with skin; body uniformly blackish.

Remarks. Identification followed Morrow (1964b), Machida (1984f) and Kenaley (2007). *Malacosteus niger* occurs worldwide in tropical to temperate waters in depths of 500–3,886 m (Machida, 1984f; Kenaley, 2007).

38. *Photostomias liemi* Kenaley, 2009
(Japanese name: Hôkiboshieso)
(Fig. 46)

Material examined. Four specimens, 84.2–155 mm SL: HUMZ 210835, HUMZ 211684, OSMT1008; HUMZ 211053, OSMT1009; HUMZ 211136, OSMT1007.

Fig. 44. *Idiacanthus fasciola*, HUMZ 211673, 276 mm SL.

Diagnosis. D 18–25; A 25–32; P_2 6; BR 10; IP 8; PV 14–18; VAV 18–20; IC 54–58; OV 13–15; VAL 20–23; OA 34–37; body elongate, compressed; mouth extremely large; lower jaw symphysis and hyoid connected only by single muscular cord; POSTORB moderately large, its length 14.8–16.0% of upper jaw length; pectoral fin absent; two rows of distinctly separated photophores along body; pelvic fin greatly elongated; dorsal fin origin above anal fin origin; body uniformly blackish.

Remarks. Identification followed Kenaley (2009) and Aizawa and Doiuchi (2013c). This species is known from the Indian Ocean, and the western and central Pacific, including Indonesia, Indo-Malaysia, the Philippines, and the Japanese and Hawaiian Archipelagos (Kenaley, 2009; Aizawa and Doiuchi, 2013c).

Order Aulopiformes
Family Notosudidae

39. *Ahliesaurus brevis* Bertelsen, Krefft and Marshall, 1976
(Japanese name: Fukami-fude-eso)
(Fig. 47)

Material examined. One specimen, 134 mm SL: HUMZ 210809, OSMT1009.

Diagnosis. D 10; A 18; P_1 10; P_2 9; GR 16; V 46; body elongate, subcylindrical in cross section; mouth large, maxilla extending beyond posterior margin of eye; eye large; pelvic fin origin almost below dorsal fin origin; anus below base of dorsal fin; body dark brown.

Remarks. Identification followed Bertelsen et al. (1976), Fujii (1984h) and Paxton and Niem (1999). This species occurs in the Indo-Pacific Region, from eastern Africa to the Hawaiian Islands and Baja California, from the surface to 995 m depth (Bertelsen et al., 1976; Fujii, 1984h).

Family Evermannellidae

40. *Coccorella atlantica* (Parr, 1928)
(Japanese name: Yarieso)
(Fig. 48)

Material examined. Seven specimens, 50.2–147 mm SL: HUMZ 210814, HUMZ 211048, HUMZ 211054, HUMZ 211086 (2), OSMT1007; HUMZ 211117, HUMZ

Fig. 45. *Malacosteus niger*, HUMZ 211686, 135 mm SL.

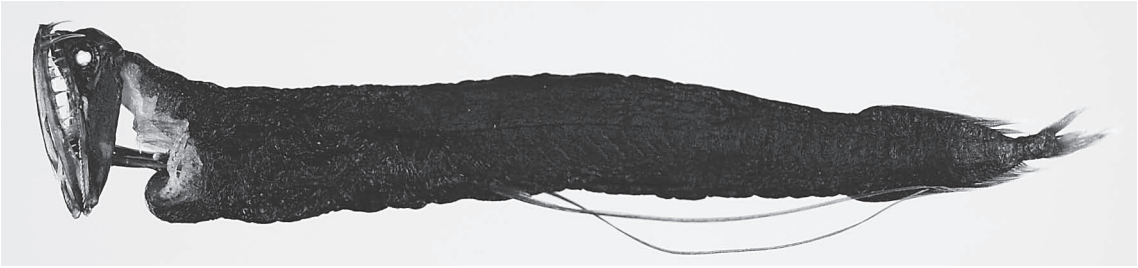

Fig. 46. *Photostomias liemi*, HUMZ 210835, 115 mm SL.

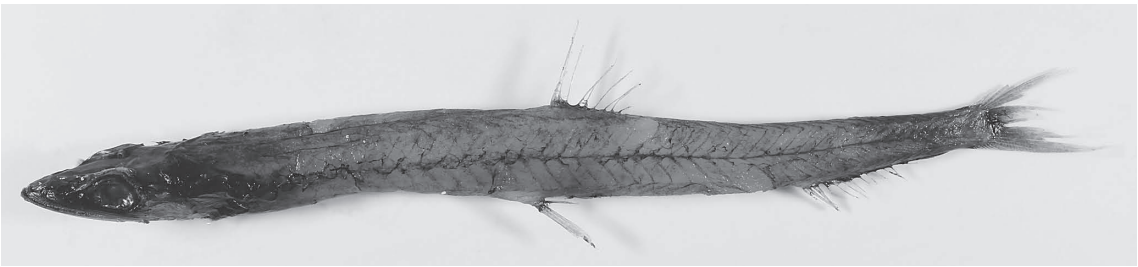

Fig. 47. *Ahliesaurus brevis*, HUMZ 210809, 134 mm SL.

Fig. 48. *Coccorella atlantica*, HUMZ 211054, 135 mm SL.

215455, OSMT1007.

Diagnosis. D 10–14; A 26–30; P_1 9–10; P_2 9; V 47–50; body moderately elongate, strongly compressed; snout high, angular and vertical anteriorly; mouth extremely large, with one row of teeth on lower jaw; eye large, semi-tubular, facing dorsolaterally; frontal with three pairs of sensory canal pores; adipose fin present; body uniformly blackish.

Remarks. Identification followed Johnson (1982), Okamura (1984d) and Kimura and Suzuki (1990). *Coccorella atlantica* occurs worldwide in tropical to temperate waters in depths of 50–1,000 m (Fujii, 1984j; Mundy, 2005).

Family Alepisauridae

41. *Omosudis lowii* Günther, 1887
(Japanese name: Kibahadaka)
(Fig. 49)

Material examined. One specimen, 141 mm SL: HUMZ 211114, OSMT1007.

Diagnosis. D 9; A 14; P_1 12; P_2 7; V 39; body moderately elongate, greatly compressed; mouth extremely large; teeth on premaxilla small; lower jaw and palatine with several canine teeth; eye covered with adipose eyelid opening anterodorsally; dorsal fin base short; adipose fin present; body with black stripe along mid dorsum and black blotch anterior to caudal peduncle.

Remarks. Identification followed Ege (1958), Rofen (1966) and Nakabo and Kai (2013a). This species occurs worldwide in tropical to temperate waters in depths of 100–1,800 m (Maul, 1986; Post, 1990a).

Order Myctophiformes
Family Neoscopelidae

42. *Neoscopelus macrolepidotus* Johnson, 1863
(Japanese name: Sotoori-iwashi)
(Fig. 50)

Material examined. One specimen, 91.4 mm SL: HUMZ 211100, OSMT1007.

Diagnosis. D 12; A 13; P_1 17; P_2 8; GR 12; Is 7; AV 9; Am 18; AVO 3; Ca 8; Pm 6; Vc 23; PO 10; PVO 3; Bp 3; LO 15; body relatively elongate, compressed; mouth large, oblique; luminous organs arranged in single series along periphery of tongue, and in midventral and several bilateral series on trunk; LO not extending beyond anal fin origin; pectoral fin large, reaching posterior end of dorsal fin; adipose fin present.

Remarks. Identification followed Matsubara (1943), Arai (1969) and Nafpaktitis (1977). *Neoscopelus macrolepidotus* occurs worldwide in tropical to temperate waters in depths of 300–1,180 m (Okamura, 1984b; Shcherbachev, 1987; Hulley, 1990b).

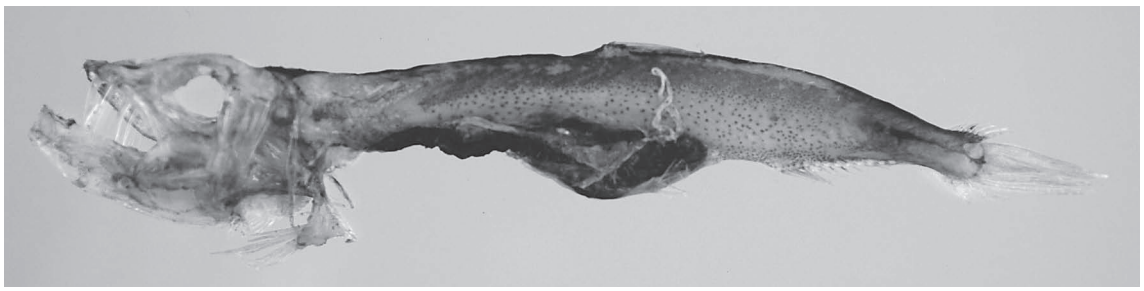

Fig. 49. *Omosudis lowii*, HUMZ 211114, 141 mm SL.

Fig. 50. *Neoscopelus macrolepidotus*, HUMZ 211100, 91.4 mm SL.

Family Myctophidae

43. *Benthosema fibulatum* (Gilbert and Cramer, 1897)
(Japanese name: Hokuto-hadaka)
(Fig. 51)

Material examined. 12 specimens, 39.4–71.3 mm SL: HUMZ 211149, HUMZ 215485 (10), OSMT1007; HUMZ 215478, OSMT1009.

Other material. 219 specimens: HUMZ 215479 (32), HUMZ 215480 (41), HUMZ 215481 (31), HUMZ 215482 (47), HUMZ 215483 (25), HUMZ 215484 (38), HUMZ 215524, HUMZ 215549 (4), OSMT1007.

Diagnosis. D 12–13; A 16–18; P_1 14–16; P_2 8; GR 24–27; PO 5; PVO 2; VO 4; SAO 3; AOa 6; AOp 4; AO 10; Pol 1; Prc 2; body moderately elongate, compressed; mouth large, nearly horizontal; eye large; Op_2 on longitudinal line through lower margin of eye; PLO and VLO near lateral line; PVO series almost horizontal; VO_2 highly elevated, displaced forward to nearly over VO_1; Prc_2 close to lateral line; male with SUGL, female with INGL.

Remarks. Identification followed Nafpaktitis and Nafpaktitis (1969), Wisner (1974) and Wang and Chen (2001). This mesopelagic species is known from the Indo-Pacific region, including southern Africa, the Arabian and South China Seas, Australia, and the Japanese and Hawaiian Archipelagos (Wisner, 1974; Fujii, 1984i; Hulley, 1986; Paxton and Hulley, 2000; Manilo and Bogorodsky, 2003; Mundy, 2005; Paxton et al., 2006b).

44. *Hygophum proximum* Becker, 1965
(Japanese name: Tsumari-dongurihadaka)
(Fig. 52)

Material examined. 15 specimens, 31.0–51.3 mm SL: HUMZ 215501, OSMT1008; HUMZ 215502 (8), HUMZ 215503 (6), OSMT1009.

Diagnosis. D 12–14; A 18–20; P_1 13–15; P_2 8; PO 5; PVO 2; VO 4; SAO 3; AOa 6–7; AOp 8; AO 14–15; Pol 2; Prc 2; body moderately elongate, compressed; mouth large, nearly horizontal; eye large; pectoral fin origin below level of center of eye; line through SAO_{1-2} passing well below PVO_1; AOa series straight; adipose fin present; male with SUGL, female with INGL.

Remarks. Identification followed Nafpaktitis and Nafpaktitis (1969), Wisner (1974) and Wang and Chen (2001). *Hygophum proximum* has been recorded from the Indo-Pacific region, including southern Africa, Australia, the South China Sea, the Japanese and Hawaiian Archipelagos, and western South America, in mesopelagic waters (Fujii, 1984i; Hulley, 1986; Pequeño, 1989; Paxton and Hulley, 2000; Mundy, 2005; Paxton et al., 2006b).

45. *Myctophum asperum* Richardson, 1845
(Japanese name: Ara-hadaka)
(Fig. 53)

Material examined. 16 specimens, 50.0–72.7 mm SL: HUMZ 210948, HUMZ 210961 (15), OSMT1009.

Other material. 18 specimens: HUMZ 210949, HUMZ 211006, HUMZ 211011 (16), OSMT1009.

Diagnosis. D 12–14; A 17–18; P_1 16–17; P_2 8; GR 16–17; PO 5; PVO 2; VO 4; SAO 3; AOa 6–8; AOp 5–7; AO 12–14; Pol 1; Prc 2; body moderately elongate, compressed; body covered with strong ctenoid scales; mouth large, nearly horizontal; eye large; SAO series angled; SAO_1 behind VO_3; Prc_2 well below lateral line; male with SUGL, female with INGL; adipose fin present.

Remarks. Identification followed Nafpaktitis and Nafpaktitis (1969), Kawaguchi and Aioi (1972) and Wisner (1974). *Myctophum asperum* occurs worldwide in tropical to temperate waters, from the surface to 990 m depth (Okamura, 1984c; Hulley, 1990a).

Fig. 51. *Benthosema fibulatum*, HUMZ 2215478, 52.2 mm SL.

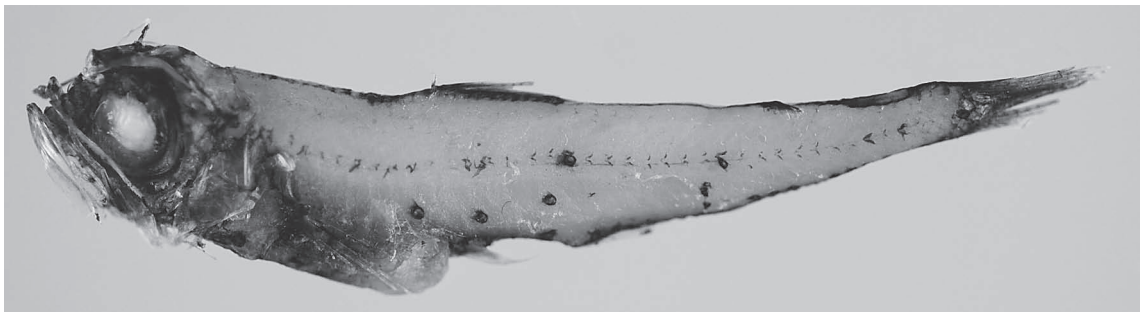

Fig. 52. *Hygophum proximum*, HUMZ 215501, 37.6 mm SL.

Fig. 53. *Myctophum asperum*, HUMZ 210948, 60.5 mm SL.

46. *Myctophum nitidulum* Garman, 1899
(Japanese name: Susuki-hadaka)
(Fig. 54)

Material examined. Eight specimens, 48.6-68.2 mm SL: HUMZ 215506-215508 (3, 1, 1), HUMZ 215552 (3), OSMT1009.

Diagnosis. D 12-14; A 19-21; P_1 12-13; P_2 8; GR 18-20; PO 5; PVO 2; VO 4; SAO 3; AOa 8-9; AOp 6-7; AO 15; Pol 1; Prc 2; body moderately elongate, compressed; mouth large, nearly horizontal; eye large; posterodorsal margin of opercle markedly angulated; SAO series straight; SAO behind VO_3; adipose fin present; Pol behind vertical from origin of base of adipose fin; male with SUGL, female with INGL.

Remarks. Identification followed Nafpaktitis and Nafpaktitis (1969), Kawaguchi and Aioi (1972) and Wisner (1974). This species is known from warm waters in the Atlantic and Indo-Pacific, from the surface to 1,000 m depth (Fujii, 1984i; Hulley, 1986; Yang et al., 1996).

47. *Myctophum orientale* (Gilbert, 1913)
(Japanese name: Usu-hadaka)
(Fig. 55)

Material examined. 18 specimens, 46.5-83.6 mm SL: HUMZ 210950-210951, HUMZ 211003, HUMZ 215510 (2), OSMT1009; HUMZ 211095 (6), HUMZ 211150 (6), OSMT1007; HUMZ 211648, OSMT1008.

Diagnosis. D 11-13; A 15-18; P_1 13-17; P_2 8; GR 18-20; PO 5; PVO 2; VO 4; SAO 3; AOa 7-8; AOp 3-4; AO 10-11; Pol 1; Prc 2; body moderately elongate, compressed; body covered with strong ctenoid scales; mouth large, nearly horizontal; eye large; SAO series in a straight

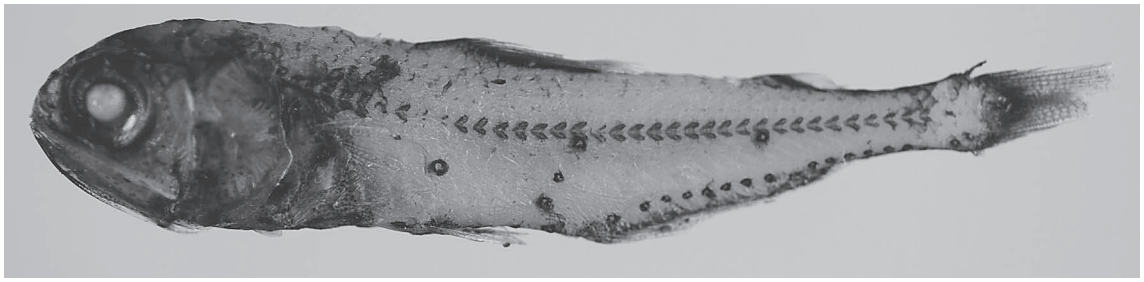

Fig. 54. *Myctophum nitidulum*, HUMZ 215508, 65.9 mm SL.

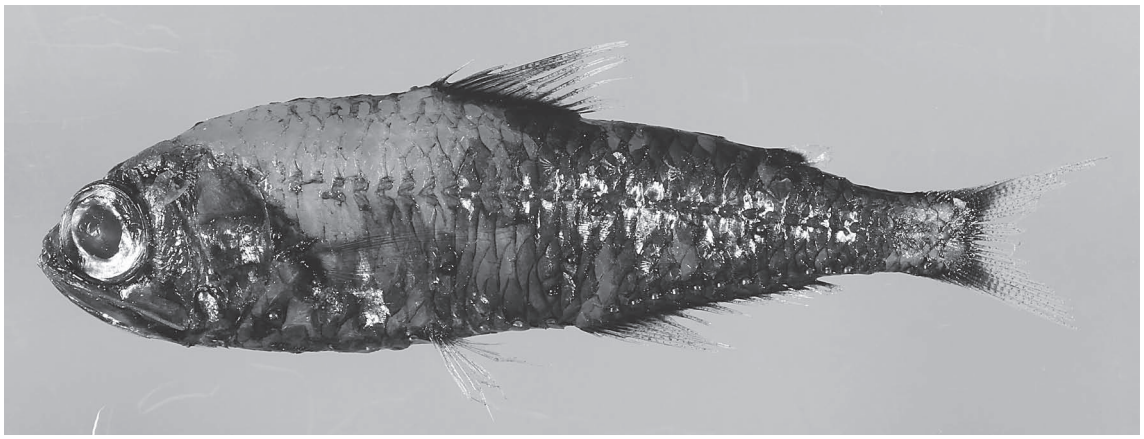

Fig. 55. *Myctophum orientale*, HUMZ 211003, 80.0 mm SL.

line; SAO_1 behind VO_3; Prc_2 well below lateral line; male with SUGL, female with INGL; adipose fin present.

Remarks. Identification followed Kawaguchi and Aioi (1972), Paxton (1979) and Fujii (1984i). This species occurs in the western Pacific, including the Japanese Archipelago and Australia, from the surface to 130 m depth (Kawaguchi and Aioi, 1972; Fujii, 1984i; Paxton et al., 2006b).

48. *Myctophum selenops* Tåning, 1928
(Japanese name: Hishi-hadaka)
(Fig. 56)

Material examined. Seven specimens, 53.2–62.0 mm SL: HUMZ 210957–210958, HUMZ 210962, HUMZ 211004–215505, HUMZ 2155509, OSMT1009; HUMZ 211098, OSMT1007.

Diagnosis. D 12–14; A 16–17; P_1 14–16; P_2 8; GR 23–26; PO 5; PVO 2; VO 4; SAO 3; AOa 7–8; AOp 3; AO 10–11; Pol 1; Prc 2; body robust, compressed; body depth greater than 29% SL; mouth large, nearly horizontal; eye large; VLO closer to pelvic fin base than to lateral line; SAO series linear; SAO_1 behind VO_3; Prc_2 well below lateral line; SUGL present; adipose fin present.

Remarks. Identification followed Kawaguchi and Aioi (1972), Nafpaktitis et al. (1977) and Fujii (1984i). This species occurs worldwide in tropical to temperate waters in depths of 40–500 m (Scott and Scott, 1988; Hulley, 1990a).

49. *Myctophum spinosum* (Steindachner, 1867)
(Japanese name: Ibara-hadaka)
(Fig. 57)

Material examined. One specimen, 98.1 mm SL: HUMZ 211680, OSMT1008.

Diagnosis. D 14; A 20; P_1 14; P_2 8; GR 20; PO 5; PVO 2; VO 4; SAO 3; AOa 7; AOp 7; AO 14; Pol 1; Prc 2; body moderately elongate, compressed; body covered with strong ctenoid scales; mouth large, nearly horizontal; eye large; uppermost part of opercle serrated; SAO series slightly angled; SAO_1 anterior to VO_4; Prc_2 well below lateral line; INGL present; adipose fin present.

Remarks. Identification followed Nafpaktitis and Nafpaktitis (1969), Kawaguchi and Aioi (1972) and Wisner (1974). *Myctophum spinosum* has been recorded from the Indo-Pacific region, including southern Africa, the South China Sea, the Japanese and Hawaiian Archipelagos, Australia and Chile, in mesopelagic waters (Fujii, 1984i; Hulley, 1986; Pequeño, 1989; Paxton and Hulley, 2000; Mundy, 2005; Paxton et al., 2006b).

50. *Symbolophorus californiensis* (Eigenmann and Eigenmann, 1889)
(Japanese name: Naga-hadaka)
(Fig. 58)

Fig. 56. *Myctophum selenops*, HUMZ 210957, 53.7 mm SL.

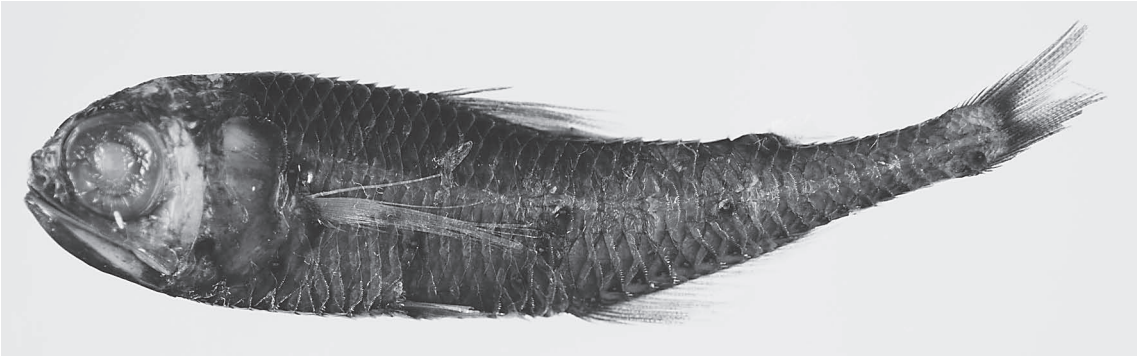

Fig. 57. *Myctophum spinosum*, HUMZ 211680, 98.1 mm SL.

Fig. 58. *Symbolophorus californiensis*, HUMZ 210963, 106 mm SL.

Material examined. One specimen, 106 mm SL: HUMZ 210963, OSMT1008.

Diagnosis. D 14; A 18; P_1 15; P_2 8; GR 24; PO 5; PVO 2; VO 4; SAO 3; AOa 7; AOp; 10; AO 17; Pol 1; Prc 2; body elongate, compressed; mouth large, nearly horizontal; eye large; SAO markedly angulated; SAO_1 anterior to VO_3; anterior four AOp photophores above anal fin base; adipose fin present; Pol well anterior to end of base of adipose fin; INGL present.

Remarks. Identification followed Wisner (1974), Fujii (1984i) and Gago and Ricord (2005). This species is known from the North Pacific, including the Japanese and Hawaiian Archipelagos, and islands off western Canada (Fujii, 1984i; McAllister, 1990; Paxton et al., 2006b).

51. *Symbolophorus evermanni* (Gilbert, 1905)
(Japanese name: Magari-hadaka)
(Fig. 59)

Materia examined. 10 specimens, 40.9-80.1 mm SL: HUMZ 210874, OSMT1008; HUMZ 210946, HUMZ 215490-215491 (3, 2), HUMZ 215494 (3), OSMT1009.

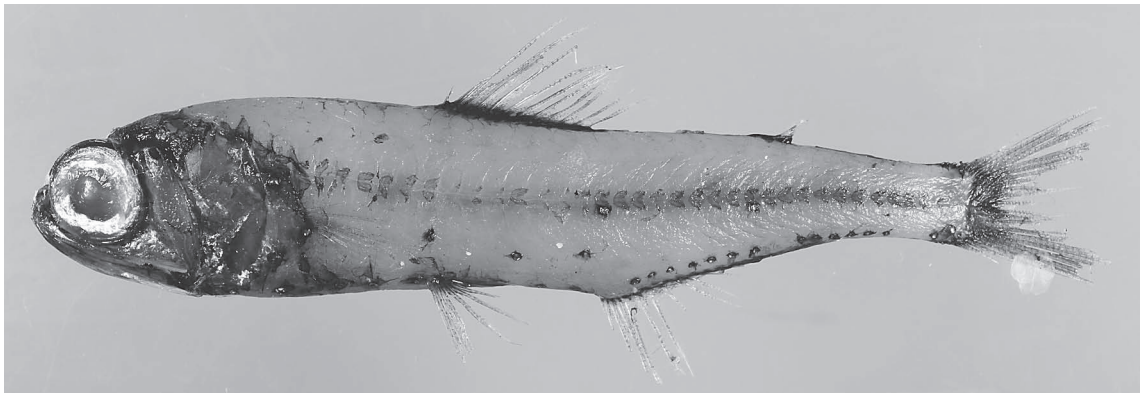

Fig. 59. *Symbolophorus evermanni*, HUMZ 210874, 76.6 mm SL.

Other material. 181 specimens: HUMZ 210947, HUMZ 215488 (11), HUMZ 215493 (9), OSMT1009; HUMZ 215487 (20), HUMZ 215489 (6), OSMT1008; HUMZ 215492 (6), HUMZ 215495–215500 (20, 20, 26, 18, 17, 27), OSMT1007.

Diagnosis. D 13–14; A 19–20; P_1 14–15; P_2 8; GR 20–22; PO 5; PVO 2; VO 4; SAO 3; AOa 8; AOp 5–6; AO 13–14; Pol 1; Prc 2; body elongate, compressed; mouth large, nearly horizontal; eye large; SAO markedly angulated; SAO_1 anterior to VO_3; anteriormost AOp photophore above anal fin base; adipose fin present; Pol well anterior to end of base of adipose fin; male with SUGL, female with INGL.

Remarks. Identification followed Wisner (1974), Fujii (1982c) and Gago and Ricord (2005). This species occurs in the Indo-Pacific region, including southern Africa, the South China Sea, the Japanese and Hawaiian Archipelagos, Australia, Columbia and Chile, in depths of 380–685 m (Fujii, 1982c; Hulley, 1986; Pequeño, 1989; Paxton and Hulley, 2000; Mundy, 2005; Castellanos-Galindo et al., 2006; Paxton et al., 2006b).

52. *Bolinichthys longipes* (Brauer, 1906)
(Japanese name: Hoso-mikazukihadaka)
(Fig. 60)

Material examined. 10 specimens, 32.1–56.9 mm SL: HUMZ 215463 (9), HUMZ 215744, OSMT1007.

Other material. 176 specimens: HUMZ 215457 (14), HUMZ 215461 (15), HUMZ 215465–215466 (14, 13), HUMZ 215486 (2), HUMZ 215525 (20), HUMZ 215548 (4), OSMT1007; HUMZ 215458–215460 (17, 4, 13), HUMZ 215462 (8), HUMZ 215464 (9), HUMZ 215468 (13), OSMT1009; HUMZ 215467 (5), HUMZ 215469 (25), OSMT1008.

Diagnosis. D 12–13; A 12–15; P_1 11–13; P_2 8; GR 16–19; PO 5; PVO 2; VO 5; SAO 3; AOa 5–6; AOp 3–5; AO 9–10; Pol 2; Prc 3; body elongate; mouth large, nearly horizontal; eye large, posterior half of iris with crescent whitish tissue; pectoral fin long, extending beyond anal fin origin; VLO on or slightly below lateral line; last AOp situated anterior to anterior end of INGL; SUGL and INGL present; adipose fin present.

Remarks. Identification followed Wisner (1974), Wang and Chen (2001) and Hulley and Duhamel (2009). This species occurs in the Indo-Pacific region, including southern Africa, the South China Sea, the Japanese and Hawaiian Archipelagos, Australia and Columbia, in depths of 50–725 m (Fujii, 1984i; Hulley, 1986; Paxton and Hulley, 2000; Mundy, 2005; Castellanos-Galindo et al., 2006; Paxton et al., 2006b; Hulley and Duhamel, 2009).

53. *Ceratoscopelus townsendi* (Eigenmann and Eigenmann, 1889)
(Japanese name: Gokô-hadaka)
(Fig. 61)

Material examined. Five specimens, 44.1–83.6 mm SL: HUMZ 210820, HUMZ 210871, HUMZ 210873, OSMT1008; HUMZ 210952, HUMZ 210964, OSMT1009.

Other material. 1,028 specimens: HUMZ 215530 (18), HUMZ 215532 (142), OSMT1008; HUMZ 215531 (46), HUMZ 215533–215537 (20, 31, 26, 1, 48); HUMZ 215539 (8), OSMT1009; HUMZ 215538 (53), HUMZ 215540–215547 (1, 103, 100, 129, 129, 59, 113, 1), OSMT1007.

Diagnosis. D 12–15; A 13–16; P_1 13–16; P_2 8; GR 14–16; PO 5; PVO 2; VO 5; SAO 3; AOa 6–7; AOp 4–6; AO 11–13; Pol 1; Prc 4; body elongate, compressed; mouth large, nearly horizontal; eye large; PVO_2 below upper end of pectoral fin base; pectoral fin long, extending beyond anal fin origin; PO_5 slightly higher than other PO photophores; several luminous scales on mid ventral line between pelvic fin base and anus; last AOa slightly higher than other AOa photophores; SUGL and INGL present; adipose fin present.

Remarks. Identification followed Paxton (1979), Badcock and Araújo (1988) and Nakabo and Kai (2013b). *Ceratoscopelus townsendi* occurs worldwide in tropical to

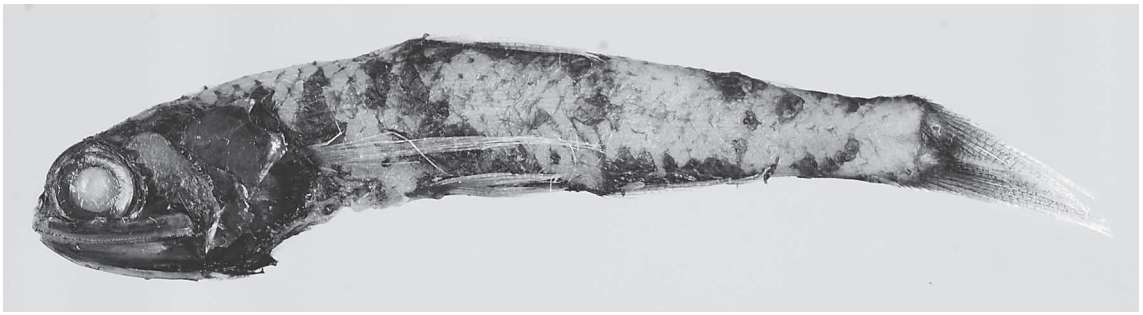

Fig. 60. *Bolinichthys longipes*, HUMZ 215744, 52.8 mm SL.

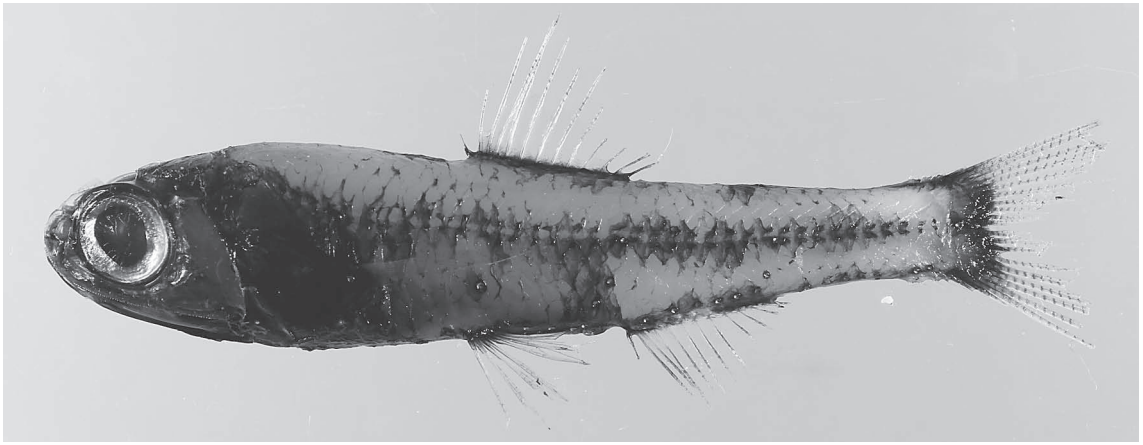

Fig. 61. *Ceratoscopelus townsendi*, HUMZ 210873, 59.0 mm SL.

temperate waters in depths of 200–1,500 m (Nakabo and Kai, 2013b).

54. *Diaphus bertelseni* Nafpaktitis, 1966
(Japanese name: Tokkuri-hadaka)
(Fig. 62)

Material examined. Four specimens, 40.5–72.4 mm SL: HUMZ 215594, OSMT1008; HUMZ 215595, OSMT1009; HUMZ 215596-215597, OSMT1007.

Diagnosis. D 14-15; A 14-15; P_1 17-18; P_2 8; GR 17-18; Dn 1; Vn 1; PO 5; PVO 2; VO 5; SAO 3; AOa 5-6; AOp 4-5; AO 10; Pol 1; Prc 4; body elongate, compressed; mouth large, nearly horizontal; eye large; Dn smaller than nasal rosette; Vn anteroventral to eye; body photophores large; PLO, VLO, SAO_3, Pol and Prc_4 clearly below lateral line; PO_4 higher than other PO photophores; adipose fin present.

Remarks. Identification followed Nafpaktitis (1966), Nafpaktitis et al. (1977) and Fujii (1984i). *Diaphus bertelseni* occurs in tropical to temperate seas in the Atlantic and Pacific, including the Japanese and Hawaiian Archipelagos, Australia and the Gulf of Mexico, in depths of 60–300 m (Fujii, 1984i; Hulley, 1990a; McEachran and Fechhelm, 1998; Mundy, 2005; Paxton et al., 2006b).

55. *Diaphus brachycephalus* Tåning, 1928
(Japanese name: Ebisu-hadaka)
(Fig. 63)

Material examined. Nine specimens, 43.5–49.9 mm SL: HUMZ 211691, OSMT1006; HUMZ 215607-215609, HUMZ 215631 (3), OSMT1009; HUMZ 215610, HUMZ 215630, OSMT1007.

Diagnosis. D 12-13; A 12-13; P_1 11-13; P_2 8; GR 18-19; Dn 1; Vn 1; So 1; PO 5; PVO 2; VO 5; SAO 3; AOa 5; AOp 4; AO 9; Pol 1; Prc 4; body elongate, compressed; mouth large, nearly horizontal; eye large; pupil vertically oval, with crescent-shaped space ventrally; Vn horizontally elongate, its size more than twice that of So; So behind posterior margin of pupil; body photophores large; PLO, VLO, SAO_3 and Pol clearly below lateral line; PO_4 higher than other PO photophores; adipose fin present.

Remarks. Identification followed Wisner (1974), Kawaguchi and Shimizu (1978) and Nafpaktitis (1978). This species occurs worldwide in tropical to temperate waters, from the surface to 1,754 m depth (Kawaguchi and Shimizu, 1978; Hulley, 1990a).

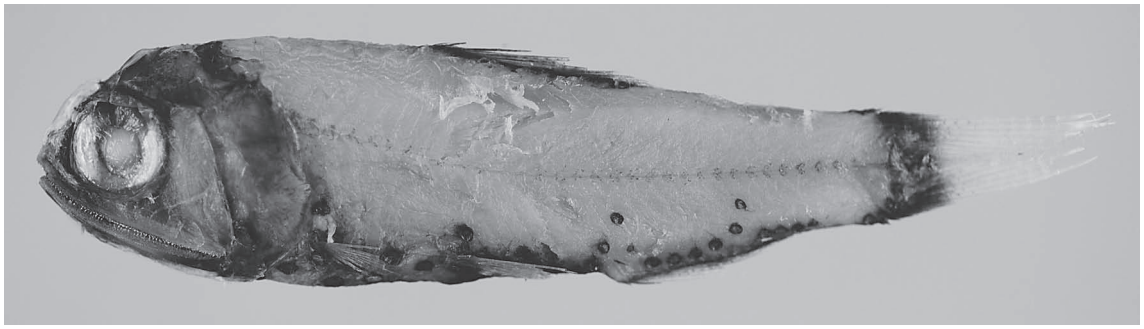

Fig. 62. *Diaphus bertelseni*, HUMZ 215595, 60.4 mm SL.

Fig. 63. *Diaphus brachycephalus*, HUMZ 215607, 49.5 mm SL.

56. *Diaphus effulgens* (Goode and Bean, 1896)
(Japanese name: Tama-hadaka)
(Fig. 64)

Material examined. Five specimens, 42.7-86.9 mm SL: HUMZ 215573-215574, HUMZ 215577 (2), HUMZ 215584, OSMT1007.

Diagnosis. D 15; A 15-16; P_1 10-11; P_2 8; GR 20-21; Ant 1; Dn 1; Vn 1; PO 5; PVO 2; VO 5; SAO 3; AOa 6; AOp 5; AO 11; Pol 1; Prc 4; body elongate, compressed; mouth large, nearly horizontal; Dn extending higher than level of dorsal margin of eye; eye large; PLO nearer to pectoral fin base than to lateral line; SAO_3 and Pol slightly below lateral line; adipose fin present.

Remarks. Identification followed Nafpaktitis et al. (1977), Nafpaktitis (1978) and McEachran and Fechhelm (1998). This species is known from the Atlantic, Indian, and central South and western North Pacific oceans in depths of 90-850 m (Hulley, 1990a; McEachran and Fechhelm, 1998).

57. *Diaphus gigas* Gilbert, 1913
(Japanese name: Suitô-hadaka)
(Fig. 65)

Material examined. Eight specimens, 30.1-115 mm SL: HUMZ 210954-210965 (1, 6), HUMZ 211005, OSMT1009.

Other material. 60 specimens: HUMZ 215585-215590 (11, 15, 18, 4, 5, 2), OSMT1009; HUMZ 215591 (2), HUMZ 215634, OSMT1007; HUMZ 215601 (2), OSMT1008.

Diagnosis. D 14-16; A 14-16; P_1 11; P_2 8; GR 23-26; Ant 1; Dn 1; Vn 1; PO 5; PVO 2; VO 5; SAO 3; AOa 6; AOp 5; AO 11; Pol 1; Prc 4; body elongate, compressed; mouth large, nearly horizontal; eye large; Dn extending higher than level of dorsal margin of eye; Vn spreading behind nasal apparatus, reaching medial ethmoid crest; PLO at middle between lateral line and upper end of pectoral fin base; PO_4 higher than other PO photophores; SAO_3 and Pol about one photophore diameter below lateral line; adipose fin present.

Remarks. Identification followed Wisner (1974), Kawaguchi and Shimizu (1978) and Okamura (1984c). *Diaphus gigas* is known from the North Pacific region, including the Japanese and Hawaiian Archipelagos, from the surface to 1,110 m depth (Sawada, 1983; Fujii, 1984i; Okamura, 1984c; Mundy, 2005).

58. *Diaphus kuroshio* Kawaguchi and Nafpaktitis, 1978
(Japanese name: Kuroshio-hadaka)
(Fig. 66)

Material examined. 11 specimens, 54.7-58.5 mm SL: HUMZ 215593, HUMZ 215636 (2), HUMZ 215637 (4), HUMZ 215641 (2), OSMT1009; HUMZ 215638 (2), OSMT1007.

Other material. Seven specimens: HUMZ 215597, OSMT1008; HUMZ 215605-215606 (2, 4), OSMT1009.

Diagnosis. D 14; A 12-13; P_1 10; P_2 8; GR 22-23;

Fig. 64. *Diaphus effulgens*, HUMZ 215573, 46.0 mm SL.

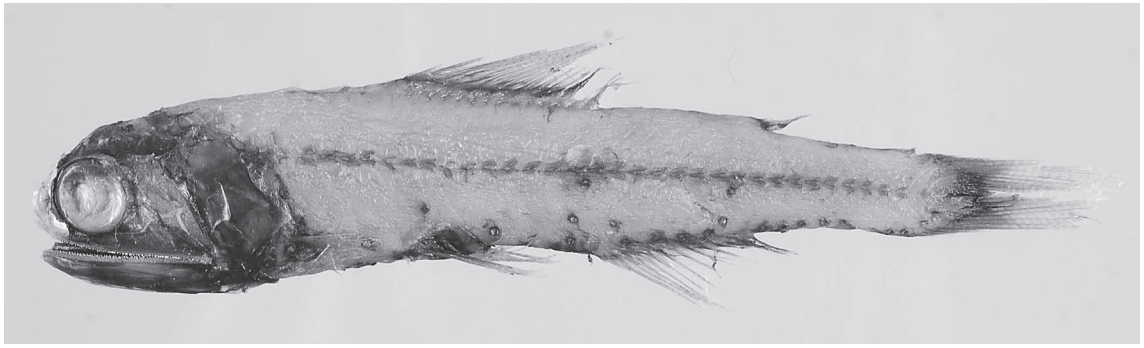

Fig. 65. *Diaphus gigas*, HUMZ 211005, 94.4 mm SL.

Fig. 66. *Diaphus kuroshio*, HUMZ 215593, 57.1 mm SL.

Dn 1; Vn 1; So 1; PO 5; PVO 2; VO 5; SAO 3; AOa 5; AOp 4; AO 9; Pol 1; Prc 4; body elongate, compressed; mouth large, nearly horizontal; eye large; Vn horizontally elongate, its size more than twice that of So; So in front of vertical through posterior margin of pupil; scale at PLO present; PO_4 higher than other PO photophores; straight line through centers of AOa_1 and AOa_2 passing above center of SAO_2; Prc_4 about its own diameter below lateral line; adipose fin present.

Remarks. Identification followed Kawaguchi and Naf-paktitis (1978), Kawaguchi and Shimizu (1978) and Fujii (1984i). This species is known from the western North and eastern Central Pacific, including the Japanese and Hawaiian Archipelagos, from the surface to 1,200 m depth (Kawaguchi and Shimizu, 1978; Fujii, 1984i; Mundy, 2005).

59. *Diaphus metopoclampus* (Cocco, 1829)
(Japanese name: Daikoku-hadaka)
(Fig. 67)

Material examined. Four specimens, 58.4–76.1 mm SL: HUMZ 210953, HUMZ 211007, HUMZ 215572,

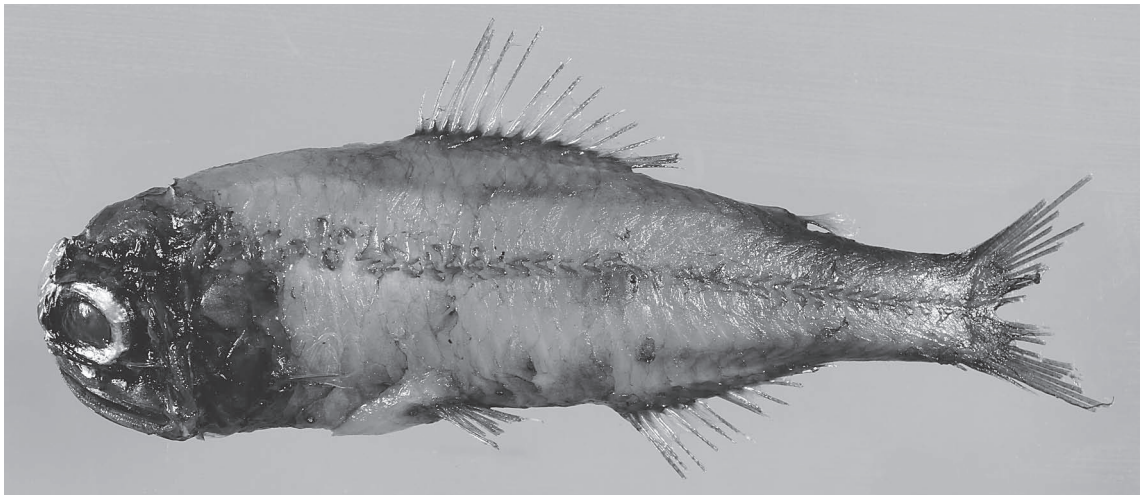

Fig. 67. *Diaphus metopoclampus*, HUMZ 210953, 59.3 mm SL.

HUMZ 215592, OSMT1009.

Diagnosis. D 15–16; A 15; P_1 10–11; P_2 8; GR 24–25; Ant 1; Dn 1; Vn 1; PO 5; PVO 2; VO 5; SAO 3; AOa 6; AOp 5–6; AO 11–12; Pol 1; Prc 4; body moderately elongate, compressed; head short, length about equal to depth; mouth large, nearly horizontal; Vn greatly elongated to lower margin of orbit and ending in distinct knob generally below posterior margin of pupil; eye large; PLO and VLO much closer to lateral line than to pectoral and pelvic fin origins; SAO_3 and Pol on lateral line; adipose fin present.

Remarks. Identification followed Wisner (1974), Kawaguchi and Shimizu (1978) and Nafpaktitis (1978). This species occurs worldwide in tropical to temperate waters, from the surface to 2,100 m depth (Kawaguchi and Shimizu, 1978; Hulley, 1990a).

60. *Diaphus perspicillatus* (Ogilby, 1898)
(Japanese name: Shirohana-hadaka)
(Fig. 68)

Material examined. Nine specimens, 37.5–90.8 mm SL: HUMZ 215580 (6), HUMZ 215582, OSMT1009; HUMZ 215583, OSMT1007; HUMZ 215602, OSMT1008.

Other material. 26 specimens: HUMZ 215579 (14), HUMZ 215581 (12), OSMT1009.

Diagnosis. D 14–15; A 13–15; P_1 10–11; P_2 8; GR 24–27; Ant 1; Dn 1; Vn 1; PO 5; PVO 2; VO 5; SAO 3; AOa 6; AOp 5; AO 11; Pol 1; Prc 4; body elongate, compressed; mouth large, nearly horizontal; eye large; Dn extending higher than level of dorsal margin of eye; Vn spreading behind nasal apparatus, reaching medial ethmoid crest; PLO midway between lateral line and upper end of pectoral fin base; PO_4 higher than other PO photophores; SAO_3 and Pol touching with lateral line; adipose fin present.

Remarks. Identification followed Nafpaktitis et al. (1977), Kawaguchi and Shimizu (1978) and Nafpaktitis (1978). This species occurs worldwide in tropical to temperate waters, from the surface to 1,400 m depth (Kawaguchi and Shimizu, 1978; Hulley, 1990a).

61. *Diaphus phillipsi* Fowler, 1934
(Japanese name: Chigire-hadaka)
(Fig. 69)

Material examined. 10 specimens 31.1–76.4 mm SL: HUMZ 210821, OSMT1008; HUMZ 215575 (2), HUMZ 215632 (5), OSMT1007; HUMZ 215576–215578, OSMT1009.

Other material. 18 specimens: HUMZ 215599–215600 (6, 4), OSMT1008; HUMZ 215604 (5), HUMZ 215633 (3), OSMT1007.

Diagnosis. D 15–16; A 15–16; P_1 10–12; P_2 8; GR 24–26; Ant 1; Dn 1; Vn 1; PO 5; PVO 2; VO 5; SAO 3; AOa 6; AOp 5–6; AO 11–12; Pol 1; Prc 4; body elongate, compressed; mouth large, nearly horizontal; Dn extending higher than level of dorsal margin of eye; eye large; PLO closer to pectoral fin base than to lateral line; SAO_3 and Pol slightly below lateral line; adipose fin present.

Remarks. Identification followed Kawaguchi and Shimizu (1978), Nafpaktitis (1978) and Fujii (1982c). *Diaphus phillipsi* occurs in the Indo-Pacific region, including southern Africa, the South China Sea, the Japanese and Hawaiian Archipelagos, and Australia, from the surface to 1,330 m depth (Kawaguchi and Shimizu, 1978; Fujii, 1984i; Hulley, 1986; Paxton and Hulley, 2000; Mundy, 2005; Paxton et al., 2006b).

62. *Diaphus problematicus* Parr, 1928
(Japanese name: Mayoi-hadaka)
(Fig. 70)

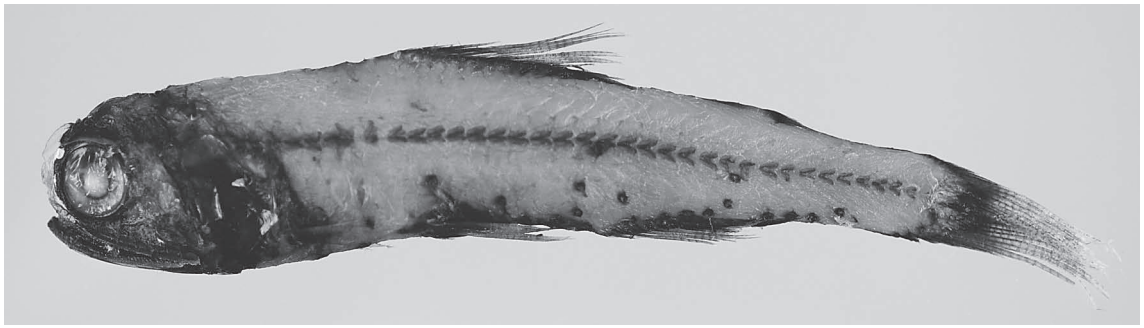

Fig. 68. *Diaphus perspicillatus*, HUMZ 215582, 90.8 mm SL.

Fig. 69. *Diaphus phillipsi*, HUMZ 215578, 71.2 mm SL.

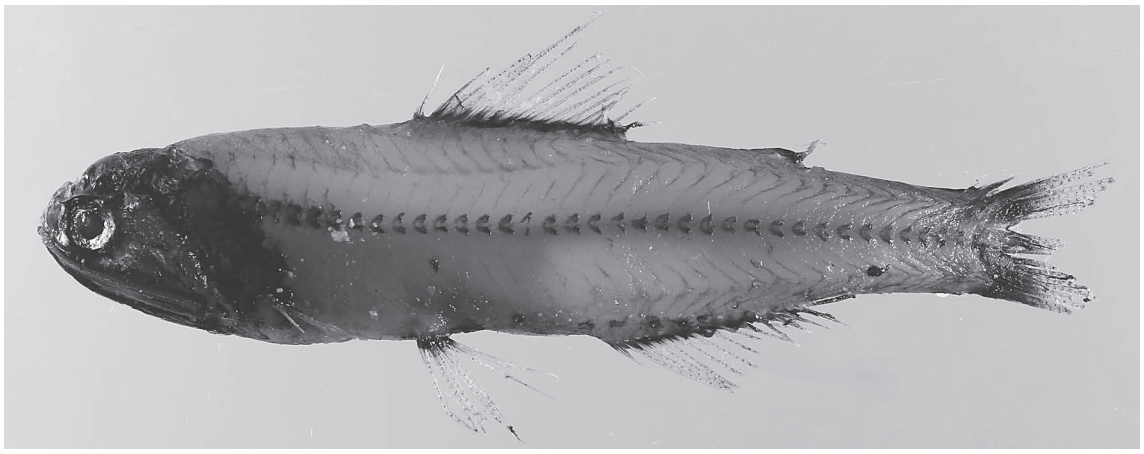

Fig. 70. *Diaphus problematicus*, HUMZ 210877, 55.0 mm SL.

Material examined. 10 specimens, 41.6–101 mm SL: HUMZ 210877, OSMT1008; HUMZ 211096 (3), HUMZ 211148 (3), HUMZ 211152 (2), HUMZ 215635, OSMT1007.

Other material. 81 specimens: HUMZ 215618 (4), HUMZ 215627 (19), OSMT1008; HUMZ 215619–215624 (2, 1, 1, 1, 7, 14), HUMZ 215628 (5), OSMT1009; HUMZ 215625–215626 (2, 16), HUMZ 215629 (9), OSMT1007.

Diagnosis. D 15–16; A 16–17; P_1 10–12; P_2 8; GR 12–15; Dn 1; Vn 1; PO 5; PVO 2; VO 5; SAO 3; AOa 6; AOp 4–5; AO 10–11; Pol 1; Prc 4; body elongate, compressed; mouth large, nearly horizontal; eye large; Dn and Vn continuous, forming a single photophore; PLO closer to base of pectoral fin than to lateral line; PO_4 higher than other PO photophores; VLO closer to lateral line than to base of ventral fin; AOa_1 abruptly elevated; adipose fin present.

Remarks. Identification followed Wisner (1974), Kawaguchi and Shimizu (1978) and Nafpaktitis (1978). *Diaphus problematicus* occurs worldwide in tropical to temperate waters, from the surface to 1,720 m depth, but has not yet been recorded from an upwelling region off Mauritania (Kawaguchi and Shimizu, 1978; Hulley, 1990a).

63. *Lampadena luminosa* (Garman, 1899)
(Japanese name: Kagami-iwashi)
(Fig. 71)

Material examined. Four specimens, 60.2–159 mm

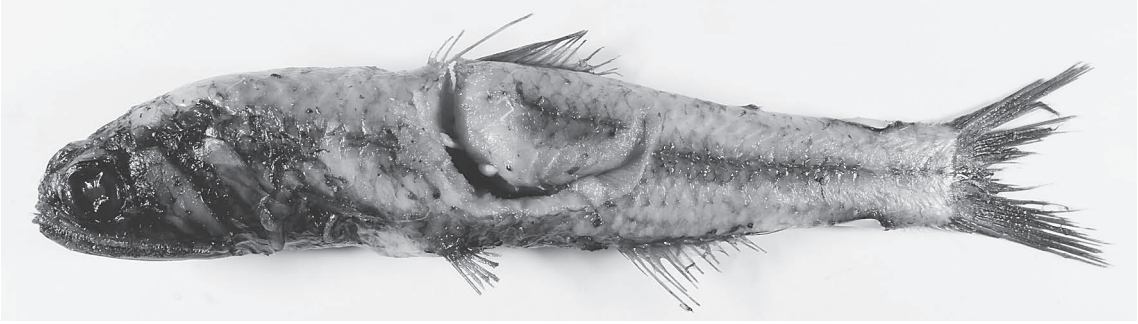

Fig. 71. *Lampadena luminosa*, HUMZ 210997, 159 mm SL.

SL: HUMZ 210997, OSMT1009; HUMZ 215528–215529 (1, 2), OSMT1007.

Diagnosis. D 14–15; A 12–14; P_1 14–15; P_2 8; GR 12–14; PO 5; PVO 2; VO 5; SAO 3; AOa 6–7; AOp 2; AO 8–9; Pol 1; Prc 3; body elongate, compressed; mouth large, nearly horizontal; eye moderately small; PVO_2 below upper end of pectoral fin base; PO_4 distinctly higher than other PO photophores; SUGL and INGL present as a single large, black-margined organ; Prc_3 on lateral line; adipose fin present.

Remarks. Identification followed Nafpaktitis and Paxton (1968), Nafpaktitis and Nafpaktitis (1969) and Wisner (1974). *Lampadena luminosa* occurs worldwide in tropical to temperate waters in depths of 40–850 m (Hulley, 1990a; McEachran and Fechhelm, 1998).

64. *Lampadena urophaos urophaos* Paxton, 1963
(Japanese name: Hotarubi-hadaka)
(Fig. 72)

Material examined. Two specimens, 95.9–107 mm SL: HUMZ 215526–215527, OSMT1007.

Diagnosis. D 14; A 12–14; P_1 15–16; P_2 8; GR 13; PO 5; PVO 2; VO 5; SAO 3; AOa 5; AOp 2; AO 7; Pol 1; Prc 3; body elongate, compressed; mouth large, nearly horizontal; eye moderately small; PVO_2 below upper end of pectoral fin base; PO_4 and PO_5 slightly higher than other PO photophores; SUGL and INGL present as a single large, black-margined organ; Prc_3 on lateral line; adipose fin present.

Remarks. Identification followed Nafpaktitis and Paxton (1968), Nafpaktitis et al. (1977) and Nakabo and Kai (2013b). This species occurs in the Pacific, including the Japanese and Hawaiian Archipelagos, Australia and New Caledonia, in depths of 50–1,000 m (Fujii, 1984i; Mundy, 2005; Paxton et al., 2006b, Fricke et al., 2011; Nakabo and Kai, 2013b).

65. *Lampanyctus jordani* Gilbert, 1913
(Japanese name: Mame-hadaka)
(Fig. 73)

Material examined. One specimen, 112 mm SL: HUMZ 215559, OSMT1009.

Diagnosis. D 15; A 17; P_1 16; P_2 8; GR 20; PO 4; PVO 2; PLO 2; VO 4; SAO 3; AOa 8; AOp 9; AO17; Pol 1; Prc 4; body elongate, compressed; mouth large, nearly horizontal; eye moderately small; pectoral fin long, extending well beyond posterior end of pelvic fin base; Cp present; SAO markedly angulated; AOa_2 and AOa_3 higher than other AOa photophores; anterior margin of adipose fin base with luminous gland; SUGL and INGL present; adipose fin present.

Remarks. Identification followed Wisner (1974), Paxton (1979) and Sawada (1983). This species is known from the North Pacific, including the Japanese and Hawaiian Archipelagos, Alaska and western Canada in depths of 200–1,400 m (Sawada, 1983; Fujii, 1984i; Peden et al., 1985; Mecklenburg et al., 2002; Mundy, 2005).

66. *Lampanyctus nobilis* Tåning, 1928
(Japanese name: Hoso-tongarihadaka)
(Fig. 74)

Material examined. 10 specimens, 75.1–115 mm SL: HUMZ 210896-210898, HUMZ 215555, OSMT1008; HUMZ 210956, OSMT1009; HUMZ 211008, HUMZ 215554, HUMZ 215557, HUMZ 215566, OSMT1009; HUMZ 215553, OSMT1007.

Other material. 37 specimens: HUMZ 215556 (2), OSMT1008; HUMZ 215558 (3), HUMZ 215560 (2), HUMZ 215564 (4), HUMZ 215567 (2), OSMT1009; HUMZ 215561–215563 (2, 6, 9), HUMZ 215565 (3), HUMZ 215568–215569 (1, 3), OSMT1007.

Diagnosis. D 13–15; A 17–19; P_1 14–15; P_2 8; GR 14–16; PO 4; PVO 2; VO 4; SAO 3; AOa 7–8; AOp 7–9; AO 14–17; Pol 1; Prc 4; body elongate, compressed; mouth large, nearly horizontal; eye moderately small; pectoral fin long, extending far beyond posterior end of pelvic fin base; VLO distinctly below lateral line; VO_2 moderately elevated but not displaced forward; SAO markedly angulated; SAO_1 distinctly below level of SAO_2; SUGL and INGL present; last three photophores of Prc arranged

Fig. 72. *Lampadena urophaos urophaos*, HUMZ 215527, 107 mm SL.

Fig. 73. *Lampanyctus jordani*, HUMZ 215559, 112 mm SL.

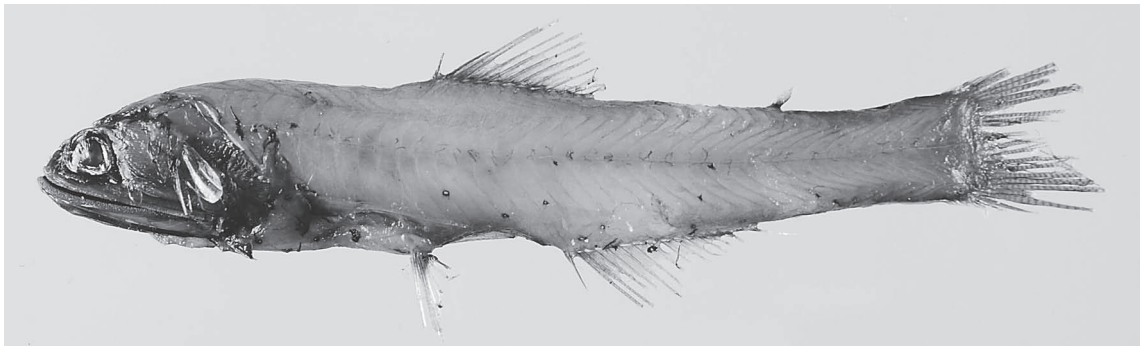

Fig. 74. *Lampanyctus nobilis*, HUMZ 210897, 111 mm SL.

linearly; adipose fin present.

Remarks. Identification follows Nafpaktitis and Nafpaktitis (1969), Wisner (1974) and Nafpaktitis et al. (1977). This mesopelagic species occurs worldwide in tropical to temperate waters (Hulley, 1990a).

67. *Lampanyctus tenuiformis* (Brauer, 1906)
(Japanese name: Nettai-nijihadaka)
(Fig. 75)

Material examined. Eight specimens, 91.2–156 mm SL: HUMZ 210893–210894, OSMT1008; HUMZ 210959–210960, HUMZ 210966, HUMZ 211014, OSMT1009; HUMZ 211065, HUMZ 21146, OSMT1007.

Other material. 31 specimens: HUMZ 210899 (5), OSMT1008; HUMZ 211010 (5), OSMT1009; HUMZ 211094 (8), HUMZ 211102 (12), HUMZ 211155, OSMT1007.

Diagnosis. D 13–15; A 16–18; P_1 13–15; P_2 8; GR 12–15; PO 4; PVO 2; VO 4; SAO 3; AOa 7–8; AOp 9; AO 16–17; Pol 1; Prc 4; body elongate, compressed; mouth large, nearly horizontal; eye moderately small; pectoral fin long, extending well beyond posterior end of pelvic fin base; VLO clearly below lateral line; line joining VO_1 and VO_2 passing below SAO_1; SAO markedly angulated; line through SAO_2, SAO_1 and VLO passing near PLO; adipose fin present; SUGL and INGL present; last three photophores of Prc angled upward.

Remarks. Identification followed Nafpaktitis and Nafpaktitis (1969), Wisner (1974) and Nafpaktitis et al. (1977). *Lampanyctus tenuiformis* occurs worldwide in tropical to temperate waters in depths of 40–750 m (Fujii, 1984i; McEachran and Fechhelm, 1998).

68. *Notoscopelus caudispinosus* (Johnson, 1863)
(Japanese name: Ôsebire-hadaka)
(Fig. 76)

Material examined. Nine specimens, 71.3–127 mm SL: HUMZ 210822, HUMZ 210825, HUMZ 210870,

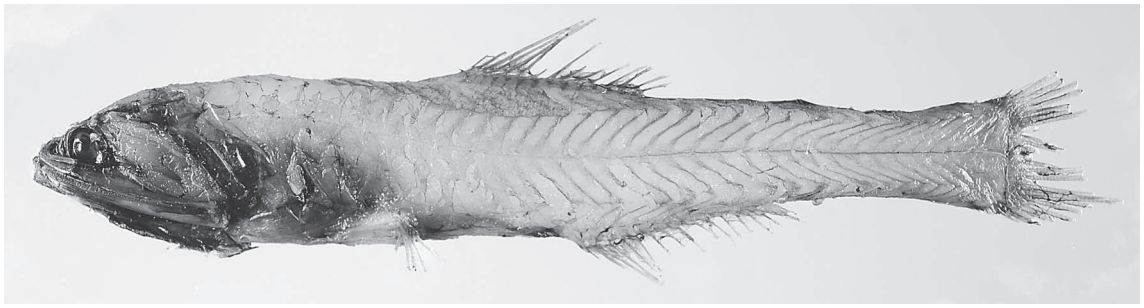

Fig. 75. *Lampanyctus tenuiformis*, HUMZ 210893, 153 mm SL.

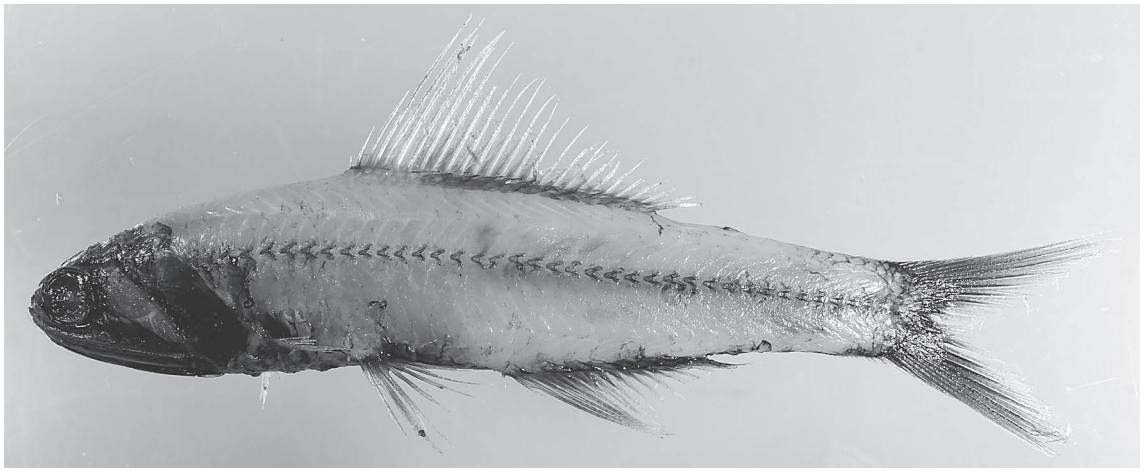

Fig. 76. *Notoscopelus caudispinosus*, HUMZ 210901, 91.0 mm SL.

HUMZ 210875, HUMZ 210901–210902, HUMZ 211644, OSMT1008; HUMZ 210955–210956, OSMT1009.

Other material. 194 specimens: HUMZ 215512 (5), OSMT1008; HUMZ 215513–215516 (25, 26, 1, 2), OSMT1009; HUMZ 215517–215523 (50, 3, 6, 4, 2, 45, 25), OSMT1007.

Diagnosis. D 25–28; A 19–22 P_1 11–13; P_2 8; GR 13–14; PO 5; PVO 2; VO 5; SAO 3; AOa 6–7; AOp 4; AO 10–11; Pol 2; Prc 3; body elongate, compressed, covered with cycloid scales; mouth large, nearly horizontal; teeth on jaws mostly villiform, those on posterior part of lower jaw enlarged; eye moderately small; PVO_2 well above upper end of pectoral fin base; Pol series arranged parallel to lateral line; adipose fin present; male with SUGL.

Remarks. Identification followed Nafpaktitis and Nafpaktitis (1969), Nafpaktitis (1975) and Fujii and Uyeno (1976). *Notoscopelus caudispinosus* occurs worldwide in tropical to temperate seas, from the surface to 1,150 m depth (Fujii, 1984i; McEachran and Fechhelm, 1998).

69. *Taaningichthys bathyphilus* (Tåning, 1928)
(Japanese name: Hage-kurohadaka)
(Fig. 77)

Material examined. 10 specimens, 36.9–60.9 mm SL: HUMZ 215476–215477 (1, 8), HUMZ 215511, OSMT1009.

Other material. Nine specimens: HUMZ 215474 (3), HUMZ 215570 (3), OSMT1009; HUMZ 215475 (3), OSMT1008.

Diagnosis. D 10–12; A 12–14; P_1 13–14; P_2 8; GR 15–17; PO 5; PVO 2; VO 5; SAO 1; AOa 2–5; AOp 2–4; AO 4–9; Pol 1; Prc 3; body elongate; mouth large, nearly horizontal; eye large, posterior half of iris with crescent whitish tissue; anal fin origin closer to pectoral insertion than to caudal base; Pol behind posterior end of adipose fin base; SUGL and INGL present; adipose fin present.

Remarks. Identification followed Davy (1972), Wisner (1974) and Nafpaktitis et al. (1977). This species occurs worldwide in tropical to temperate waters in depths of 600–1,000 m (Wisner, 1974; Fujii, 1984i).

70. *Taaningichthys minimus* (Tåning, 1928)
(Japanese name: Kurohadaka)
(Fig. 78)

Material examined. Nine specimens, 44.1–59.1 mm SL: HUMZ 210823, HUMZ 210872, HUMZ 210876, HUMZ 215470 (3), OSMT1008; HUMZ 215473 (3), OSMT1007.

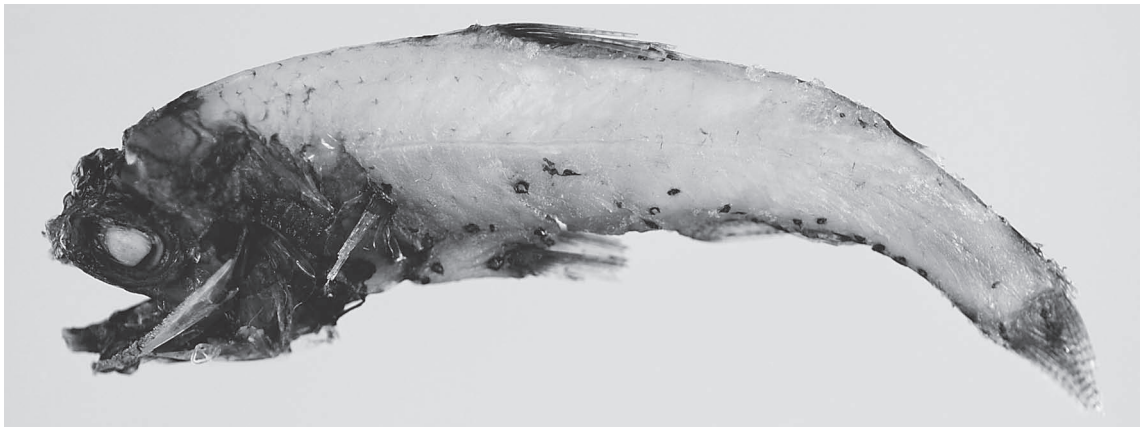

Fig. 77. *Taaningichthys bathyphilus*, HUMZ 215511, 59.0 mm SL.

Fig. 78. *Taaningichthys minimus*, HUMZ 210823, 56.4 mm SL.

Other material. 10 specimens: HUMZ 215472 (10), OSMT1009.

Diagnosis. D 10–12; A 11–14; P_1 14–16; P_2 8; GR 15–17; PO 5; PVO 2; VO 8–10; SAO 1; AOa 5–8; AOp 5–7; AO 10–14; Pol 1; Prc 3; body elongate; mouth large, nearly horizontal; eye large, posterior half of iris with crescent of whitish tissue; pectoral fin long, extending beyond anal fin origin; anal fin origin closer to caudal base than to pectoral insertion; Pol anterior to posterior end of adipose fin base; SUGL and INGL present; adipose fin present.

Remarks. Identification followed Nafpaktitis and Nafpaktitis (1969), Davy (1972) and Wisner (1974). *Taaningichthys minimus* occurs worldwide in tropical to temperate waters, from the surface to 800 m depth (Wisner, 1974; Fujii, 1984i).

Order Lampriformes
Family Trachipteridae

71. *Desmodema* sp.
(Fig. 79)

Material examined. One specimen, ca. 702 mm SL: HUMZ 210996, OSMT1009.

Description. Counts: D ca. 147; P_1 11; C 6; GR 12; V anterior to anus 39.

Body greatly elongate, strongly compressed, constricted behind anus. Dorsal profile of body rising rapidly from snout tip to dorsal fin origin, before tapering to tail. Head and body, except snout and opercle, covered with tubercles. Mouth large, greatly protrusible anteriorly. Upper jaw teeth absent. Tip of lower jaw with two fang-like teeth. Vomerine and palatine teeth absent. Eye large. Dorsal fin origin posterior to eye. Anterior six dorsal fin rays short, succeeding rays becoming longer; highest dorsal fin rays situated anterior to level of anus; dorsal fin height decreasing gradually along tail. Pectoral fin on lower portion of body, its base horizontal. Pelvic and anal fins absent. Lateral line ending at caudal fin base. Anus on ventral midline. Tail exceedingly long and narrow. Caudal fin well developed, parallel to axis of body. Body silver when fresh, with pale black patchy pattern. Dorsal and pectoral fin rays unpigmented. Caudal fin rays blackish.

Remarks. The single specimen examined conformed to the genus *Desmodema* Walters and Fitch, 1960 in having six caudal fin rays, the body constricted behind the anus, the tail exceedingly long and narrow, and the caudal fin parallel to the axis of the body (Rosenblatt and Butler, 1977). At present,

Fig. 79. *Desmodema* sp., HUMZ 210996, ca. 702 mm SL.

Desmodema includes two species, *Desmodema polystictum* (Ogilby, 1898) and *Desmodema lorum* Rosenblatt and Butler, 1977, both known from the North Pacific (e.g., Rosenblatt and Butler, 1977; Fujii, 1984l; Hayashi and Senou, 2013). According to Rosenblatt and Butler (1977) and Fujii (1984k), *D. polystictum* and *D. lorum* are distinguished from each other by dorsal and caudal fin ray, and preanal vertebral numbers, and certain proportional relationships [dorsal fin rays 116–131, caudal fin rays 7–10 (usually 8), vertebrae anterior to anus 37–42, snout length less than eye diameter, snout vent length longer and longest dorsal fin ray shorter in larger specimens in *D. polystictum* vs. 187–215, 4–7 (usually 6) and 46–50, respectively, snout length greater than eye diameter, snout vent length shorter and longest dorsal fin ray longer in larger specimens in *D. lorum*]. Because the snout of the present specimen was firmly fixed in a protruded condition, making the accurate measurement of snout, standard and snout vent lengths difficult, the above-mentioned proportional characters could not be considered. On the other hand, the specimen agreed with *D. lorum* in having six caudal fin rays, but was similar to *D. polystictum* in having 39 preanal vertebrae. Furthermore, the number of dorsal fin rays (ca. 147) differed from those in both named species, although the partial damage to the dorsal margin of the body of the present specimen may have resulted in a miscount. The specimen may represent an undescribed species of *Desmodema*.

Order Gadiformes
Family Bregmacerotidae

72. *Bregmaceros japonicus* Tanaka, 1908
(Japanese name: Saiuo)
(Fig. 80)

Material examined. Nine specimens, 47.3–100 mm SL: HUMZ 210807, HUMZ 210941–210942, HUMZ 211025, HUMZ 211027–211028, HUMZ 215660, OSMT1009; HUMZ 211653, OSMT1008; HUMZ 215661, OSMT1007.

Other material. 54 specimens: HUMZ 210943 (6), HUMZ 211027 (17), OSMT1009; HUMZ 211075 (16), HUMZ 211124 (15), OSMT1007.

Diagnosis. D 1 + 52–61; A 64–70; P_1 15–20; P_2 5–7; V 54–60; body elongate, compressed, covered with cycloid scales; head small, lacking scales; mouth nearly oblique; eye small; pelvic fin jugular, greatly elongate; first dorsal fin represented by filamentous ray on occiput; second dorsal fin origin behind anal fin origin; body dark gray above, silvery below when fresh; head uniformly blackish.

Remarks. Identification followed D'Ancona and Cavinato (1965), Okamura (1984e) and Torii et al. (2003). *Bregmaceros japonicas* is known from the western Pacific, including southern Japan, Australia, New Caledonia and the Hawaiian Islands, in depths of 50–4,000 m (Okamura, 1984e; Mundy, 2005; Paxton et al., 2006c; Fricke et al., 2011).

Family Melanonidae

73. *Melanonus zugmayeri* Norman, 1930
(Japanese name: Kawari-hiredara)
(Fig. 81)

Material examined. Four specimens, 155–229 mm SL: HUMZ 210803, OSMT1009; HUMZ 211662–211664, OSMT1008.

Diagnosis. D 72–80; A 58–62; P_1 13–14; P_2 7–8; GR 11–12; body slender, compressed, tapering posteriorly; head slightly compressed, with many minute papillae arranged parallel to body axis; teeth on upper jaw arranged in three rows; teeth on vomer and palatine arranged in single row; teeth on lower jaw arranged in three rows anteriorly, in two rows posteriorly, teeth of inner row on lateral part larger than others; dorsal and anal fin bases long; anal fin rays shorter than dorsal fin rays; dorsal and anal fins separated from caudal fin; head and body dark brown.

Remarks. Identification followed Arai (1983), Paulin (1990) and Henriques et al. (2001). This species occurs worldwide in tropical to temperate waters in depths of 524–3,000 m (Cohen, 1990; Paulin, 1990; Mundy, 2005).

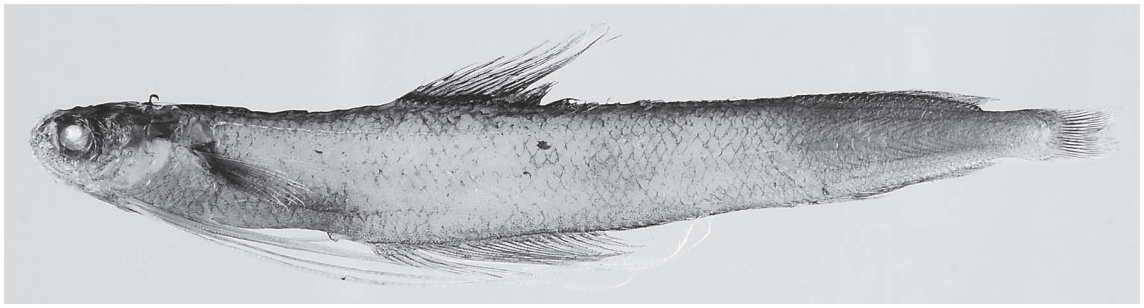

Fig. 80. *Bregmaceros japonicus*, HUMZ 211025, 100 mm SL.

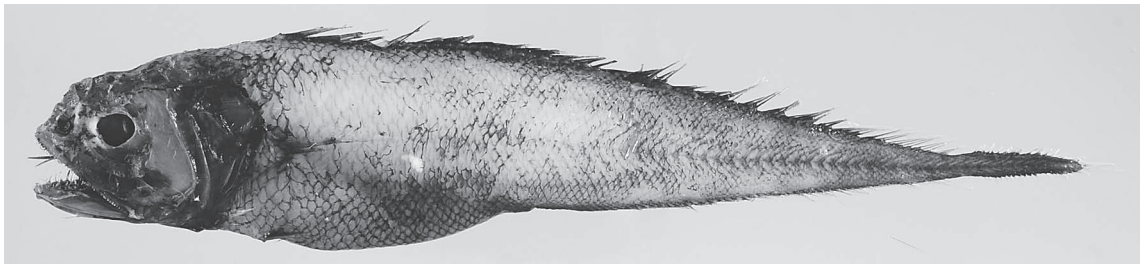

Fig. 81. *Melanonus zugmayeri*, HUMZ 211662, 229 mm SL.

Order Ophidiiformes
Family Ophidiidae

74. *Brotulotaenia nielseni* Cohen, 1974
(Japanese name: Karasu-obiashiro)
(Fig. 82)

Material examined. One specimen, 201 mm TL: HUMZ 211105, OSMT1007.

Diagnosis. D 93; A 75; P_1 22; GR 17; V 73; HL 19.4% SL; body slender, compressed; body and head covered with circular scales having small spines; head with several pores; mouth large, slightly oblique, extending beyond posterior edge of eye; both jaws, vomer and palatine with teeth; eye circular, subequal to one half of snout length; pectoral fin small, covered with thick skin; dorsal and anal fin bases extremely long; body uniformly blackish.

Remarks. Identification followed Cohen (1974), Machida et al. (1997) and Ohashi et al. (2012). The species was recently reported from Japan (near the Ogasawara Islands and off Miyagi Prefecture) for the first time by Ohashi et al. (2012). It is known from the Indo-Pacific region, including Somalia, the Arabian, Banda and South China seas, the Japanese and Hawaiian Archipelagos, New Guinea, western Mexico, western Columbia and Peru, from the surface to 1,200 m depth (Cohen, 1974; Parin et al., 1977; Kashkin, 1978; Shcherbachev, 1980; Machida et al., 1997; Mundy, 2005; Ohashi et al., 2012).

Order Lophiiformes
Family Himantolophidae

75. *Himantolophus sagamius* (Tanaka, 1918)
(Japanese name: Chôchin-ankô)
(Fig. 83)

Material examined. One specimen, 118 mm SL: HUMZ 211661, OSMT1008.

Diagnosis. D 5; A 4; P_1 14; V 18; illicium length 47% SL; anterior escal appendage length 24%; distal escal appendage length 7.6%; caudal peduncle length 13%; body deep, extremely robust, covered with bony plates each with medial spine; mouth nearly vertical; eye extremely small; illicium present; escal bulb of illicium appendage with two short protrusions and filaments; caudal peduncle short.

Remarks. Many authors have identified Japanese *Himantolophus* Reinhardt, 1837 as *Himantolophus groenlandicus* Reinhardt, 1837, recognizing *H. sagamius* as a junior synonym of the former (e.g., Matsubara, 1955; Amaoka, 1984a; Nakabo, 2002a). However, Bertelsen and Krefft (1988) revealed *H. sagamius* to be valid, being separable from *H. groenlandicus* in having the distal escal appendage length 6.2–11% SL (0.9–2.1% in *H. groenlandicus*), although this difference is evident only in specimens greater than about 100 mm SL. Pietsch (2009) and Nakabo and Kai (2013c) followed Bertelsen and Krefft (1988). The present specimen (118 mm SL) agreed closely with *H. sagamius sensu* Bertelsen and Krefft (1988), being identified as such herein, although Bertelsen (1990) subsequently listed the two species

Fig. 82. *Brotulotaenia nielseni*, HUMZ 211105, 201 mm TL.

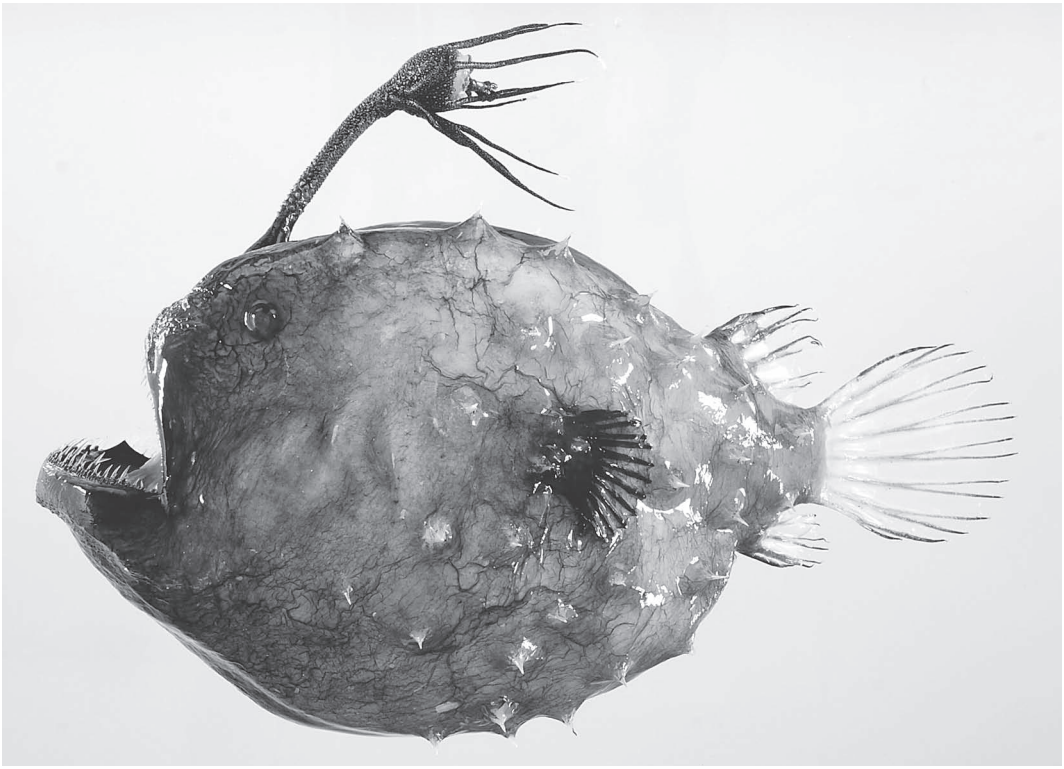

Fig. 83. *Himantolophus sagamius*, HUMZ 211661, 118 mm SL.

as conspecific, but without explanation. *Himantolophus sagamius* is known from the Pacific Ocean, including the Japanese and Hawaiian Archipelagos, the Halmahera Sea, and off California and Chile, in depths of 600–1,210 m (Tanaka, 1918; Bertelsen and Krefft, 1988; Meléndez and Kong, 1997; Klepadlo et al., 2003; Mundy, 2005; Pietsch, 2009; Nakabo and Kai, 2013c).

Family Oneirodidae

76. *Oneirodes bulbosus* Chapman, 1939
(Japanese name: Yume-ankô)
(Fig. 84)

Material examined. One specimen, 95.1 mm SL: HUMZ 211047, OSMT1009.

Diagnosis. D 6; A 4; P_1 15; V 19; illicium length 67% SL; body nearly globular; mouth large, slightly oblique; eye extremely small; illicium present; escal bulb of illicium with three appendages, middle one large, branched into many filaments; sphenotic spine present; origin of dorsal fin just above origin of anal fin; body uniformly brown.

Remarks. Identification followed Pietsch (1974, 2009) and Amaoka (1983a). *Oneirodes bulbosus* is known from the North Pacific region, including northern Japan, the Okhotsk and Bering seas, Alaska and western Canada, in depths of 600–1,310 m (Amaoka, 1984b; McAllister, 1990; Mecklenburg et al., 2002).

77. *Oneirodes* sp.
(Fig. 85)

Material examined. One specimen, 118 mm SL: HUMZ 211649, OSMT1008.

Description. Counts: D 4; A 4; P_1 12; C 8; V 19; upper jaw teeth 22; lower jaw teeth 20. Proportions (% SL): HL 62.9; BD 47.8; snout length 10.3; upper jaw length 28.4; lower jaw length 31; eye diameter 13.1; interorbital length 8.2; predorsal length 85.4; postdorsal length 15.6; preanal length 89.0; postanal length 9.2; pectoral fin

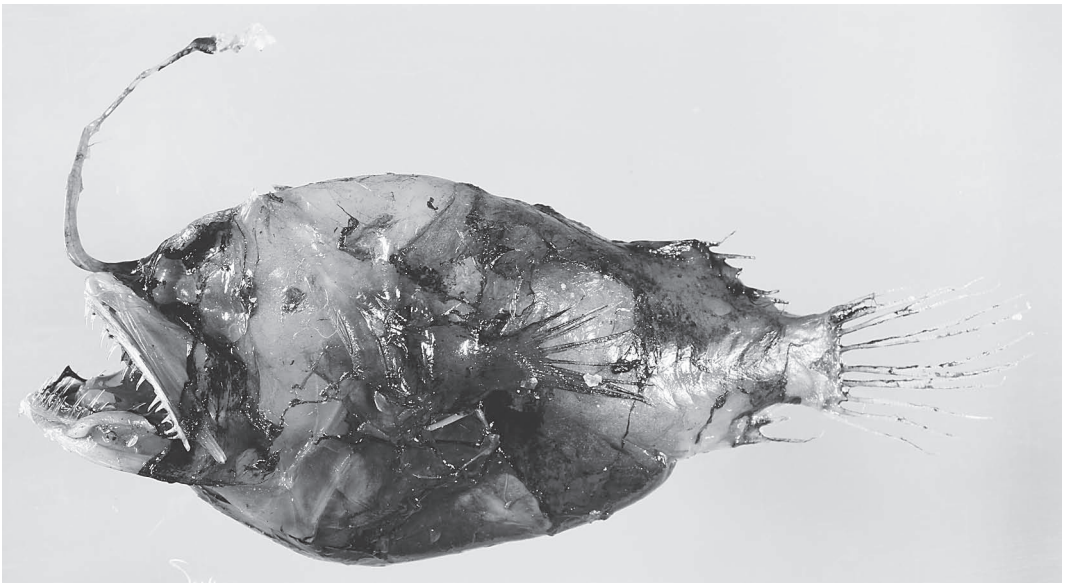

Fig. 84. *Oneirodes bulbosus*, HUMZ 211047, 95.1 mm SL.

Fig. 85. *Oneirodes* sp., HUMZ 211649, 118 mm SL.

length 17.9; dorsal fin base 8.7; anal fin base 6.9; caudal peduncle length 10.8; caudal peduncle depth 14.2; length of illicium 63.6.

Body short, globular. Mouth large; posterior margin of upper jaw extending well beyond eye. Length of symphysial cartilage of upper jaw longer than its width. Long and short teeth alternately arranged on upper jaw; tip of upper jaw without teeth. All teeth on both jaws depressible. Vomer with four fang-like teeth. Palatine teeth absent. Dorsal profile of head convex. Eye large. Long slender illicium present on frontal. Globular escal bulb with three appendages present on tip of illicium. Terminal appendage of escal bulb relatively long, its length about equal to bulb, with many filaments surrounding base. Anterior appendage of escal bulb extremely short, its length about one-sixth of terminal appendage. A short filament below anterior appendage of escal bulb. Posterior appendage of escal bulb short, its length about one-third of terminal appendage. A short filament below posterior appendage of escal bulb. Illicium trough becoming progressively wider and shallower

toward posterior end. Single well developed sphenotic spine present. Single well developed symphysial spine on anterior tip of lower jaw. Quadrate spine present, well developed, distinctly longer than articular spine. Posterior margin of opercle deeply notched. Two pharyngobranchial tooth plates present; anterior plate with three teeth; posterior plate with six teeth. Gill opening situated below pectoral fin base. Dorsal and anal fins extremely small, mostly symmetrical, positioned posteriorly on body. Caudal peduncle short, deep. Head and body uniformly blackish. Illicium and escal bulb unpigmented.

Remarks. The present specimen conformed to *Oneirodes* Lütken, 1871 in having four anal fin rays, 20 lower jaw teeth, the dorsal profile of the head convex, an illicium on the frontal, and the sphenotic spine and a symphysial spine on the anterior tip of the lower jaw both well developed (Pietsch, 2009). Among the 35 species of *Oneirodes* currently recognized (see Pietsch, 2009), the present specimen was most similar to *Oneirodes thompsoni* (Schultz, 1934), known from the North Pacific, and Okhotsk and Bering seas (e.g., Amaoka, 1984b), in having 20 lower jaw teeth (18–36 in *O. thompsoni* vs. more than 20 in others) (Schultz, 1934; Pietsch, 2009). However, it was distinguished from *O. thompsoni* in having the anterior appendage of the escal bulb extremely short (vs. greatly elongate in *O. thompsoni*) (Amaoka, 1984b; Pietsch, 2009). Furthermore, the former differed from other species of *Oneirodes* in its combination of other escal bulb characters, viz. the terminal appendage relatively long, its length about equal to the escal bulb; many filaments surrounding the base of the terminal appendage; the anterior appendage extremely short, its length about one-sixth of the terminal appendage; and the posterior appendage short, its length about one-third of the terminal appendage (see Orr, 1991; Pietsch, 2009). Although the present specimen may represent an undescribed species, it has not yet been compared directly with type or non-type material of other species of *Oneirodes*.

Family Linophrynidae

78. *Haplophryne mollis* (Brauer, 1902)
(Japanese name: Yûrei-oni-ankô)
(Fig. 86)

Material examined. One specimen, 42.8 mm SL: HUMZ 211066, OSMT1007.

Description. Counts: D 3; A 3; P_1 15; C 9; V 20. Proportions (% SL): HL 60.7; BD 41.6; snout length 33.4; upper jaw length 37.9; lower jaw length 42.8; eye diameter 4.2; interorbital width 12.1; predorsal length 76.6; postdorsal length 23.1; preanal length 77.1; postanal length 28.0; pectoral fin length 16.6; length of dorsal fin base 7.5; length of anal fin base 6.8; caudal peduncle length 11.7; caudal peduncle depth 11.7; illicium length 11.9.

Body short, compressed, moderately deep. Head and body entirely lacking scales. Head strongly arched dorsally; dorsal profile of body straight to slightly convex. Mouth large; posterior end of upper jaw extending well beyond eye posteriorly. Teeth on both jaws relatively short, numerous, larger anteriorly. Lower jaws extending slightly beyond upper jaw anteriorly. Tip of lower jaw with conical cartilaginous process. Vomerine and palatine teeth absent. Illicium extremely short, almost fully embedded within tissue of esca. Esca almost globular, with a small posterior escal appendage divided distally into two short branches. Hyoid barbel absent. Eye small, slightly tubular, directed anteriorly. Frontal, lower jaw and preopercular ridges with fine serration. Single spine on sphenotic and frontal. Preopercle angled posteroventrally. Single preopercular spine present near posteroventral corner, distinctly compressed laterally, divided distally two short broad cusps. Symphysis of lower jaw with single spine. Epiotic and posttemporal spines absent. Pelvic fin absent. Gill opening just below base of pectoral fin. Dorsal and anal fins extremely small, generally symmetrical, positioned posteriorly on body. Dorsal and anal fin rays mostly covered with skin. Caudal peduncle slender. Lowermost caudal fin ray about half length of adjacent ray. Skin on head and body unpigmented. Subdermal pigmentation comprising two series of melanophores along sides of body, forming a single cluster at caudal fin base.

Distribution. The species occurs worldwide in tropical to temperate waters in depths of 20–2,000 m (Pietsch, 2009).

Remarks. The single specimen examined conformed closely with the monotypic linophrynid genus *Haplophryne* Regan, 1912 in having the skin on the head and body unpigmented (vs. pigmented in other linophrynid genera) (Pietsch, 2009), and agreed well with *H. mollis*, redescribed by Munk and Bertelsen (1983) and Pietsch (2009) (who examined the type series) in having three dorsal and anal fin rays, 15 pectoral fin rays, vomerine teeth absent, the illicium externally short, hyoid barbell absent, frontal and sphenotic spines well developed, and preopercular spine divided distally into two short broad cusps.

This species has been recorded from the Philippines in the western Pacific region (Pietsch and Seigel, 1980), but from no further north in the Pacific. Although Amaoka (2013) listed three examples of the species, including the present specimen (see Amaoka, 2013: figs. on p. 163), and proposed a new Japanese name (Yûrei-oni-ankô), he provided neither a detailed description nor collection localites. Therefore, the present record represents the first reliable record of the species from Japanese waters, in addition to being the northernmost record for the Pacific.

Fig. 86. *Haplophryne mollis*, HUMZ 211066, 42.8 mm SL.

79. *Linophryne densiramus* Imai, 1941
(Japanese name: Oni-ankô)
(Fig. 87)

Material examined. One specimen, 55.3 mm SL: HUMZ 210801, OSMT1009.

Diagnosis. D 3; A 3; P_1 10; V 20; illicium length 30% SL; length of appendage at tip of escal bulb of illicium 22%; body robust; mouth extremely large, nearly horizontal; eye small; illicium present; appendage at tip of escal bulb of illicium long; lower jaw barbel present, with three thick stems; sphenotic and preopercular spines present; dorsal, anal and pectoral fins extremely small; body blackish.

Remarks. Identification followed Imai (1941), Bertelsen (1980) and Pietsch (2009). *Linophryne densiramus* occurs worldwide in tropical to temperate waters in depths of 150–380 m (Pietsch, 2009).

Order Sephanoberyciformes
Family Melamphaidae

80. *Melamphaes longivelis* Parr, 1933
(Japanese name: Maru-kabutouo)
(Fig. 88)

Material examined. Two specimens, 71.7–98.2 mm SL: HUMZ 211643, OSMT1008; HUMZ 215647, OSMT1009.

Diagnosis. D III, 16–17; A I, 8; P_1 13–14; P_2 I, 7; GR 16–18; V 27; body elongate, compressed; mouth large, oblique; upper jaw teeth arranged in band; eye diameter equal to suborbital width; three pores on cheek forming triangle; gill rakers slender, rod like; pectoral fin long, extending to anus; anal fin origin just below posterior end of dorsal fin base; caudal peduncle depth more than twice of its length; body uniformly brown.

Remarks. Identification followed Ebeling (1962), Fujii (1984k) and Aizawa and Doiuchi (2013e). This species occurs worldwide in tropical to temperate waters in depths of 1,100–1,500 m (Fujii, 1984k; Maul, 1990).

81. *Melamphaes polylepis* Ebeling, 1962
(Japanese name: Uroko-kabutouo)
(Fig. 89)

Material examined. Seven specimens, 61.6–68.4 mm SL: HUMZ 210816, HUMZ 215654–215655, OSMT1009; HUMZ 210888–210889, HUMZ 211040, OSMT1008; HUMZ 215657, OSMT1007.

Other material. 96 specimens: HUMZ 215652–215653 (19, 39), OSMT1009; HUMZ 215656 (19), HUMZ 215658 (19), OSMT1007.

Diagnosis. D III, 14–16; A I, 8; P_1 13–15; P_2 I, 7; GR 19–20; V 28; body elongate, compressed; mouth large, oblique; upper jaw teeth arranged in band; eye diameter less than suborbital width; three pores on cheek forming triangle; gill rakers broad; pectoral fin long, extending to anus; anal fin origin just below posterior end of dorsal fin base; caudal peduncle depth greater than twice its length; body uniformly blackish.

Remarks. Identification followed Ebeling (1962), Uyeno and Sato (1983) and Kotlyar (2011). *Melamphaes polylepis* occurs worldwide in tropical to temperate waters in depths of 400–1,500 m (Kotlyar, 2011; Aizawa and Doiuchi, 2013e).

82. *Poromitra unicornis* (Gilbert, 1905)
(Japanese name: Hutozuno-kabutouo)
(Fig. 90)

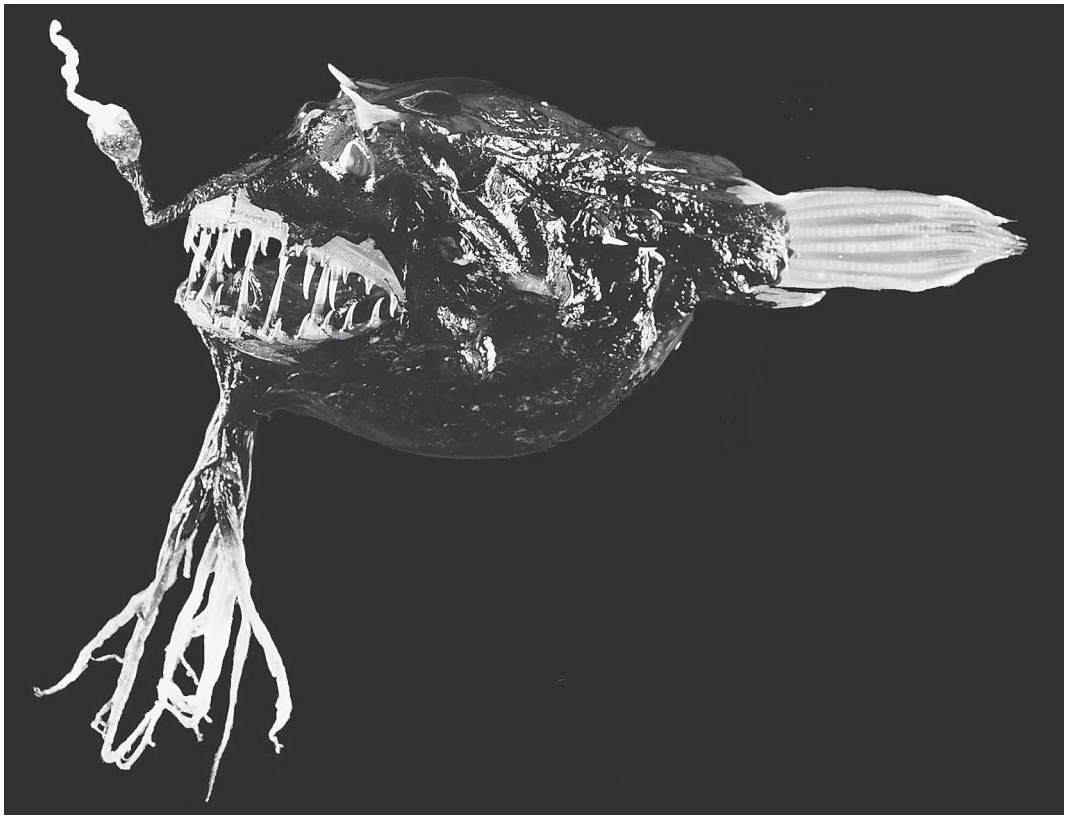

Fig. 87. *Linophryne densiramus*, HUMZ 210801, 55.3 mm SL.

Fig. 88. *Melamphaes longivelis*, HUMZ 215647, 98.2 mm SL.

Material examined. Four specimens, 118–125 mm SL: HUMZ 210938, OSMT1009; HUMZ 210990, OSMT1009; HUMZ 211642, OSMT1008; HUMZ 211658, OSMT1008.

Diagnosis. D III, 11; A I, 8; P_1 13–14; P_2 I, 7; GR 28–31; V 25; body elongate, compressed; mouth large, oblique; upper jaw teeth arranged in band; supramaxilla present; internarial spine present; crest like ridges on head with serrated margins; eye diameter less than snout length; gill rakers flatted, posteriorly serrated; pectoral fin long, extending to middle of anal fin base; caudal peduncle depth greater than twice its length; body uniformly blackish.

Remarks. Many authors have recognized *Poromitra unicornis* as a junior synonym of *Poromitra crassiceps* (Günther, 1878) (e.g., Ebeling and Weed, 1973; Parin and Ebeling, 1980; Aizawa, 2002b). However, Norman (1929), followed by Kotlyar (2008), considered *P. unicornis* to be valid, being separable from *P. crassiceps* in having 11 soft dorsal fin rays (vs. 12–13 in *P. crassiceps*), eight soft anal fin rays (vs. 9–10) and 25–26 vertebrae (vs. 27–29). The present specimen agreed closely with *P. unicornis sensu* Norman (1929) and is identified as such herein (see also Aizawa and Doiuchi, 2013e). *Poromitra unicornis* is known from the western Pacific region, including the Philippines, southern Japan and the Hawaiian Islands, from the surface to 5,300 m depth (Fujii, 1984k; Kotlyar, 2008; Aizawa and Doiuchi, 2013e).

Fig. 89. *Melamphaes polylepis*, HUMZ 210816, 62.6 mm SL.

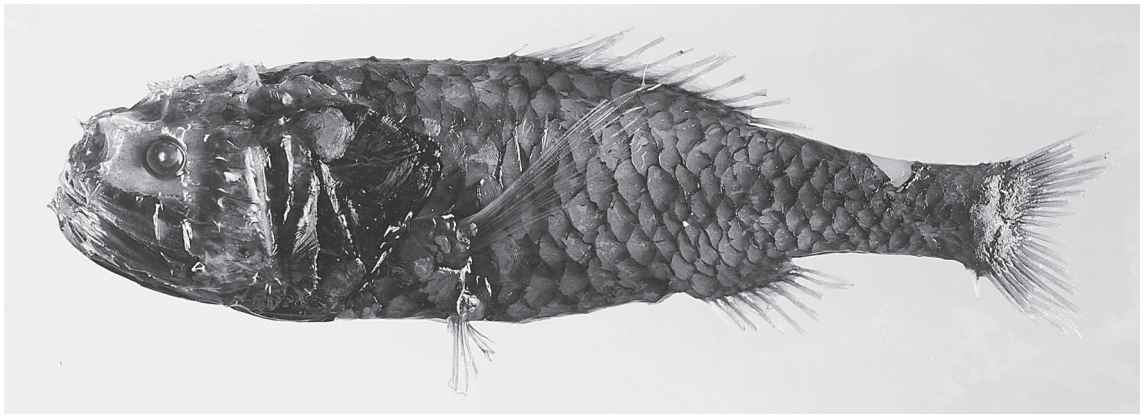

Fig. 90. *Poromitra unicornis*, HUMZ 210990, 124 mm SL.

83. *Scopelogadus mizolepis* (Günther, 1878)
(Japanese name: Yoroiginme)
(Fig. 91)

Material examined. Six specimens, 52.0–89.6 mm SL: HUMZ 210939–210940, OSMT1009; HUMZ 211079–211080, HUMZ 215648, HUMZ 215650, OSMT1007.

Other material. 13 specimens: HUMZ 215649 (6), OSMT1009; HUMZ 215651 (7), OSMT1007.

Diagnosis. D II, 10–12; A I, 8–9; P_1 12–14; P_2 I, 7; GR 20–22; V 24; body elongate, compressed; mouth large, oblique; upper jaw teeth arranged in one row; posterior margin of preopercle serrated; pectoral fin long, extending to middle of anal fin base; anal fin origin just below posterior end of dorsal fin base; caudal peduncle depth greater than twice its length; body uniformly blackish.

Remarks. Identification followed Ebeling and Weed (1963), Yamakawa (1982a) and Aizawa (2002b). This species occurs worldwide in tropical to temperate waters in 500–1,800 m depth (Fujii, 1984k; Aizawa and Doiuchi, 2013e).

Family Rondeletiidae

84. *Rondeletia loricata* Abe and Hotta, 1963
(Japanese name: Aka-chokki-kujirauo)
(Fig. 92)

Material examined. One specimen, 82.7 mm SL: HUMZ 211660, OSMT1008.

Diagnosis. D 14; A 13; P_1 10; P_2 5; GR 20; V 26; body oval, elongate and strongly compressed, scaleless, with many rows of nipple-shaped superficial neuromasts; head extremely large; mouth large, upper jaw extending to vertical through center of pupil; teeth villiform, forming band on both jaws; pectoral and pelvic fins small; dorsal fin origin slightly anterior to anal fin origin; body uniformly brown.

Remarks. Identification followed Abe and Hotta (1963), Tominaga and Kubota (1972) and Okamura (1985b). This species occurs worldwide in tropical to temperate waters in 100–3,500 m depth (Paxton and Blake, 1990; Yang et al., 1996).

Family Barbourisiidae

85. *Barbourisia rufa* Parr, 1945
(Japanese name: Aka-kujirauo-damashi)
(Fig. 93)

Material examined. One specimen, 157 mm SL: HUMZ 210810, OSMT1009.

Diagnosis. D 19; A 17; P_1 12; P_2 6; GR 19; V 42; body elongate, compressed; body and fins covered with minute spinules, velvety in texture; mouth large, posterior

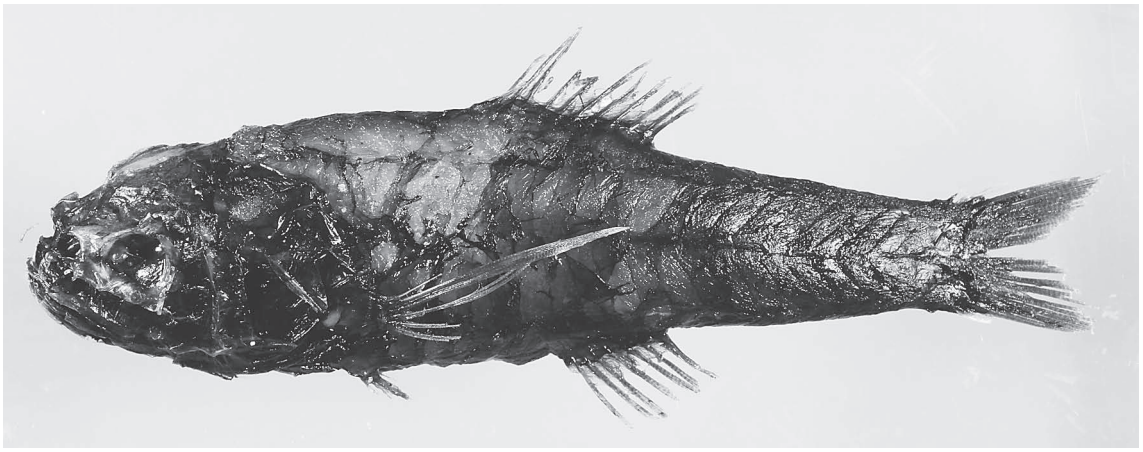

Fig. 91. *Scopelogadus mizolepis*, HUMZ 210940, 89.6 mm SL.

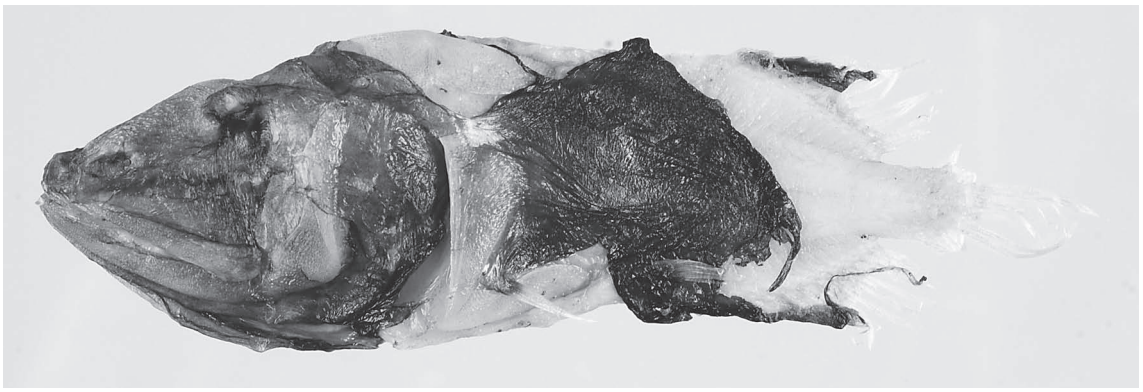

Fig. 92. *Rondeletia loricata*, HUMZ 211660, 82.7 mm SL.

Fig. 93. *Barbourisia rufa*, HUMZ 210810, 157 mm SL.

end of upper jaw extending well beyond posterior margin of eye; teeth villiform, pointed at tips, curved inward, forming band on both jaws; eye moderately small; lateral line thick and tubular; pectoral and pelvic fins extremely small; dorsal fin origin slightly anterior to anal fin origin; body uniformly bright red when fresh.

Remarks. Identification followed Parr (1945), Amaoka (1983b) and Okamura (1985a). This species occurs worldwide in mesopelagic and bathypelagic waters in depths of 300–2,000 m (Paxton and Blake, 1990; McEachran and Fechhelm, 1998).

Order Beryciformes
Family Anoplogastridae

86. *Anoplogaster cornuta* (Valenciennes, 1883)
(Japanese name: Oni-kinme)
(Fig. 94)

Material examined. Three specimens, 83.8–124 mm SL: HUMZ 210808, HUMZ 210987, OSMT1009; HUMZ 211641, OSMT1008.

Diagnosis. D 18–19; A 8–9; P_1 14–15; P_2 6–7; GR

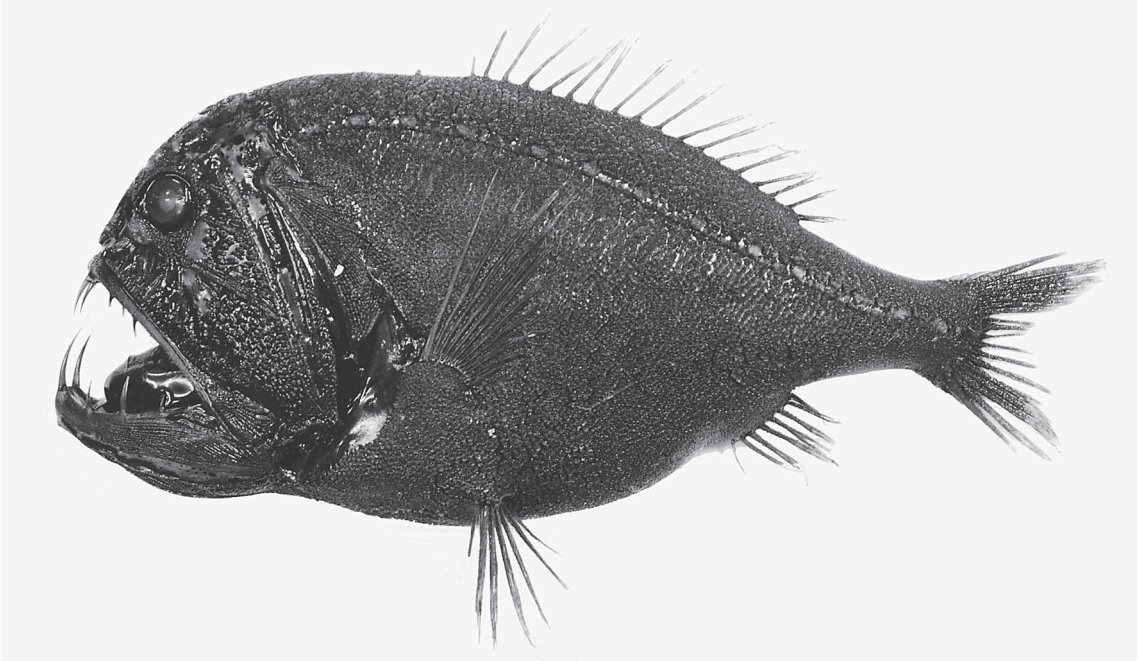

Fig. 94. *Anoplogaster cornuta*, HUMZ 210808, 124 mm SL.

17–19; V 25–26; body robust, strongly compressed, covered with minute rough scales; head extremely large, with many irregular grooves and ridges; mouth extremely large, with fang-like teeth on both jaws; eye small; gill rakers short, each with two or three spines; lateral line in single groove bridged over at intervals by fused scales; caudal peduncle relatively slender, tapering; body uniformly blackish.

Remarks. The genus *Anoplogaster* Günther, 1859 includes two species, *A. cornuta* and *Anoplogaster brachycera* Kotlyar, 1986 (Kotlyar, 2003), distinguishable from each other by the number of dorsal fin rays, and lengths of the temporal and preopercular spines (Kotlyar, 1987). Although Kotlyar (1987) noted that the temporal and preopercular spines are larger in *A. cornuta* than in *A. brachycera* in specimens less than 60 mm SL, those spines become relatively smaller with growth in the former. Furthermore, specimens of *A. brachycera* larger than 60 mm SL have not been collected (Kotlyar, 2003). Although the above spine lengths cannot be used to discriminate between larger examples of the two species, the present specimens agreed closely with *A. cornuta* in having 18–19 dorsal fin rays (16–17 in *A. brachycera*). *Anoplogaster cornuta* occurs worldwide in temperate to tropical waters in depths of 46–4,900 m (Post, 1990b; McEachran and Fechhelm, 1998).

Order Scorpaeniformes
Family Scorpaenidae

87. *Ectreposebastes imus* Garman, 1899
(Japanese name: Kuro-kasago)
(Fig. 95)

Material examined. Five specimens, 62.1–182 mm SL: HUMZ 210811-210812, HUMZ 210988, OSMT1009; HUMZ 210882, OSMT1008; HUMZ 211118, OSMT1007.

Diagnosis. D XII, 10–11; A III, 6–7; P_1 18–20; P_2 I, 5; GR 16–18; V 23–25; body oval, strongly compressed; body covered with small cycloid scales; mouth large, upper jaw extending to below posterior margin of orbit; maxilla with median keel; eye small; preorbital margin with three spines; preopercle with five spines; lateral line a continuous trough, covered with thin, deciduous scales; pectoral fin long, reaching middle of anal fin base; caudal peduncle slender; body uniformly blackish.

Remarks. Although many authors have considered *Ectreposebastes niger* (Fourmanoir, 1970) to be a junior synonym of *E. imus*, Eschmeyer and Randall (1975) showed the former to be valid and distinguishable from the latter by the large scales on the body (vs. small in *E. imus*) and the pectoral fin not reaching the middle of the anal fin base (vs. reaching). The present specimens were accordingly identified as *E. imus*. *Ectreposebastes imus* occurs worldwide in tropical to temperate waters in depths of 150–2,000 m (e.g., Amaoka, 1984c; Eschmeyer and Dempster, 1990).

Order Perciformes
Family Percichthyidae

88. *Bathysphyraenops simplex* Parr, 1933
(Japanese name: Toge-sumikuiuo)
(Fig. 96)

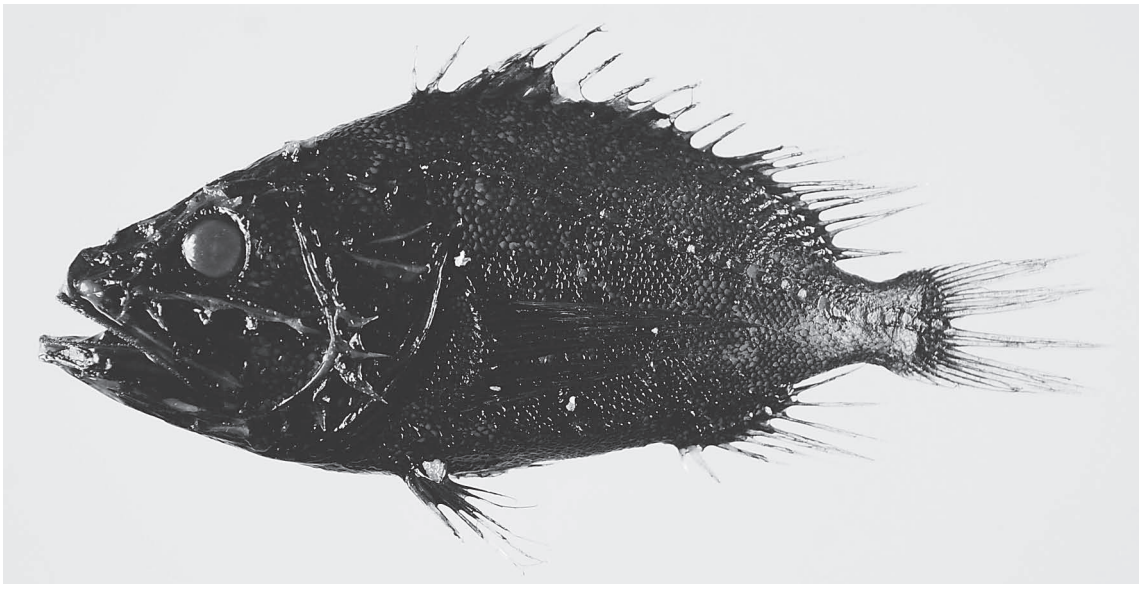

Fig. 95. *Ectreposebastes imus*, HUMZ 210812, 94.8 mm SL.

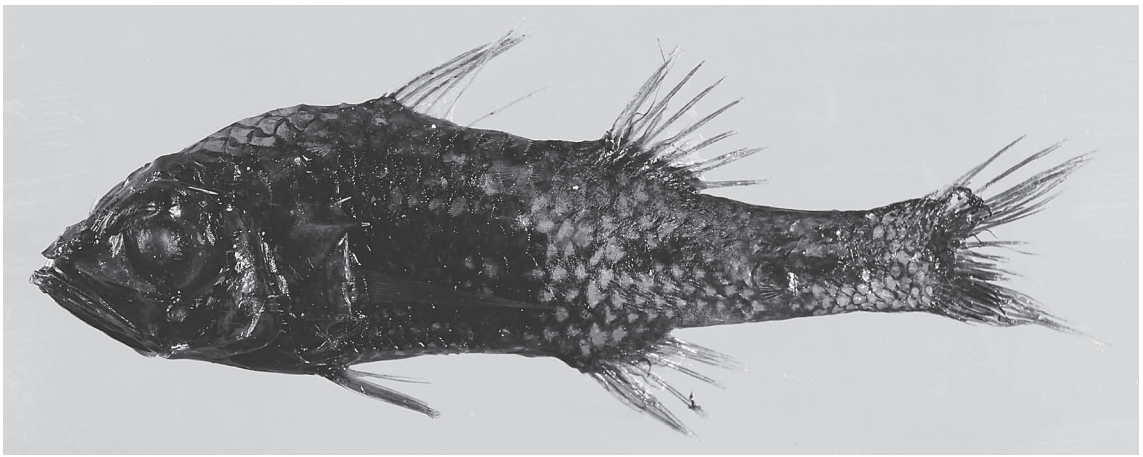

Fig. 96. *Bathysphyraenops simplex*, HUMZ 211043, 57.7 mm SL.

Material examined. Two specimens, 57.7–65.1 mm SL: HUMZ 211043, OSMT1009: HUMZ 211111, OSMT1007.

Diagnosis. D VIII-I, 9; A III, 7; P_1 13–14; P_2 I, 5; GR 26–27; TRa 2–3; TRb 7–8; V 24–25; body elongate, compressed, covered with deciduous ctenoid scales; mouth small, oblique; eye large; two spines on upper margin of orbit; opercle with two spines; subopercle with two well separated spines of about equal length; posterior margin of preopercle distinctly serrated; pectoral fin long, extending to anal fin origin; body uniformly blackish.

Remarks. Identification followed Mochizuki (1984a), McEachran and Fechhelm (2005) and Prokofiev (2007). This species occurs worldwide in tropical to temperate waters in depths of 100–500 m (McEachran and Fechhelm, 2005; Mundy, 2005).

89. *Howella zina* Fedoryako, 1976
(Japanese name: Toge-kushi-sumikuiuo)
(Fig. 97)

Material examined. 10 specimens, 29.4–86.8 mm SL: HUMZ 210815, HUMZ 210984, HUMZ 211041, OSMT1009; HUMZ 210884, OSMT1008; HUMZ 211087 (6), OSMT1007.

Other material. 19 specimens: HUMZ 210985–210986 (1, 5), HUMZ 211042 (5), OSMT1009; HUMZ 211110 (8), OSMT1007.

Diagnosis. D VII–VIII-I, 8–9; A III, 7; P_1 14–15; P_2 I, 5; GR 28–32; LLp 30–38; TRa 2; TRb 7–8; V 25–26; body elongate, compressed, covered with strong ctenoid scales; mouth small, oblique; vomer and palatine with teeth; eye large; two spines on upper margin of orbit; subopercle with one large spine; opercle with one upper and

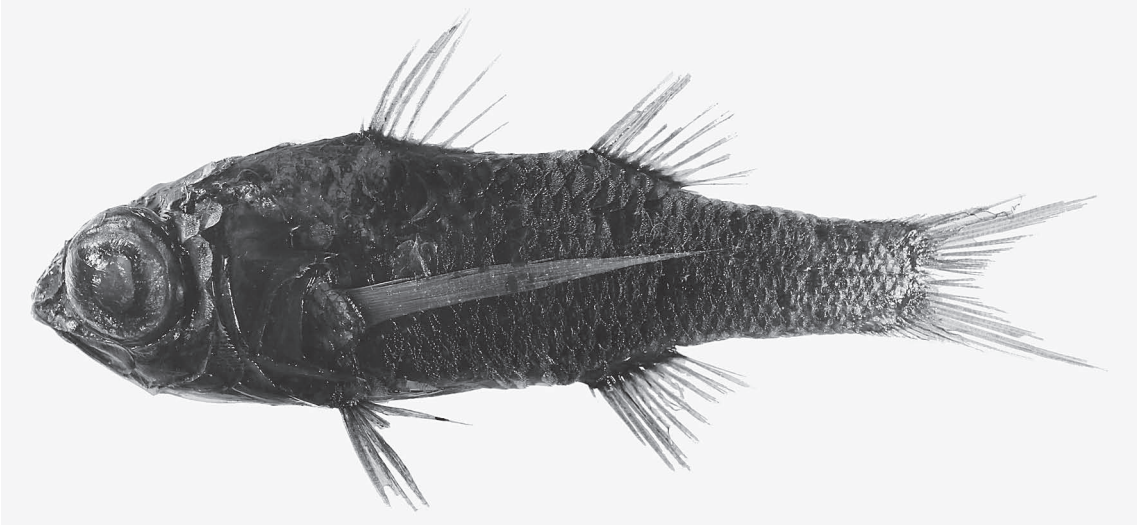

Fig. 97. *Howella zina*, HUMZ 210815, 77.5 mm SL.

several lower spines; lateral line on anterior part of body interrupted; body uniformly blackish.

Remarks. Identification followed Fedoryako (1976), Yamakawa (1982b) and Mochizuki (1984b). *Howella zina* occurs in the western and central North Pacific region, including southern Japan and the Hawaiian Islands, in depths of 322–400 m (Yamakawa, 1982b; Mochizuki, 1984b; Mundy, 2005).

Family Caristiidae

90. *Caristius macropus* (Bellotti, 1903)
(Japanese name: Yaegisu)
(Fig. 98)

Material examined. Four specimens, 146–186 mm SL: HUMZ 211060–211062, OSMT1007; HUMZ 211647, OSMT1008.

Diagnosis. D 32–34; A 19–22; P_1 15–17; P_2 I, 5; GR 18; V 35–36; BD 41–49% SL; snout length 3.9–4.7%; pelvic fin length 45–46%; body ovoid, strongly compressed, covered with small deciduous cycloid scales; snout extremely short, slightly covered with skin; forehead steeply rising, knife-edged; mouth large, oblique; both jaws, vomer and palatine with teeth in single row; dorsal fin origin about above center of eye; pelvic fin greatly elongate; body uniformly brown.

Remarks. Identification followed Amaoka (1983c), Paxton (2001) and Kukuev et al. (2012). This species occurs in the Atlantic and Pacific Oceans, including Angola, Australia, the Japanese and Hawaiian Archipelagos, the Bering Sea and Alaska, in depths of 200–1,450 m (Fujii, 1984m; Post, 1990c; Balanov, 2000; Mecklenburg et al., 2002; Mundy, 2005; Bray et al, 2006; Tweddle and Anderson, 2008; Okamoto et al., 2010).

91. *Paracaristius maderensis* (Maul, 1949)
(New Japanese name: Madeira-kokuchi-yaegisu)
(Fig. 99)

Material examined. Five specimens, 177–203 mm SL: HUMZ 210818–211002, OSMT1009.

Diagnosis. D 28–31; A 19–21; P_1 13–14; P_2 6; GR 21–22; V 33–36; BD 55–63% SL; snout length 7.0–9.8% SL; pelvic fin length 49–54% SL; body ovoid, strongly compressed, covered with small cycloid scales; snout short, widely covered with skin; mouth large, oblique; both jaws with teeth in multiple rows; vomer and palatine without teeth; finger-like papillae absent along dorsal margin of hyoid arch, and at articulation of interhyal and posterior ceratohyal; dorsal fin origin posterior to eye; pelvic fin greatly elongate; body uniformly dark brown.

Remarks. Two species of *Paracaristius*, *P. maderensis* and *Paracaristius nudarcus* Stevenson and Kenaley, 2011 have been recorded from Japanese waters (Stevenson and Kenaley, 2011). *Paracaristius maderensis* is distinguished from the latter by having the teeth on both jaws arranged in multiple rows (vs. single row in *P. nudarcus*) and the dorsal fin origin posterior to the eye (vs. above eye) (Stevenson and Kenaley, 2011). *Paracaristius maderensis* also differs from two other congeners, *Paracaristius aquilus* Stevenson and Kenaley, 2011 and *Paracaristius nemorosus* Stevenson and Kenaley, 2011, in having 28–31 dorsal fin rays (vs. 30–33 in *P. aquilus* and *P. nemorosus*) and 18–21 anal fin rays (vs. 16–17 in *P. aquilus* and 15–18 in *P. nemorosus*), and in lacking finger-like papillae along the dorsal margin of the hyoid arch and at the articulation of the interhyal and posterior ceratohyal (vs. present in *P. aquilus* and *P. nemorosus*). *Paracaristius maderensis* is known from the Atlantic, southern Indian and Pacific oceans, including Nova Scotia, New England, Gulf of Mexico, off Angola, and the Hawaiian and Ogasawara

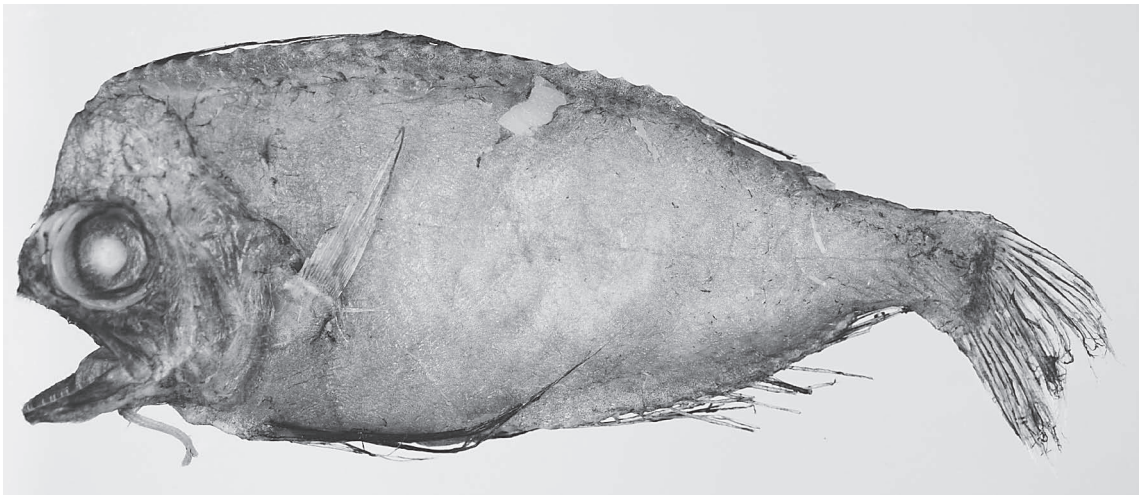

Fig. 98. *Caristius macropus*, HUMZ 211060, 146 mm SL.

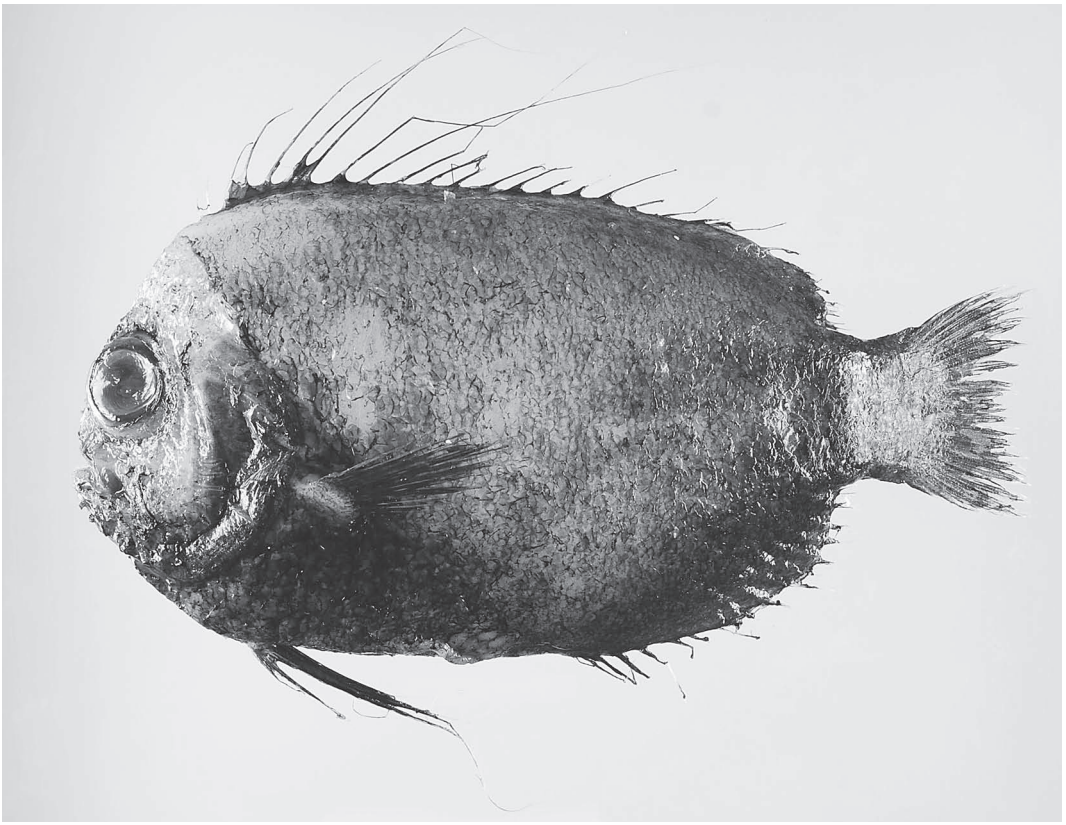

Fig. 99. *Paracaristius maderensis*, HUMZ 210818, 186 mm SL.

islands, in depths of 100–2,000 m (e.g., Post, 1990c; Trunov and Kukuev, 2004; McEachran and Fechhelm, 2005; Mundy, 2005; Trunov et al., 2006; Tweddle and Anderson, 2008; Hartel et al., 2008; Stevenson and Kenaley, 2011; this study).

Although Hatooka (2013b) revised the taxonomy of the Japanese caristiids, he did not include *P. maderensis*, having been unable to examine Japanese examples of the species. The new Japanese name "Madeira-kokuchi-yaegisu" is proposed herein for *P. maderensis*.

Family Emmelichthyidae

92. *Emmelichthys struhsakeri* Heemstra and Randall, 1977
(Japanese name: Rôsoku-chibiki)
(Fig. 100)

Material examined. Two specimens, 48.6–64.5 mm

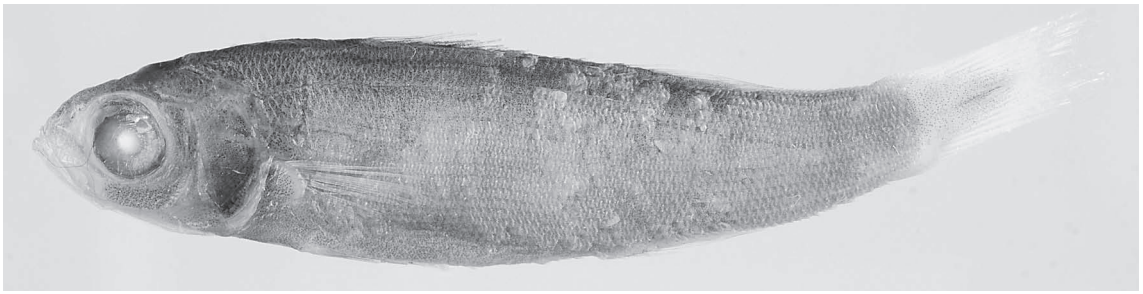

Fig. 100. *Emmelichthys struhsakeri*, HUMZ 211119, 48.6 mm SL.

SL: HUMZ 211119, OSMT1007; HUMZ 211654, OSMT1008.

Diagnosis. D VII-I-I-I-I,10 or VIII-I-I-I,10; A III, 9-10; P_1 19-20; P_2 I, 5; GR 30-31; LLp 70-76; TRa 6; TRb 13-18; V 23; BD 22-26% SL; body slender, slightly compressed, covered with ctenoid scales; mouth oblique; upper jaw toothless, reaching below anterior margin of pupil; lower jaw with villiform teeth; eye relatively large; upper posterior margin of gill cavity with a single fleshy papilla; body uniformly pale brown.

Remarks. Identification followed Heemstra and Randall (1977), Tameka (1982) and Yamakawa (1985). This species occurs in the western and central Pacific, including southern Japan, the South China Sea, Australia and the Hawaiian Islands, in depths of 222–360 m (Heemstra and Randall, 1977; Mochizuki, 1984c; Yamakawa, 1985; Randall and Lim, 2000b; Mundy, 2005; Allen, 2006).

Family Chiasmodontidae

93. *Chiasmodon* sp.
(Fig. 101)

Material examined. Four specimens, 84.5-224 mm SL: HUMZ 210935, OSMT1009; HUMZ 211083, HUMZ 211090 (2), OSMT1007.

Diagnosis. D X-XI-27-28; A I, 25-28; P_1 15; P_2 I, 5; V 42-44; body elongate, moderately compressed, covered with tiny spines; mouth large; teeth present on premaxilla, dentary, palatine, second and third basibranchials, second hypobranchial, upper pharyngobranchials, and fifth ceratobranchial; two fang-like teeth on anterior part of premaxilla; eye relatively large; nine supraorbital pores present; body uniformly blackish.

Remarks. The present specimens were most similar to *Chiasmodon asper* Melo, 2009 in having 15 pectoral fin rays, tiny spines on the body, two fang-like teeth on the anterior part of the premaxilla and nine supraorbital pores (Melo, 2009). However, Prokofiev (2010) considered *C. asper* to be a junior synonym of *Chiasmodon lavenbergi* Prokofiev, 2008, which species Melo (2009) had placed as a junior synonym of *C. pluriradiatus* Parr, 1933. However, because Melo (2009) and Prokofiev (2010) did not examine the type series of *C. lavenbergi* or *C. asper*, respectively, such being also the case in the present study, the validity of *C. asper* cannot be evaluated here. The present specimens are tentatively treated as *Chiasmodon* sp. herein, pending further study.

94. *Pseudoscopelus odontoglossum* Melo, 2010
(Fig. 102)

Material examined. One specimen, 162 mm SL: HUMZ 211112, OSMT1007.

Diagnosis. D VIII-24; A 25; P_1 12; P_2 I, 5; V 36; body elongate, moderately compressed; snout short, convex anteriorly; mouth large, canine teeth on both jaws; hooked teeth present on lateral series of dentary and premaxilla; teeth visible from dorsal and ventral views; head with apf, mxf, vnf, ppf, amf and pmf, and body with pf, paf, vf, vaf, if, prvf, ptvf, saf and prcf photophores; both sides of first dorsal fin base lacking bony plate row; pectoral fin short, not reaching origin of anal fin; body uniformly blackish.

Remarks. The present specimen was identified as *Pseudoscopelus odontoglossum* on the basis of having a short, anteriorly convex snout, both sides of the first dorsal fin base lacking a bony plate row and the pectoral fin not reaching the origin of the anal fin (Melo, 2010). Nakabo and Doiuchi (2013a) recently reported *Pseudoscopelus* sp. (Japanese name: Tômaru-kurobôzugisu) from Japan, indicating its similarity to *P. odontoglossum* in the above characters. However, *Pseudoscopelus* sp. differed from *P. odontoglossum* in having 21 soft dorsal fin rays and 20 anal fin rays (vs. 23-26 and 24-27, respectively, in *P. odontoglossum*). A Japanese name has not been proposed herein for *P. odontoglossum* owing to its uncertain status *vis-à-vis Pseudoscopelus* sp. *Pseudoscopelus odontoglossum* is known only from the Pacific Ocean, including the Ogasawara Islands, in depths of 325-2,700 m (Melo, 2010; this study).

95. *Pseudoscopelus sagamianus sagamianus* Tanaka, 1908
(Japanese name: Kurobôzugisu)
(Fig. 103)

Material examined. Two specimens, 103-127 mm

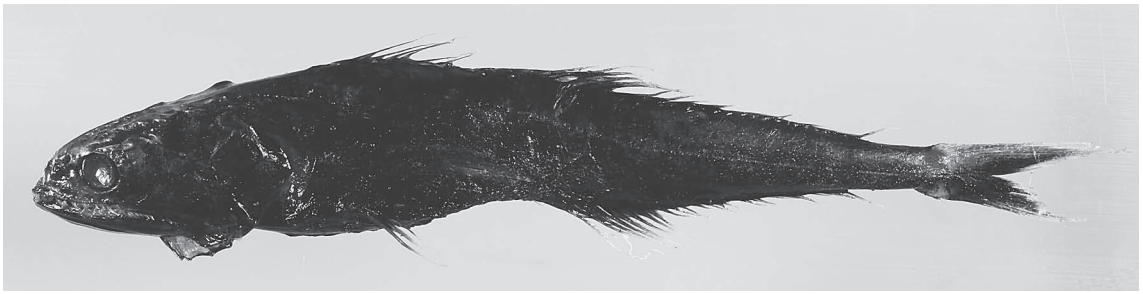

Fig. 101. *Chiasmodon* sp., HUMZ 210935, 94.4 mm SL.

Fig. 102. *Pseudoscopelus odontoglossum*, HUMZ 211112, 162 mm SL.

Fig. 103. *Pseudoscopelus sagamianus sagamianus*, HUMZ 211683, 127 mm SL.

SL: HUMZ 210804, OSMT1009; HUMZ 211683, OSMT1008.

Diagnosis. D VIII–IX–21–22; A 23–24; P_1 13–15; P_2 I, 5; V 35; body elongate, moderately compressed; snout long, pointed; mouth large; canine teeth on both jaws arranged in four rows; head with apf, dnf, inof, mxf, vnf, ppf, amf and pmf, and body with pf, paf, vf, vaf, trf, if, prvf, ptvf, saf and prcf photophores; trf forming two rows; saf extending anteriorly beyond level of anus; prcf forming long band; two dorsal fins present; pectoral fin long, extending beyond anal fin origin; body and internal part of mouth uniformly blackish.

Remarks. Many authors have rejected the division of *Pseudoscopelus sagamianus* into subspecific taxa (e.g., Spits et al., 2007; Melo, 2010; Nakabo and Doiuchi, 2013a), whereas Prokofiev (2009) recognized three significant differences between the North Pacific and Atlantic–Indian populations in this species (i.e., trf usually forming two or three rows in the former vs. four or five rows in the latter; prcf forming a long band vs. shorter and usually rhomboidal; and internal part of mouth blackish vs. whitish). Subsequently, Prokofiev (2011) considered *P. sagamianus* to be separable into two subspecies, *P. s. sagamianus* (North Pacific population) and *Pseudoscopelus sagamianus oceanicus* Prokofiev, 2011 (Atlantic–Indian population). The present specimens agreed closely with *P. s. sagamianus sensu* Prokofiev (2011), which occurs in the western and central Pacific region, including Taiwan and the Japanese Archipelago (Prokofiev, 2009, 2011).

96. *Pseudoscopelus scutatus* Krefft, 1971
(Japanese name: Uroko–kurobôzugisu)
(Fig. 104)

Material examined. Two specimens, 57.2–67.1 mm SL: HUMZ 211113, HUMZ 215737, OSMT1007.

Diagnosis. D VII–22–23; A 24–25; P_1 13; P_2 I, 5; V 35; body elongate, moderately compressed; snout tip with depression; mouth large; canine teeth on both jaws; head with apf, amf and pmf, and body with if, prvf, ptvf, svf, saf and prcf photophores; both sides of first dorsal fin base with

Fig. 104. *Pseudoscopelus scutatus*, HUMZ 211113, 67.1 mm SL.

bony plates row; body uniformly brown.

Remarks. Identification followed Prokofiev and Kukuev (2006), Melo (2010) and Nakabo and Doiuchi (2013a). This species is known from the Atlantic and Indo-West Pacific, including waters off New England, the Gulf of Mexico and the Japanese Archipelago, in depths of 85–1,716 m (Bekker et al., 1975; Moore et al., 2003; Prokofiev and Kukuev, 2006; Melo, 2010; Nakabo and Doiuchi, 2013a).

Family Gempylidae

97. *Diplospinus multistriatus* Maul, 1948
(Japanese name: Hoso-kurotachi)
(Fig. 105)

Material examined. Two specimens, 179–193 mm SL: HUMZ 215662, OSMT1009; HUMZ 215663, OSMT1007.

Diagnosis. D XXXI–XXXIV–37–41; A II, 26–30; P_1 10–11; P_2 I; V 57–59; body greatly elongate, compressed; mouth moderately large; tip of upper jaw with conical cartilaginous process; upper jaw with three immovable fang-like teeth; pelvic fin comprising one minute spine; first dorsal fin base about twice length of second dorsal fin base; anus situated midway between tips of snout and caudal fin (in front of first anal fin spine by distance equal to head length); body uniformly pale brown.

Remarks. Identification followed Nakamura (1982), Nakamura and Parin (1993) and Parin and Nakamura (2003). *Diplospinus multistriatus* occurs worldwide in tropical to temperate waters in depths of 100–1,000 m (Nakamura, 1984; Nakamura and Parin, 1993).

98. *Gempylus serpens* Cuvier, 1829
(Japanese name: Kurotachi-kamasu)
(Fig. 106)

Material examined. Two specimens, 196–267 mm SL: HUMZ 211089, OSMT1007; HUMZ 211668, OSMT1008.

Diagnosis. D XXVIII–XXIX–15–19; A II, 16–17; P_1 13–15; P_2 I, 3; V 49–50; body greatly elongate, compressed; mouth moderately large; upper jaw with three immovable fang-like teeth; tip of lower jaw with conical cartilaginous process; two lateral lines present, both inserted below base of first dorsal spine, upper one extending to end of first dorsal fin, lower one running along midline to caudal peduncle; pelvic fin extremely small; dorsal and anal fins with several finlets; body uniformly blackish.

Remarks. Identification followed Fujii (1983c), Nakamura and Parin (1993) and Parin and Nakamura (2003). This species occurs worldwide in tropical to temperate waters, from the surface to 200 m depth (Nakamura, 1984; Nakamura and Parin, 1993).

Family Trichiuridae

99. *Benthodesmus elongatus* (Clarke, 1879)
(Japanese name: Yamamoto-tachimodoki)
(Fig. 107)

Material examined. One specimen, 1203 mm SL: HUMZ 210998, OSMT1009.

Diagnosis. D 153; A 98; P_1 12: P_2 I; GR 13; HL 14.5% SL; BD 4.8%; body extremely elongate; mouth extremely large, but posterior end of upper jaw not extending beyond posterior of eye; lower jaw extending to anterior tip of upper jaw; tips of both jaws with short dermal process; both jaws with large fang-like teeth; palatine teeth present; vomerine teeth absent; body silver when fresh; jaws and opercle blackish.

Remarks. Parin (1986) divided *Benthodesmus elongatus* into three subspecies [*B. e. elongatus*, *Benthodesmus elongatus simonyi* (Steindachner, 1891) and *Benthodesmus elongatus pacificus* Parin and Becker, 1970] based on meristic characters and geographical distribution, subsequently being

Fig. 105. *Diplospinus multistriatus*, HUMZ 215662, 179 mm SL.

Fig. 106. *Gempylus serpens*, HUMZ 211668, 196 mm SL.

Fig. 107. *Benthodesmus elongatus*, HUMZ 210998, 1,203 mm SL.

followed by Scott and Scott (1988) and McAllister (1990). However, Nakabo (2002b) and Nakabo and Doiuchi (2013b) found the supposed subspecific diagnostic characters to be confused in specimens collected from Japanese waters and accordingly listed their material at the specific level only (see Nakabo, 2002b for details). Their decision is followed here. *Benthodesmus elongatus* occurs in the Atlantic and Indo-Pacific region in depths of 260-950 m (Nakabo, 2002b; Nakabo and Doiuchi, 2013b).

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