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PENSOFT

A checklist of ponyfishes (Teleostei, Leiognathidae) from Miyazaki Prefecture, east coast of Kyushu, southern Japan, with range extensions of three tropical species

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Abstract
A checklist is presented of ponyfish species (Teleostei, Leiognathidae) from the coast of Miyazaki Prefecture, eastern coast of Kyushu, in the warm temperate zone of Japan and in areas influenced by the warm Kuroshio Current. Fish collection surveys (autumn, October 2016 to winter, early 2017) recorded 9 species of the family, including 1 collected by previous authors. Records of 3 species, *Gazza minuta* (Bloch, 1795), *Leiognathus equulus* (Forsskål, 1775), and *Leiognathus fasciatus* (Lacepède, 1803), extended their distributional ranges northward by ca 150–500 km. These 3 species and 3 others are distributed mainly in the tropical zone, and, combined with previous records of leiognathid fishes along the coasts influenced by the Kuroshio Current in southern Japan, this study shows a continuous distribution pattern of these tropical species, suggesting that the east coast of Kyushu is also influenced by this warm current. Diagnostic features, color images, and voucher specimen data are provided for each species.

Key words
Distribution; *Gazza minuta*; Kadogawa Bay; Kuroshio Current; *Leiognathus equulus*; *Leiognathus fasciatus*; new record.

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Introduction

Members of the family Leiognathidae (Teleostei, Perciformes), known as ponyfishes, are small, generally silvery fishes, most less than 15 cm in total length, but some reach nearly 25 cm. Most species form schools that may contain up to several hundred individuals. They are found near the bottom in shallow coastal waters, with several species entering brackish waters, especially estuaries, and with a few ranging into fresh water. This family is widely distributed in the Indo-West Pacific region with most species occurring in tropical Southeast Asia (Allen and Erdmann 2012). Approximately 49 species in 9 genera are known (Woodland et al. 2001, Allen and Erdmann 2012, Kimura 2015, Nelson et al. 2016). Fourteen species in 7 genera are known from Japan (Senou 2013), and 11 of these are considered tropical species based on their distribution patterns (Nakabo 2013).

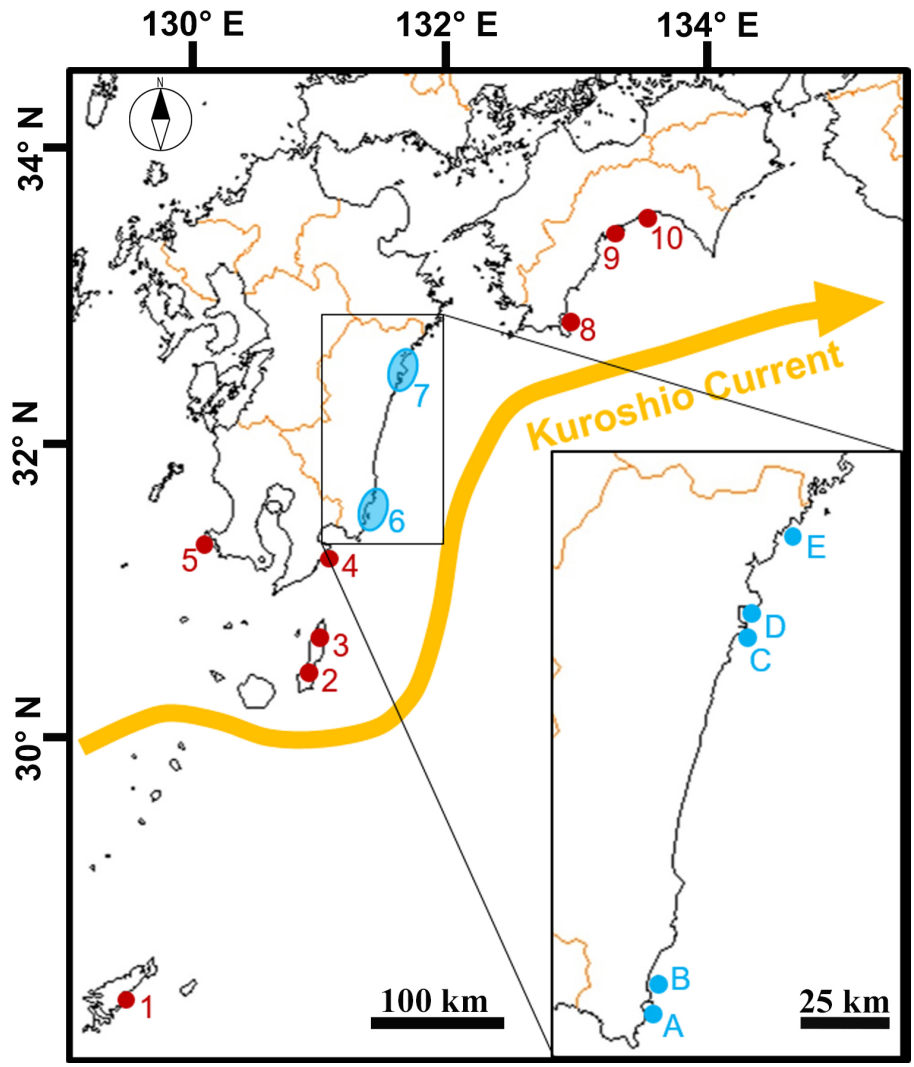

Figure 1. Map showing literature records based on vouchers (red numbers) and the sampling points of this study (blue numbers and letters) for tropical species of Leiognathidae along the Kuroshio Current (orange line) in southern Japan. The numbers and letters represent the following sites: 1, Sumiyo Bay, Amami Island; 2, southern part of Tanega-shima island; 3, northern part of Tanega-shima island; 4, Uchinoura Bay, Kagoshima Prefecture; 5, Kasasa Town, Kagoshima Prefecture; 6, southern part of Miyazaki Prefecture; 7, northern part of Miyazaki Prefecture; 8, Iburi, Tosa-shimizu City, Kochi Prefecture; 9, Urado Bay, Kochi Prefecture; 10, Konan City, Kochi Prefecture; A, B, collecting points to be landed in the Meitsu Fishing Port; C, collecting point to be landed in the Tomishima Fishing Port ; D, collecting point to be landed in the Kadogawa and Iorigawa fishing ports; E, collecting point to be landed in the Urashiro Fishing Port.

Miyazaki Prefecture is located on the south-east side of Kyushu, which is the southernmost main island of Japan, and has a long coast (latitudinally) that faces the Pacific Ocean. Offshore, the warm, strong Kuroshio Current flows from the south-west to the north-east (Fig. 1), and a number of tropical fishes have been reported at their northernmost extent of distribution in the prefecture (e.g. Miyamoto et al. 2011, Hayashida et al. 2012, Miki 2017, Miki et al. 2017). Comprehensive fish surveys of this region are needed to better understand the effects of the Kuroshio Current on marine fish diversity in relation to the known biogeography of the northwestern Pacific region. During our survey of the marine fish fauna of Miyazaki Prefecture, 9 species of leiognathids were collected and 3 of these species represent their northernmost records. We herein provide a list of leiognathid species of Miyazaki Prefecture based on voucher specimens, with their diagnostic features and color images.

Methods

Study site. Ponyfish collections were made from October 2016 (Japanese autumn) to January 2017 (winter). A diversity of marine fish taxa can be expected during these seasons because most of the tropical fishes transported by the Kuroshio Current are present off Japan's main southern island in the warm season and absent in the cold season (Motomura 2012). Fishes were collected by gathering bycatch fishes landed with set net or trawl for fishery purposes at the following fishing ports of Miyazaki Prefecture (Fig. 1A–E): Urashiro Fishing Port (mixed catch from 2 set nets, 32°39′30″N, 131°50′02″E, ca 30 m depth and 32°39′20″N, 131°49′10″E ca 30 m depth); Iorigawa Fishing Port (mixed catch from 2 set nets, 32°28′39″N, 131°39′57″E, 8 m depth and 32°28′37″N, 131°39′42″E, 8 m depth; trawl, Kadogawa Bay, coast of Kadogawa town, ca 40 m depth); Kadogawa Fishing Port (trawl, around Biro-jima island, coast of Kadogawa town, ca

40 m depth); Tomishima Fishing Port (mixed catch from 2 set nets, 32°25′43.5″N, 131°41′36.8″E, 32 m depth and 32°24′47.6″N 131°41′05.7″E, 20 m depth); Meitsu Fishing Port (mixed catch from 6 set nets, 31°31′44.3″N, 131°25′19.8″E, 45 m depth; 31°30′50.5″N, 131°23′26.8″E, 27 m depth; 31°30′16.4″N, 131°23′20.4″E, 15 m depth; 31°28′30.0″N, 131°23′50.1″E, 48 m depth; 31°27′23.2″N, 131°22′27.8″E, 12 m depth; and 31°26′25.3″N, 131°22′46.4″E, 25 m depth). In order to summarize the leiognathid fauna in the prefecture, we also reexamined a specimen identified by Eguchi et al. (2008) as *Leiognathus equulus* (Forsskål, 1775), which was collected from Kita-gawa river, Kawashima Town, Nobeoka City, the northern part of Miyazaki Prefecture on 5 July 2005 and subsequently deposited in the Kyushu University (KYUM-PI 1373, ex FRLK-070265).

Data collection. The collected specimens were fixed with 10% formalin and preserved in 70% ethanol. These materials were deposited in the fish collection of the Kanagawa Prefectural Museum of Natural History (KPM-NI) as vouchers for the present study. The identification and scientific names followed Senou (2013), Sparks and Chakrabarty (2015), and Suzuki and Kimura (2017). Counts and measurements followed Mochizuki and Hayashi (1989). Senou (2013) reviewed previous distribution records of members of the family Leiognathidae from Japanese waters and additional information was added by Endo (2012), Fujiwara and Motomura (2016), and Suzuki and Kimura (2017). The distribution of leiognathid species in Japanese waters followed these authors. Standard length (SL) was measured as the distance from the snout tip to the base of the caudal fin. Color photographs of the specimens were taken when fresh and deposited in the image data base of Kanagawa Prefectural Museum of Natural History (KPM-NR). Nakabo (2013) defined the biogeographic categories of fishes distributed in Japanese waters into 46 groups based on differences in distributional patterns. We followed his definitions for dividing each leiognathid species into its biogeographic category. Tropical species of the family have their northernmost limits along coasts of Japan that are influenced by the Kuroshio Current, and the distribution records of tropical species recorded in the present study are summarized in Table 1 and Figure 1.

Results

We recorded 464 individuals from 7 genera and 8 species from Miyazaki Prefecture. In addition to these species, we confirmed *Leiognathus equulus* by the reexamination of a specimen listed in a past study and from photographic material. Of these records, those of *Gazza minuta* (Bloch, 1785), *L. equulus*, and *Leiognathus fasciatus* (Lacepède, 1803) represent the northernmost records for the species. A list of all specimens examined, their digitized voucher numbers, and geographic coordinates are listed in the Appendix (Table A1).

Family Leiognathidae

Genus *Deveximentum* Fowler, 1904

***Deveximentum indicium* (Monkolprasit, 1973):** Figure 2A, B

Secutor indicius Monkolprasit 1973: 14—Woodland et al. 2001: 2819; Kimura et al. 2008a: 111; Kimura 2011: 115; Senou 2013: 901; Fujiwara and Motomura 2016: 199.

Deveximentum indicium—Kottelat 2013: 337; Kimura 2017: 121.

Diagnosis. This species is characterized by the following combination of characters: mouth protruding upwards; small slender teeth on both jaws; cheek completely naked; 15–22 irregular vertical dark markings consisting of dots and dashes dorsolaterally on body (Senou 2013).

Distribution. *Deveximentum indicium* is known from Japan, Taiwan, South China Sea, Philippines, Indonesia, New Guinea, and the Gulf of Thailand. In Japanese waters, this species is known from the coast of Konan City of Kochi Prefecture, northern and southern coasts of Miyazaki Prefecture, Uchinoura Bay (Pacific coast), and the coast of Minami-satsuma City, Kagoshima Prefecture (East China Sea) (Fig. 1, Table 1: Kimura et al. 2008a, Endo 2012, Senou 2013, Fujiwara and Motomura 2016, this study).

Remarks. Although *Deveximentum indicium* was first reported from Japan by Kimura et al. (2008a as *Secutor indicius*) from Uchinoura Bay, south-eastern Kyushu, 245 specimens (29.0–105.4 mm SL) of the species were collected from the coasts of Miyazaki Prefecture throughout the present survey period. In addition to the large number of specimens, a wide range of sizes were observed. This species is known to attain about 100

Table 1. Distribution records (P, present; —, absent) of six tropical species of Leiognathidae defined by Nakabo (2013) and their literature source. Number of each site (1–10) corresponding with site numbers in Figure 1

Species	Fujiwara and Motomura (2016)					This study		Senou (2013)*	Endo (2012)	
	Site 1	Site 2	Site3	Site 4	Site 5	Site 6	Site 7	Site 8	Site 9	Site 10
D. indicium	—	—	—	P	P	P	P	—	—	P
E. splendens	—	P	P	P	P	—	P	—	P	—
G. minuta	—	P	P	P	P	P	P	—	—	—
L. equulus	P	—	—	—	—	—	P	—	—	—
L. fasciatus	P	P	—	—	P	—	P	—	—	—
P. bindus	—	—	—	P	P	P	P	P	—	—

*Based on the record of Gosho (2001)

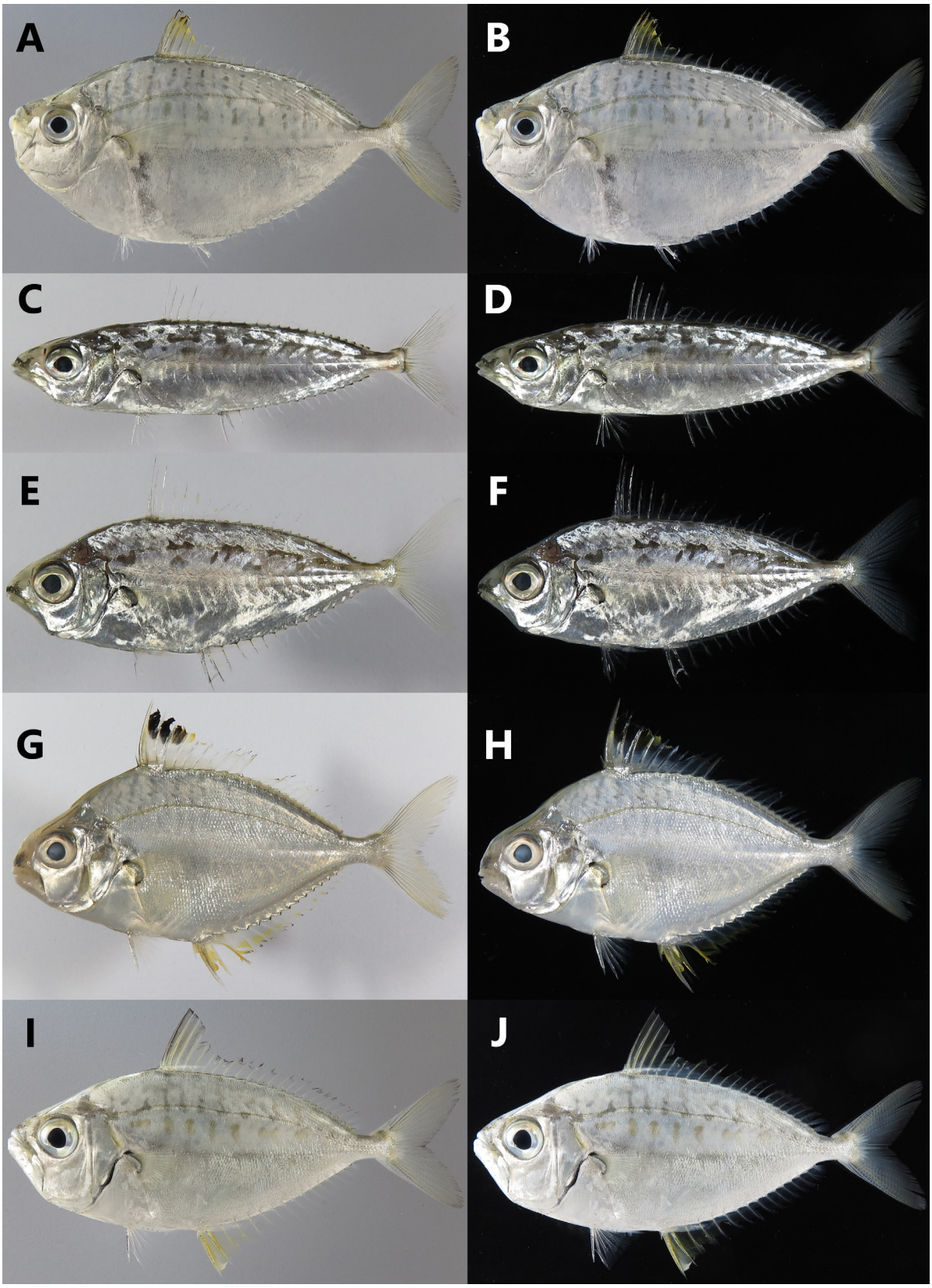

Figure 2. Color photographs of 5 species of Leiognathidae from Miyazaki Prefecture, southern Japan. **A, B.** *Deveximentum indicium*, KPM-NI 42050 (photo number KPM-NR 176933A, B respectively), 99.4 mm SL, Kadogawa Bay, set net, 8 m depth. **C, D.** *Equulites popei*, KPM-NI 42111, (KPM-NR 176937A, B), 65.6 mm SL, coast of Ichiki, Kushima City, set net, 25 or 48 m depth. **E, F.** *Equulites rivulatus*, KPM-NI 42104, (KPM-NR 176936A, B), 50.9 mm SL, Kadogawa Bay, trawl, ca 40 m depth; **G, H.** *Eubleekeria splendens*, KPM-NI 41909, (KPM-NR 176930A, B), 70.2 mm SL, Kadogawa Bay, set net, 8 m depth. **I, J.** *Gazza minuta*, KPM-NI 42053, (KPM-NR 176935A, B), 81.7 mm SL, Kadogawa Bay, set net, 8 m depth. Photos by A. Murase (C, D, E, F, G, H) and R. Miki (A, B, I, J).

mm SL (Kimura 2011), and therefore individuals from Miyazaki Prefecture are large enough to be mature. Furthermore, the largest specimen in this study (KPM-NI 42096, 105.4 mm SL) represents the maximum size from literature records in Japan.

Genus *Equulites* Fowler, 1904

***Equulites popei* (Whitley, 1932):** Figure 2C, D

Macilentichthys popei Whitley 1932: 114.

Leiognathus elongatus [not of Günther]—Senou 2013: 904; Fujiwara and Motomura 2016: 189.

Equulites popei—Suzuki and Kimura 2017: 339.

Diagnosis. this species is characterized by the following combination of characters: slender body, its depth equal to or shorter than head length; mouth protruding downwards; small slender teeth on both jaws; anterior dorsolateral surface of body and breast completely scaled; anterior spinous dorsal fin without conspicuous black blotch (Senou 2013).

Distribution. *Equulites popei* is known from Japan, Philippines, Malaysia (Sabah), Thailand (Gulf of Thailand), Oman, the Red Sea including Suez Bay, the Mediterranean (immigrant from the Red Sea), and southern Mozambique. In Japanese waters, this species is known from the Noto Peninsula, Sea of Japan coast of Yamaguchi Prefecture, western coast of Kyushu (Sea of Japan coast), Sagami Bay to the southern part of eastern coast of Kyushu (Pacific coast), and Okinawa Island (Senou 2013, Suzuki and Kimura 2017).

Remarks. Five specimens (35.6–65.5 mm SL) of *E. popei* were caught from the southern coast of Miyazaki Prefecture in December.

***Equulites rivulatus* (Temminck & Schlegel, 1845):** Figure 2E, F

Equula rivulata Temminck and Schlegel 1845: 126.

Equulites rivulatus—Senou 2013: 904, Fujiwara and Motomura 2016: 191.

Diagnosis. This species is characterized by the following combination of characters: body deep, its depth longer than head length; mouth protruding downwards; small slender teeth on both jaws; anterior dorsolateral surface of body and breast completely scaled; anterior spinous dorsal fin without conspicuous black blotch; irregular black blotches dorsolaterally on body (Senou 2013).

Distribution. *Equulites rivulatus* is known from Japan and the southern coast of Korean Peninsula. In Japanese waters, this species is known from the coast of Akita Prefecture to the southern part of western coast of Kyushu (Sea of Japan coast), the coast of Ibaraki Prefecture to the southern part of eastern coast of Kyushu, the Seto Inland Sea (Pacific coast), and the continental shelf of East China Sea (Senou 2013).

Remarks. 96 specimens (30.1–73.4 mm SL) of *E. rivulatus* were caught from the northern and southern coasts of Miyazaki Prefecture in November to January.

Genus *Eubleekeria* Fowler, 1904

***Eubleekeria splendens* (Cuvier, 1829):** Figure 2G, H

Equula splendens Cuvier 1829: 212.

Leiognathus splendens—Woodland et al. 2001: 2815.

Eubleekeria splendens—Chakrabarty et al. 2010: 112; Kottelat 2013: 338; Senou 2013: 903; Sparks and Chakrabarty 2015: 187; Fujiwara and Motomura 2016: 187; Kimura 2017: 123.

Diagnosis. This species is characterized by the following combination of characters: mouth protruding downwards; small slender teeth on both jaws; anterior dorsolateral surface of body and breast completely scaled; conspicuous black blotch on anterior spinous dorsal fin; many wavy transverse dark bars dorsolaterally on body (Senou 2013).

Distribution. *Eubleekeria splendens* is widely distributed in the Indo-West Pacific. In Japanese waters, this species is known from Urado Bay of Kochi Prefecture, the northern part of Miyazaki Prefecture, Uchinoura Bay (Pacific coast), the Ryukyu Islands, and Yaeyama Islands (Fig. 1, Table 1: Endo 2012, Senou 2013, Fujiwara and Motomura 2016, this study).

Remarks. A single specimen (70.2 mm SL) of *E. splendens* was caught from Kadogawa Bay in November.

Genus *Gazza* Rüppell, 1835

***Gazza minuta* (Bloch, 1795):** Figure 2I, J

Scomber minutus Bloch 1795: 110.

Gazza minuta—Woodland et al. 2001: 2799; Chakrabarty et al. 2010: 113; Kimura 2011: 112; Allen and Erdmann 2012: 441; Kottelat 2013: 338; Senou 2013: 900; Fujiwara and Motomura 2016: 193; Kimura 2017: 124.

Diagnosis. This species is characterized by the following combination of characters: mouth protruding forwards, with distinct canine teeth on both jaws; scaled area of anterior dorsolateral surface of body extending anteriorly beyond a vertical through posterior tip of sensory canal on temporal (Senou 2013).

Distribution. *Gazza minuta* is widely distributed in the Indo-West Pacific. In Japanese waters, this species is known from northern and southern coasts of Miyazaki Prefecture, Uchinoura Bay (Pacific coast), the coast of Minami-satsuma City of Kagoshima Prefecture (East China Sea), Tanega-shima Island, the Ryukyu Islands, and Yaeyama Islands (Fig. 1, Table 1: Senou 2013, Fujiwara and Motomura 2016, this study).

Remarks. The present record of 106 specimens (34.0–103.1 mm SL) and frequency of catchment (over autumn–winter period) indicates that *Gazza minuta* is a common species along the coasts of Miyazaki Prefecture. Previously, the northernmost record of the species was Uchinoura Bay, southeastern coast of Kyushu (Fujiwara and Motomura 2016), and the present specimens of *G. minuta* from Kadogawa Bay extend the known distributional range of the species ca 150 km north-northeast from Uchinoura Bay.

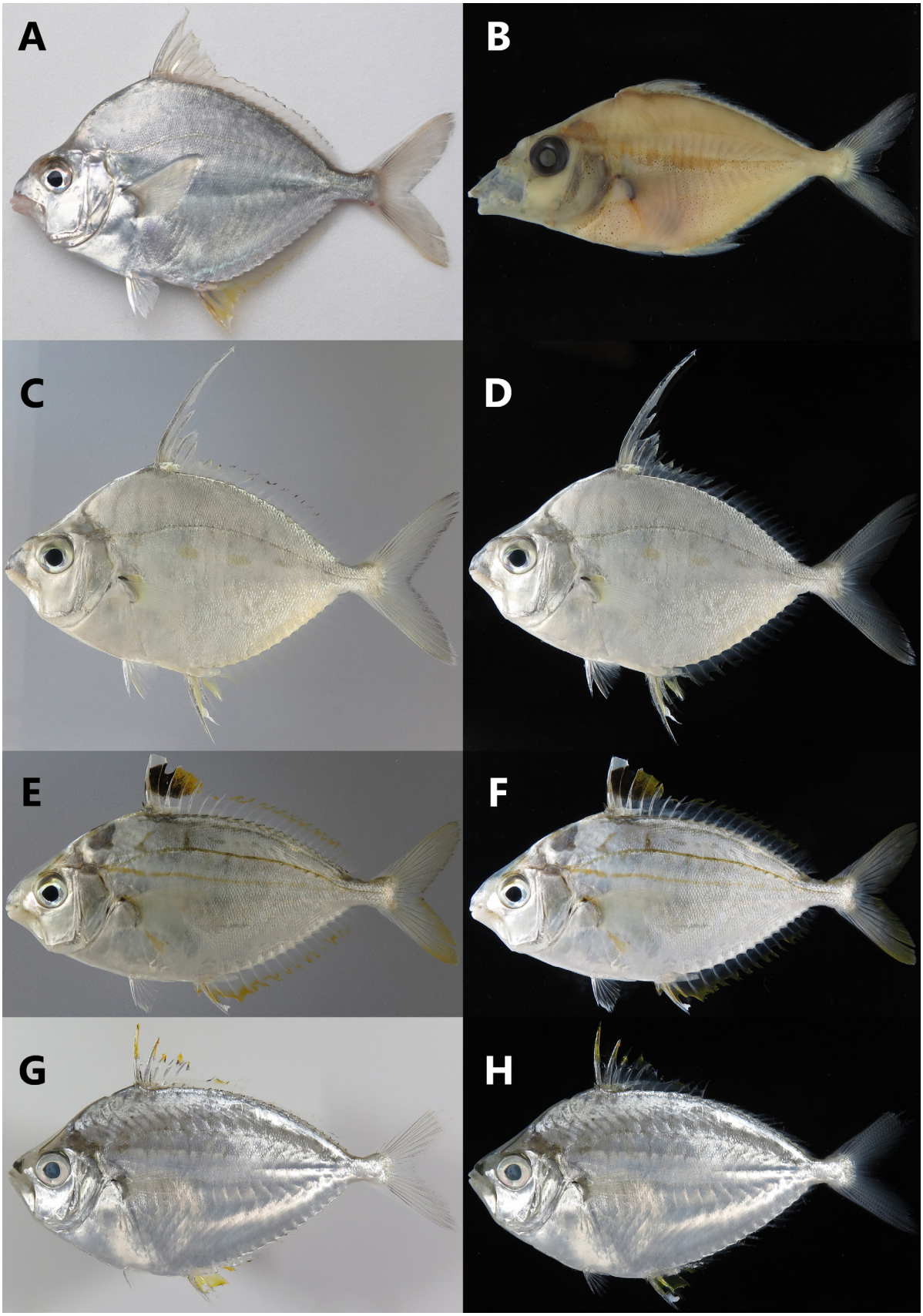

Figure 3. Color photographs of four species of Leiognathidae from Miyazaki Prefecture, southern Japan. **A.** *Leiognathus equulus*, specimen not obtained (photo number KPM-NR 176728), ca 150 mm SL, Kadogawa Bay, set net, 8 m depth. **B.** *Leiognathus equulus*, KYUM-PI 1373, 40.4 mm SL, Kita-gawa river of Kawashima Town, Nobeoka City, the northern part of Miyazaki Prefecture. **C, D.** *Leiognathus fasciatus*, KPM-NI 42049, (photo number KPM-NR 176932A, B respectively), 91.6 mm SL, Kadogawa Bay, set net, 8 m depth. **E, F.** *Nuchequula nuchalis*, KPM-NI 42052, (KPM-NR 176934A, B), 87.7 mm SL, Kadogawa Bay, set net, 8 m depth. **G, H.** *Photopectoralis bindus*, KPM-NI 41897, (KPM-NR 176929A, B), 74.0 mm SL, coast of Nango, Nichinan City or coast of Ichiki, Kushima City, set net, 25–48 m depth. Photos by M. Wada (A), A. Murase (B, G, H) and R. Miki (C, D, E, F).

Genus *Leiognathus* Lacepède, 1802

***Leiognathus equulus* (Forsskål, 1775):** Figure 3A, B

Scomber equula Forsskål 1775: 58.

Leiognathus equulus—Woodland et al. 2001: 2808; Eguchi et al. 2008: 19; Chakrabarty et al. 2010: 114; Kimura 2011: 113; Allen and Erdmann 2012: 442; Kottelat 2013: 339; Senou 2013: 903; Fujiwara and Motomura 2016: 195; Kimura 2017: 124.

Diagnosis. This species is characterized by the following combination of characters: mouth protruding downwards; small slender teeth on both jaws; anterior dorsolateral surface of body completely scaled; breast completely naked; second dorsal and anal-fin spines slightly elongated, but not filamentous; dorsolateral body with numerous narrow dark vertical lines; no yellowish spots on the body (Senou 2013).

Distribution. *Leiognathus equulus* is widely distributed in the Indo-West Pacific. In Japanese waters, this species is known from Kita-gawa river and Kadogawa Bay, the northern part of Miyazaki Prefecture (Pacific coast), Amami Island, and the Ryukyu Islands (Fig. 1, Table 1: Senou 2013, Fujiwara and Motomura 2016, this study).

Remarks. *Leiognathus equulus* was not collected in our survey. However, Eguchi et al. (2008) published a list of fishes of the Kita-gawa river, Nobeoka City, northern part of Miyazaki Prefecture, including *L. equulus* with a voucher specimen number (as FRLK-070265, thereafter KYUM-PI 1373). However, this record did not provide any basis of identification nor mention its distribution range. We can confirm here that this specimen (Fig. 3B) is *L. equulus*. In addition to this specimen, a single individual photographed from Kadogawa Bay (KPM-NR 176728, Fig. 3A) was recorded in our study. Although the northernmost record of the species was previously Amami Island, the northern part of Ryukyu Islands (Senou 2013, Fujiwara and Motomura 2016), the present specimens of *L. equulus* from Kita-gawa river extend the known distribution range of the species ca 500 km north-northeastward from Amami Island.

***Leiognathus fasciatus* (Lacepède, 1803):** Figure 3C, D

Clupea fasciata Lacepède 1803: 425, 460.

Aurigequula fasciata—Chakrabarty et al. 2010: 110; Sparks and Chakrabarty 2015: 187.

Leiognathus fasciatus—Woodland et al. 2001: 2809; Senou 2013: 903; Fujiwara and Motomura 2016: 195.

Diagnosis. This species is characterized by the following combination of characters: mouth protruding downwards; small slender teeth on both jaws; anterior dorsolateral surface of body completely scaled; breast completely naked; second dorsal-fin spines elongated, filamentous; dorsolateral body with 10–15 narrow dark vertical lines; several yellowish spots below lateral line (Senou 2013).

Distribution. *Leiognathus fasciatus* is widely distributed in the Indo-West Pacific. In Japanese waters, this species is known from Kadogawa Bay of Miyazaki Prefecture (Pacific coast), the coast of Minami-satsuma City of Kagoshima Prefecture (East China Sea), Tanega-shima Island, Amami Island, Tokuno-shima Island, Kume-jima Island, Irabu-jima Island, and Yaeyama Islands (Fig. 1, Table 1: Senou 2013, Fujiwara and Motomura 2016, this study).

Remarks. A single specimen (91.6 mm SL) of *Leiognathus fasciatus* was caught from Kadogawa Bay in December. Previously, the northernmost record of the species was the coast of Kasasa Town, the south-western part of Satsuma Peninsula (Fujiwara and Motomura 2016), and the present specimen of *L. fasciatus* from Kadogawa Bay extends the known distribution of the species ca 200 km northeastward from Kasasa town.

Genus *Nuchequula* Whitley, 1932

***Nuchequula nuchalis* (Temminck & Schlegel, 1845**): Figure 3E, F

Equula nuchalis Temminck and Schlegel 1845: 126.

Leiognathus nuchalis—Eguchi et al. 2008: 19.

Nuchequula nuchalis—Chakrabarty and Sparks 2007: 18; Kimura et al. 2008b: 22; Senou 2013: 902; Fujiwara and Motomura 2016: 197.

Diagnosis. This species is characterized by the following combination of characters: mouth protruding downwards; small slender teeth on both jaws; anterior dorsolateral surface of body completely naked; black blotch on nape (Senou 2013).

Distribution. *Nuchequula nuchalis* is known from Japan, the western and southern coasts of Korean Peninsula, Taiwan, and the coast of China. In Japanese waters, this species is known from the western coast of Aomori Prefecture to the southern part of the western coast of Kyushu (Sea of Japan coast), the eastern coast of Aomori Prefecture to the southern part of eastern coast of Kyushu, Seto Inland Sea, and Okinawa Island (Pacific coast) (Senou 2013).

Remarks. The record of *Nuchequula nuchalis* in this study is based on 8 specimens (40.8–116.4 mm SL) from Kadogawa Bay in November and December. However, this species is caught frequently with shallow set nets (<10 m depth) for commercial purposes in the bay (author. Wada, pers. comm.). In addition, our survey did not record this species with the other deeper set nets, although we collected it from estuaries in Miyazaki Prefecture out of the survey period (KPM-NI 41550–41553, Kita-gawa river, northern part of Miyazaki Prefecture; KPM-NI 41888–41891, Hitotsuse-gawa river and Tondahama Lagoon, central Miyazaki Prefecture). These records indicate that *N. nuchalis* inhabits estuaries and shallow areas of the coasts of Miyazaki Prefecture.

Genus *Photopectoralis* Sparks, Dunlap & Smith, 2005

***Photopectoralis bindus* (Valenciennes in Cuvier & Valenciennes, 1835):** Figure 3G, H

Equula bindus Valenciennes in Cuvier and Valenciennes 1835: 78.

Leiognathus bindus—Woodland et al. 2001: 2802.

Photopectoralis bindus—Chakrabarty et al. 2010: 117; Kimura 2011:

114; Allen and Erdmann 2012: 442; Senou 2013: 902; Sparks and Chakrabarty 2015: 187; Fujiwara and Motomura 2016: 198; Kimura 2017: 125.

Diagnosis. This species is characterized by the following combination of characters: deep body, its depth 44–58% of SL; mouth protruding forwards; small slender teeth on both jaws; no black line from lower margin of orbit to chin (Senou 2013).

Distribution. *Photopectoralis bindus* is widely distributed in the Indo-West Pacific. In Japanese waters, this species is known from the coast of Iburi, Tosa-shimizu City of Kochi Prefecture, north and south coasts of Miyazaki Prefecture, Uchinoura Bay (Pacific coast), the coast of Minami-satsuma City in Kagoshima Prefecture (East China Sea), and Okinawa Island (Fig. 1, Table 1: Gosho 2001, Senou 2013, Fujiwara and Motomura 2016, this study).

Remarks. Two specimens (52.7–74.0 mm SL) of *P. bindus* were caught from the southern part of Miyazaki Prefecture in October and December. In addition to these current survey records, an additional specimen (KPN-NI 42527, 38.4 mm SL) was collected from Kadogawa Bay, northern part of Miyazaki Prefecture in August 2016.

Discussion

Our study is the second faunal survey of leiognathid fishes along the eastern coast of Kyushu. In the first survey, Fujiwara and Motomura (2016) reported 7 species, *Deveximentum indicium, Equulites popei, Equulites rivulatus, Eubleekeria splendens, Gazza minuta, Nuchequula nuchalis*, and *Photopectoralis bindus,* from Uchinoura Fishing Port, which is located ca 40 km southwest of Meitsu Fishing Port (Fig. 1). In addition to the 7 species reported by Fujiwara and Motomura (2016), we recorded 2 additional species, *Leiognathus equulus* and *Leiognathus fasciatus*, for the first time from the east coast of Kyushu, mainland of Japan, and the northernmost records for the 2 species. These facts suggest that the former 7 species are widely distributed in the eastern coast of Kyushu and the occurrence of the latter 2 species may be strays in the temperate zone of Japan.

Nishimura (1992) proposed the following 7 areas in Japanese waters in his marine zoogeographical study: frigid zone, subarctic zone, cool temperate zone, intermediate temperate zone, warm temperate zone, subtropical zone, and tropical zone. According to his divisions, the coast of Miyazaki Prefecture is located in the warm temperate zone. On the other hand, Nakabo (2013) considered *E. popei*, *E. rivulatus*, and *N. nuchalis* to be temperate fishes, and the other leiognathid species were categorized as tropical fishes occurring mainly in the tropical zone. In other words, despite the coasts of Miyazaki Prefecture being located in the temperate zone, we recorded several tropical species of Leiognathidae, resulting in a continuous distribution pattern for those species in Japan along the Kuroshio Current (Table 1). The Kuroshio Current, which flows from the eastern part of Philippines via the eastern part of Taiwan and along the Pacific coast of Japan, has a strong effect, transporting larvae and juveniles of many tropical fishes to temperate regions of Japan (Senou et al. 2006) (Fig. 1). The diverse leiognathid assemblage along the coast of the Miyazaki Prefecture probably reflects the influence of the current on the marine fish fauna of the eastern coast of Kyushu.

Most tropical fishes transported from the south to the mainland of Japan by the Kuroshio Current, cannot survive the winter nor mature due to the cooler water (Motomura 2012). While some tropical leiognathids were collected over the autumn to winter period and some of the individuals were large enough to be mature, these results do not definitively suggest that these species represent populations that persist over the entire winter. Recent catches of *D. indicium* and *G. minuta* along the coasts of Miyazaki Prefecture have rapidly increased (local fishermen, pers. comm.) and many individuals of these 2 tropical species were collected in almost every survey in our study. It is necessary to conduct a comprehensive ichthyofaunal survey along the eastern coast of Kyushu utilizing both qualitative and quantitative methods to construct baseline information to reveal relationships between marine fish diversity and physical environmental dynamics, such as the warm, strong current and climate change.

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Authors’ Contributions

RM and AM designed the research and wrote the paper; RM, AM and MW collected, identified, the specimens.

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Appendix

Table A1. List of specimens of Leiognathidae of Miyazaki Prefecture. Abbreviations of geographic coordinates indicate the following locations: Ur, mixed catch from 2 set nets, 32°39′30″N, 131°50′02″E, ca 30 m depth and 32°39′20″N, 131°49′10″E, ca 30 m depth; Io 1, 32°28′39″N, 131°39′57″E, 8 m depth, set net; Io 2, 32°28′37″N, 131°39′42″E, 8 m depth, set net; To 1, 32°25′43.5″N, 131°41′36.8″E, 32 m depth, set net; To 2, 32°24′47.6″N, 131°41′05.7″E, 20 m depth, set net; Me 1, mixed catch from 2 set nets, 31°31′44.3″N, 131°25′19.8″E, 45 m depth and 31°30′50.5″N, 131°23′26.8″E, 27 m depth; Me 2, mixed catch from 4 set nets, 31°30′16.4″N, 131°23′20.4″E, 15 m depth; 31°28′30.0″N, 131°23′50.1″E, 48 m depth; 31°27′23.2″N, 131°22′27.8″E, 12 m depth and 31°26′25.3″N, 131°22′46.4″E, 25 m depth.

Species	Voucher no.	No. of spec.	SL (mm)	Port name	Geographic coordinates	Date	Collecting method
Deveximentum indicium	KPM-NI 41896	1	64.7	Meitsu Fishing Port	Me 1 or 2	18 Oct. 2016	Set net
Deveximentum indicium	KPM-NI 41899	4	62.3–66.3	Iorigawa Fishing Port	Io 1 or 2	24 Oct. 2016	Set net
Deveximentum indicium	KPM-NI 41901	8	51.4–69.0	Iorigawa Fishing Port	Io 1 or 2	24 Oct. 2016	Set net
Deveximentum indicium	KPM-NI 41903	9	33.4–38.1	Iorigawa Fishing Port	Io 1 or 2	24 Oct. 2016	Set net
Deveximentum indicium	KPM-NI 41904	5	42.6–50.7	Iorigawa Fishing Port	Io 1 or 2	24 Oct. 2016	Set net
Deveximentum indicium	KPM-NI 41912	1	96.1	Iorigawa Fishing Port	Io 1 or 2	04 Nov. 2016	Set net
Deveximentum indicium	KPM-NI 41917	4	30–46.5	Iorigawa Fishing Port	Io 1 or 2	09 Nov. 2016	Set net
Deveximentum indicium	KPM-NI 41918	3	58.8–63.1	Iorigawa Fishing Port	Io 1 or 2	09 Nov. 2016	Set net
Deveximentum indicium	KPM-NI 41919	1	93.6	Iorigawa Fishing Port	Io 1 or 2	09 Nov. 2016	Set net
Deveximentum indicium	KPM-NI 41920	2	70.3–73.9	Iorigawa Fishing Port	Io 1 or 2	09 Nov. 2016	Set net
Deveximentum indicium	KPM-NI 41921	2	70.0–70.1	Iorigawa Fishing Port	Io 1 or 2	09 Nov. 2016	Set net
Deveximentum indicium	KPM-NI 41922	1	70.4	Iorigawa Fishing Port	Io 1 or 2	09 Nov. 2016	Set net
Deveximentum indicium	KPM-NI 41923	1	69.8	Iorigawa Fishing Port	Io 1 or 2	09 Nov. 2016	Set net
Deveximentum indicium	KPM-NI 41929	1	99.7	Iorigawa Fishing Port	Io 1 or 2	11 Nov. 2016	Set net
Deveximentum indicium	KPM-NI 41930	1	92.4	Iorigawa Fishing Port	Io 1 or 2	11 Nov. 2016	Set net
Deveximentum indicium	KPM-NI 41931	1	96.3	Iorigawa Fishing Port	Io 1 or 2	11 Nov. 2016	Set net
Deveximentum indicium	KPM-NI 41932	1	96.2	Iorigawa Fishing Port	Io 1 or 2	11 Nov. 2016	Set net
Deveximentum indicium	KPM-NI 41937	1	34.2	Iorigawa Fishing Port	Io 1 or 2	12 Nov. 2016	Set net
Deveximentum indicium	KPM-NI 41939	1	99.9	Iorigawa Fishing Port	Io 1 or 2	12 Nov. 2016	Set net
Deveximentum indicium	KPM-NI 41940	1	73.5	Iorigawa Fishing Port	Io 1 or 2	12 Nov. 2016	Set net
Deveximentum indicium	KPM-NI 41941	5	44.9–54.4	Iorigawa Fishing Port	Io 1 or 2	12 Nov. 2016	Set net
Deveximentum indicium	KPM-NI 41942	3	57.1–60.7	Iorigawa Fishing Port	Io 1 or 2	12 Nov. 2016	Set net
Deveximentum indicium	KPM-NI 41943	2	58.2–65.3	Iorigawa Fishing Port	Io 1 or 2	12 Nov. 2016	Set net
Deveximentum indicium	KPM-NI 41944	1	69.6	Iorigawa Fishing Port	Io 1 or 2	12 Nov. 2016	Set net
Deveximentum indicium	KPM-NI 41950	1	53.6	Meitsu Fishing Port	Me 1 or 2	14 Nov. 2016	Set net
Deveximentum indicium	KPM-NI 41964	2	62.5–65.1	Iorigawa Fishing Port	Io 1 or 2	18 Nov. 2016	Set net
Deveximentum indicium	KPM-NI 41965	2	52.2–53.8	Iorigawa Fishing Port	Io 1 or 2	18 Nov. 2016	Set net
Deveximentum indicium	KPM-NI 41966	2	52.4–57.6	Iorigawa Fishing Port	Io 1 or 2	18 Nov. 2016	Set net
Deveximentum indicium	KPM-NI 41967	2	30.6–35.1	Iorigawa Fishing Port	Io 1 or 2	18 Nov. 2016	Set net
Deveximentum indicium	KPM-NI 41969	1	101.5	Iorigawa Fishing Port	Io 1 or 2	21 Nov. 2016	Set net
Deveximentum indicium	KPM-NI 41974	1	42.6	Iorigawa Fishing Port	Io 1 or 2	21 Nov. 2016	Set net
Deveximentum indicium	KPM-NI 41975	1	103.3	Iorigawa Fishing Port	Io 1 or 2	22 Nov. 2016	Set net
Deveximentum indicium	KPM-NI 41976	2	62.9–68.0	Iorigawa Fishing Port	Io 1 or 2	22 Nov. 2016	Set net
Deveximentum indicium	KPM-NI 41977	3	47.8–50.8	Iorigawa Fishing Port	Io 1 or 2	22 Nov. 2016	Set net
Deveximentum indicium	KPM-NI 41978	1	64.3	Iorigawa Fishing Port	Io 1 or 2	25 Nov. 2016	Set net
Deveximentum indicium	KPM-NI 41980	1	59.5	Urashiro Fishing Port	Ur	06 Dec. 2016	Set net
Deveximentum indicium	KPM-NI 41981	1	55.4	Iorigawa Fishing Port	Io 1 or 2	08 Dec. 2016	Set net
Deveximentum indicium	KPM-NI 41982	1	46.4	Iorigawa Fishing Port	Io 1 or 2	08 Dec. 2016	Set net
Deveximentum indicium	KPM-NI 41983	1	53.6	Iorigawa Fishing Port	Io 1 or 2	08 Dec. 2016	Set net
Deveximentum indicium	KPM-NI 41984	1	54.4	Iorigawa Fishing Port	Io 1 or 2	08 Dec. 2016	Set net
Deveximentum indicium	KPM-NI 41985	1	63.8	Iorigawa Fishing Port	Io 1 or 2	08 Dec. 2016	Set net
Deveximentum indicium	KPM-NI 41986	1	68.2	Iorigawa Fishing Port	Io 1 or 2	08 Dec. 2016	Set net
Deveximentum indicium	KPM-NI 41987	1	72.2	Iorigawa Fishing Port	Io 1 or 2	08 Dec. 2016	Set net
Deveximentum indicium	KPM-NI 41988	1	71.0	Iorigawa Fishing Port	Io 1 or 2	08 Dec. 2016	Set net
Deveximentum indicium	KPM-NI 41989	1	77.7	Iorigawa Fishing Port	Io 1 or 2	08 Dec. 2016	Set net
Deveximentum indicium	KPM-NI 41999	1	63.3	Iorigawa Fishing Port	Io 1 or 2	09 Dec. 2016	Set net
Deveximentum indicium	KPM-NI 42000	1	64.4	Iorigawa Fishing Port	Io 1 or 2	09 Dec. 2016	Set net
Deveximentum indicium	KPM-NI 42001	1	67.0	Iorigawa Fishing Port	Io 1 or 2	09 Dec. 2016	Set net
Deveximentum indicium	KPM-NI 42002	1	62.5	Iorigawa Fishing Port	Io 1 or 2	09 Dec. 2016	Set net
Deveximentum indicium	KPM-NI 42003	1	64.6	Iorigawa Fishing Port	Io 1 or 2	09 Dec. 2016	Set net
Deveximentum indicium	KPM-NI 42004	1	66.4	Iorigawa Fishing Port	Io 1 or 2	09 Dec. 2016	Set net
Deveximentum indicium	KPM-NI 42005	1	44.4	Iorigawa Fishing Port	Io 1 or 2	09 Dec. 2016	Set net
Deveximentum indicium	KPM-NI 42006	1	76.3	Iorigawa Fishing Port	Io 1 or 2	09 Dec. 2016	Set net
Deveximentum indicium	KPM-NI 42007	1	75.3	Iorigawa Fishing Port	Io 1 or 2	09 Dec. 2016	Set net

Table A1. *Continued.*

Species	Voucher no.	No. of spec.	SL (mm)	Port name	Geographic coordinates	Date	Collecting method
Deveximentum indicium	KPM-NI 42008	1	74.4	Iorigawa Fishing Port	Io 1 or 2	09 Dec. 2016	Set net
Deveximentum indicium	KPM-NI 42009	1	70.5	Iorigawa Fishing Port	Io 1 or 2	09 Dec. 2016	Set net
Deveximentum indicium	KPM-NI 42010	1	69.3	Iorigawa Fishing Port	Io 1 or 2	09 Dec. 2016	Set net
Deveximentum indicium	KPM-NI 42011	1	93.6	Iorigawa Fishing Port	Io 1 or 2	09 Dec. 2016	Set net
Deveximentum indicium	KPM-NI 42012	1	101.1	Iorigawa Fishing Port	Io 1 or 2	09 Dec. 2016	Set net
Deveximentum indicium	KPM-NI 42036	1	49.8	Iorigawa Fishing Port	Io 1 or 2	09 Dec. 2016	Set net
Deveximentum indicium	KPM-NI 42037	1	39.6	Iorigawa Fishing Port	Io 1 or 2	09 Dec. 2016	Set net
Deveximentum indicium	KPM-NI 42048	1	97.2	Iorigawa Fishing Port	Io 1 or 2	09 Dec. 2016	Set net
Deveximentum indicium	KPM-NI 42050	1	99.4	Iorigawa Fishing Port	Io 1 or 2	17 Dec. 2016	Set net
Deveximentum indicium	KPM-NI 42055	1	99.0	Iorigawa Fishing Port	Io 1 or 2	17 Dec. 2016	Set net
Deveximentum indicium	KPM-NI 42056	1	100.0	Iorigawa Fishing Port	Io 1 or 2	17 Dec. 2016	Set net
Deveximentum indicium	KPM-NI 42057	1	90.1	Iorigawa Fishing Port	Io 1 or 2	17 Dec. 2016	Set net
Deveximentum indicium	KPM-NI 42058	1	97.4	Iorigawa Fishing Port	Io 1 or 2	17 Dec. 2016	Set net
Deveximentum indicium	KPM-NI 42059	1	94.2	Iorigawa Fishing Port	Io 1 or 2	17 Dec. 2016	Set net
Deveximentum indicium	KPM-NI 42060	1	99.4	Iorigawa Fishing Port	Io 1 or 2	17 Dec. 2016	Set net
Deveximentum indicium	KPM-NI 42061	1	98.8	Iorigawa Fishing Port	Io 1 or 2	17 Dec. 2016	Set net
Deveximentum indicium	KPM-NI 42062	4	66.4–70.0	Iorigawa Fishing Port	Io 1 or 2	16 Dec. 2016	Set net
Deveximentum indicium	KPM-NI 42063	3	71.6–73.9	Iorigawa Fishing Port	Io 1 or 2	16 Dec. 2016	Set net
Deveximentum indicium	KPM-NI 42064	3	69.4–71.0	Iorigawa Fishing Port	Io 1 or 2	16 Dec. 2016	Set net
Deveximentum indicium	KPM-NI 42065	5	59.4–70.0	Iorigawa Fishing Port	Io 1 or 2	16 Dec. 2016	Set net
Deveximentum indicium	KPM-NI 42066	3	70.7–72.6	Iorigawa Fishing Port	Io 1 or 2	16 Dec. 2016	Set net
Deveximentum indicium	KPM-NI 42067	3	73.6–78.3	Iorigawa Fishing Port	Io 1 or 2	16 Dec. 2016	Set net
Deveximentum indicium	KPM-NI 42068	3	67.5–69.2	Iorigawa Fishing Port	Io 1 or 2	16 Dec. 2016	Set net
Deveximentum indicium	KPM-NI 42069	2	78.2–79.9	Iorigawa Fishing Port	Io 1 or 2	16 Dec. 2016	Set net
Deveximentum indicium	KPM-NI 42070	3	70.1–72.7	Iorigawa Fishing Port	Io 1 or 2	16 Dec. 2016	Set net
Deveximentum indicium	KPM-NI 42071	2	77.2–78.9	Iorigawa Fishing Port	Io 1 or 2	16 Dec. 2016	Set net
Deveximentum indicium	KPM-NI 42072	3	74.2–77.6	Iorigawa Fishing Port	Io 1 or 2	16 Dec. 2016	Set net
Deveximentum indicium	KPM-NI 42073	3	68.0–76.2	Iorigawa Fishing Port	Io 1 or 2	16 Dec. 2016	Set net
Deveximentum indicium	KPM-NI 42074	2	77.3–77.4	Iorigawa Fishing Port	Io 1 or 2	16 Dec. 2016	Set net
Deveximentum indicium	KPM-NI 42075	2	75.2–76.3	Iorigawa Fishing Port	Io 1 or 2	16 Dec. 2016	Set net
Deveximentum indicium	KPM-NI 42076	4	66.5–70.5	Iorigawa Fishing Port	Io 1 or 2	16 Dec. 2016	Set net
Deveximentum indicium	KPM-NI 42077	6	52.3–66.1	Iorigawa Fishing Port	Io 1 or 2	16 Dec. 2016	Set net
Deveximentum indicium	KPM-NI 42078	3	72.8–77.1	Iorigawa Fishing Port	Io 1 or 2	16 Dec. 2016	Set net
Deveximentum indicium	KPM-NI 42079	3	66.5–73.6	Iorigawa Fishing Port	Io 1 or 2	16 Dec. 2016	Set net
Deveximentum indicium	KPM-NI 42080	2	76.3–76.3	Iorigawa Fishing Port	Io 1 or 2	16 Dec. 2016	Set net
Deveximentum indicium	KPM-NI 42081	4	68.3–71.6	Iorigawa Fishing Port	Io 1 or 2	16 Dec. 2016	Set net
Deveximentum indicium	KPM-NI 42082	4	65.4–66.5	Iorigawa Fishing Port	Io 1 or 2	16 Dec. 2016	Set net
Deveximentum indicium	KPM-NI 42083	3	72.6–76.1	Iorigawa Fishing Port	Io 1 or 2	16 Dec. 2016	Set net
Deveximentum indicium	KPM-NI 42084	5	60.7–69.4	Iorigawa Fishing Port	Io 1 or 2	16 Dec. 2016	Set net
Deveximentum indicium	KPM-NI 42085	3	72.2–76.9	Iorigawa Fishing Port	Io 1 or 2	16 Dec. 2016	Set net
Deveximentum indicium	KPM-NI 42086	3	66.2–73.0	Iorigawa Fishing Port	Io 1 or 2	16 Dec. 2016	Set net
Deveximentum indicium	KPM-NI 42087	3	70.1–72.7	Iorigawa Fishing Port	Io 1 or 2	16 Dec. 2016	Set net
Deveximentum indicium	KPM-NI 42088	2	75.7–75.8	Iorigawa Fishing Port	Io 1 or 2	16 Dec. 2016	Set net
Deveximentum indicium	KPM-NI 42089	8	47.5–59.5	Iorigawa Fishing Port	Io 1 or 2	16 Dec. 2016	Set net
Deveximentum indicium	KPM-NI 42090	2	71.5–78.8	Iorigawa Fishing Port	Io 1 or 2	16 Dec. 2016	Set net
Deveximentum indicium	KPM-NI 42091	4	65.1–72.4	Iorigawa Fishing Port	Io 1 or 2	16 Dec. 2016	Set net
Deveximentum indicium	KPM-NI 42092	3	65.3–71.5	Iorigawa Fishing Port	Io 1 or 2	16 Dec. 2016	Set net
Deveximentum indicium	KPM-NI 42093	2	75.1–78.4	Iorigawa Fishing Port	Io 1 or 2	16 Dec. 2016	Set net
Deveximentum indicium	KPM-NI 42094	1	95.3	Iorigawa Fishing Port	Io 1 or 2	16 Dec. 2016	Set net
Deveximentum indicium	KPM-NI 42095	1	96.9	Iorigawa Fishing Port	Io 1 or 2	16 Dec. 2016	Set net
Deveximentum indicium	KPM-NI 42096	1	105.4	Iorigawa Fishing Port	Io 1 or 2	16 Dec. 2016	Set net
Deveximentum indicium	KPM-NI 42097	1	94.3	Iorigawa Fishing Port	Io 1 or 2	16 Dec. 2016	Set net
Deveximentum indicium	KPM-NI 42098	1	103.6	Iorigawa Fishing Port	Io 1 or 2	16 Dec. 2016	Set net
Deveximentum indicium	KPM-NI 42110	3	60.1–66.1	Tomishima Fishing Port	To 2	23 Dec. 2016	Set net
Deveximentum indicium	KPM-NI 42117	2	56.2–57.7	Meitsu Fishing Port	Me 1	28 Dec. 2016	Set net
Deveximentum indicium	KPM-NI 42118	1	68.2	Meitsu Fishing Port	Me 1	28 Dec. 2016	Set net
Deveximentum indicium	KPM-NI 42121	1	92.5	Iorigawa Fishing Port	Io 1	01 Nov. 2016	Set net
Deveximentum indicium	KPM-NI 42122	1	68.3	Iorigawa Fishing Port	Io 1	01 Nov. 2016	Set net
Deveximentum indicium	KPM-NI 42123	1	46.0	Iorigawa Fishing Port	Io 1	01 Nov. 2016	Set net
Deveximentum indicium	KPM-NI 42124	1	29.0	Iorigawa Fishing Port	Io 1	01 Nov. 2016	Set net
Deveximentum indicium	KPM-NI 42528	3	73.4–74.6	Iorigawa Fishing Port	Io 1 or 2	16 Dec. 2016	Set net

Table A1. *Continued.*

Species	Voucher no.	No. of spec.	SL (mm)	Port name	Geographic coordinates	Date	Collecting method
Deveximentum indicium	KPM-NI 42529	3	70.1–75.3	Iorigawa Fishing Port	Io 1 or 2	16 Dec. 2016	Set net
Deveximentum indicium	KPM-NI 42530	6	61.6–64.3	Iorigawa Fishing Port	Io 1 or 2	16 Dec. 2016	Set net
Equulites popei	KPM-NI 42111	1	35.6	Meitsu Fishing Port	Me 2	28 Dec. 2016	Set net
Equulites popei	KPM-NI 42112	2	49.9–53.4	Meitsu Fishing Port	Me 2	28 Dec. 2016	Set net
Equulites popei	KPM-NI 42113	2	64.9–65.5	Meitsu Fishing Port	Me 2	28 Dec. 2016	Set net
Equulites rivulatus	KPM-NI 41956	1	32.7	Iorigawa Fishing Port	Io 1 or 2	18 Nov. 2016	Set net
Equulites rivulatus	KPM-NI 41968	5	30.1–32.5	Iorigawa Fishing Port	Io 1 or 2	18 Nov. 2016	Set net
Equulites rivulatus	KPM-NI 42038	10	42.6–46.3	Iorigawa Fishing Port	—	12 Dec. 2016	Trawl
Equulites rivulatus	KPM-NI 42039	10	43.6–49.0	Iorigawa Fishing Port	—	12 Dec. 2016	Trawl
Equulites rivulatus	KPM-NI 42040	10	44.1–49.1	Iorigawa Fishing Port	—	12 Dec. 2016	Trawl
Equulites rivulatus	KPM-NI 42041	10	37.2–40.5	Iorigawa Fishing Port	—	12 Dec. 2016	Trawl
Equulites rivulatus	KPM-NI 42042	10	40.1–43.9	Iorigawa Fishing Port	—	12 Dec. 2016	Trawl
Equulites rivulatus	KPM-NI 42043	8	51.2–61.5	Iorigawa Fishing Port	—	12 Dec. 2016	Trawl
Equulites rivulatus	KPM-NI 42044	5	59.6–65.1	Iorigawa Fishing Port	—	12 Dec. 2016	Trawl
Equulites rivulatus	KPM-NI 42045	4	66.6–73.4	Iorigawa Fishing Port	—	12 Dec. 2016	Trawl
Equulites rivulatus	KPM-NI 42046	4	59.7–70.7	Iorigawa Fishing Port	—	12 Dec. 2016	Trawl
Equulites rivulatus	KPM-NI 42103	1	54.5	Kadogawa Fishing Port	—	20 Dec. 2016	Trawl
Equulites rivulatus	KPM-NI 42104	1	50.9	Kadogawa Fishing Port	—	20 Dec. 2016	Trawl
Equulites rivulatus	KPM-NI 42105	2	62.0–64.3	Kadogawa Fishing Port	—	20 Dec. 2016	Trawl
Equulites rivulatus	KPM-NI 42106	2	46.7–49.7	Kadogawa Fishing Port	—	20 Dec. 2016	Trawl
Equulites rivulatus	KPM-NI 42108	1	69.5	Tomishima Fishing Port	To 2	23 Dec. 2016	Set net
Equulites rivulatus	KPM-NI 42109	3	47.3–56.5	Tomishima Fishing Port	To 2	23 Dec. 2016	Set net
Equulites rivulatus	KPM-NI 42114	2	71.0–71.3	Meitsu Fishing Port	Me 2	28 Dec. 2016	Set net
Equulites rivulatus	KPM-NI 42115	4	44.4–49.4	Meitsu Fishing Port	Me 2	28 Dec. 2016	Set net
Equulites rivulatus	KPM-NI 42119	2	51.4–54.4	Meitsu Fishing Port	Me 1	28 Dec. 2016	Set net
Equulites rivulatus	KPM-NI 42128	1	51.3	Tomishima Fishing Port	To 1	17 Jan. 2017	Set net
Eubleekeria splendens	KPM-NI 41909	1	70.2	Iorigawa Fishing Port	Io 1 or 2	05 Nov. 2016	Set net
Gazza minuta	KPM-NI 41898	3	68.0–76.7	Iorigawa Fishing Port	Io 1 or 2	24 Oct. 2016	Set net
Gazza minuta	KPM-NI 41900	6	50.7–67.3	Iorigawa Fishing Port	Io 1 or 2	24 Oct. 2016	Set net
Gazza minuta	KPM-NI 41902	3	47.0–48.2	Iorigawa Fishing Port	Io 1 or 2	24 Oct. 2016	Set net
Gazza minuta	KPM-NI 41905	1	72.2	Iorigawa Fishing Port	Io 1 or 2	31 Oct. 2016	Set net
Gazza minuta	KPM-NI 41906	1	68.0	Iorigawa Fishing Port	Io 1 or 2	31 Oct. 2016	Set net
Gazza minuta	KPM-NI 41907	1	54.8	Iorigawa Fishing Port	Io 1 or 2	31 Oct. 2016	Set net
Gazza minuta	KPM-NI 41908	1	65.6	Iorigawa Fishing Port	Io 1 or 2	04 Nov. 2016	Set net
Gazza minuta	KPM-NI 41910	3	56.5–69.3	Iorigawa Fishing Port	Io 1 or 2	05 Nov. 2016	Set net
Gazza minuta	KPM-NI 41911	1	41.1	Iorigawa Fishing Port	Io 1 or 2	05 Nov. 2016	Set net
Gazza minuta	KPM-NI 41913	1	73.8	Iorigawa Fishing Port	Io 1 or 2	04 Nov. 2016	Set net
Gazza minuta	KPM-NI 41914	1	53.8	Iorigawa Fishing Port	Io 1 or 2	07 Nov. 2016	Set net
Gazza minuta	KPM-NI 41924	2	57.4–61.6	Iorigawa Fishing Port	Io 1 or 2	09 Nov. 2016	Set net
Gazza minuta	KPM-NI 41925	2	72.8–73.3	Iorigawa Fishing Port	Io 1 or 2	09 Nov. 2016	Set net
Gazza minuta	KPM-NI 41926	1	71.6	Iorigawa Fishing Port	Io 1 or 2	09 Nov. 2016	Set net
Gazza minuta	KPM-NI 41927	1	52.8	Iorigawa Fishing Port	Io 1 or 2	09 Nov. 2016	Set net
Gazza minuta	KPM-NI 41933	1	98.6	Iorigawa Fishing Port	Io 1 or 2	11 Nov. 2016	Set net
Gazza minuta	KPM-NI 41934	1	71.5	Iorigawa Fishing Port	Io 1 or 2	11 Nov. 2016	Set net
Gazza minuta	KPM-NI 41945	1	79.3	Iorigawa Fishing Port	Io 1 or 2	12 Nov. 2016	Set net
Gazza minuta	KPM-NI 41946	1	74.8	Iorigawa Fishing Port	Io 1 or 2	12 Nov. 2016	Set net
Gazza minuta	KPM-NI 41947	1	71.8	Iorigawa Fishing Port	Io 1 or 2	12 Nov. 2016	Set net
Gazza minuta	KPM-NI 41948	1	53.4	Iorigawa Fishing Port	Io 1 or 2	12 Nov. 2016	Set net
Gazza minuta	KPM-NI 41951	1	103.1	Iorigawa Fishing Port	Io 1 or 2	15 Nov. 2016	Set net
Gazza minuta	KPM-NI 41952	1	73.8	Iorigawa Fishing Port	Io 1 or 2	15 Nov. 2016	Set net
Gazza minuta	KPM-NI 41953	1	75.8	Iorigawa Fishing Port	Io 1 or 2	15 Nov. 2016	Set net
Gazza minuta	KPM-NI 41954	1	70.5	Iorigawa Fishing Port	Io 1 or 2	15 Nov. 2016	Set net
Gazza minuta	KPM-NI 41955	3	56.3–61.2	Iorigawa Fishing Port	Io 1 or 2	15 Nov. 2016	Set net
Gazza minuta	KPM-NI 41957	1	73.4	Iorigawa Fishing Port	Io 1 or 2	18 Nov. 2016	Set net
Gazza minuta	KPM-NI 41958	1	77.9	Iorigawa Fishing Port	Io 1 or 2	18 Nov. 2016	Set net
Gazza minuta	KPM-NI 41959	1	70.9	Iorigawa Fishing Port	Io 1 or 2	18 Nov. 2016	Set net
Gazza minuta	KPM-NI 41960	2	54.1–57.5	Iorigawa Fishing Port	Io 1 or 2	18 Nov. 2016	Set net
Gazza minuta	KPM-NI 41961	2	54.0–60.7	Iorigawa Fishing Port	Io 1 or 2	18 Nov. 2016	Set net
Gazza minuta	KPM-NI 41962	1	34.0	Iorigawa Fishing Port	Io 1 or 2	18 Nov. 2016	Set net
Gazza minuta	KPM-NI 41970	1	71.7	Iorigawa Fishing Port	Io 1 or 2	21 Nov. 2016	Set net

Table A1. *Continued.*

Species	Voucher no.	No. of spec.	SL (mm)	Port name	Geographic coordinates	Date	Collecting method
Gazza minuta	KPM-NI 41971	1	74.3	Iorigawa Fishing Port	Io 1 or 2	21 Nov. 2016	Set net
Gazza minuta	KPM-NI 41972	2	62.0–63.6	Iorigawa Fishing Port	Io 1 or 2	21 Nov. 2016	Set net
Gazza minuta	KPM-NI 41973	2	48.2–49.1	Iorigawa Fishing Port	Io 1 or 2	21 Nov. 2016	Set net
Gazza minuta	KPM-NI 41979	1	36.6	Iorigawa Fishing Port	Io 1 or 2	25 Nov. 2016	Set net
Gazza minuta	KPM-NI 41990	1	68.9	Iorigawa Fishing Port	Io 1 or 2	08 Dec. 2016	Set net
Gazza minuta	KPM-NI 41991	1	68.4	Iorigawa Fishing Port	Io 1 or 2	08 Dec. 2016	Set net
Gazza minuta	KPM-NI 41992	1	69.0	Iorigawa Fishing Port	Io 1 or 2	08 Dec. 2016	Set net
Gazza minuta	KPM-NI 41993	1	78.4	Iorigawa Fishing Port	Io 1 or 2	08 Dec. 2016	Set net
Gazza minuta	KPM-NI 41994	1	71.3	Iorigawa Fishing Port	Io 1 or 2	08 Dec. 2016	Set net
Gazza minuta	KPM-NI 41995	1	81.1	Iorigawa Fishing Port	Io 1 or 2	08 Dec. 2016	Set net
Gazza minuta	KPM-NI 41996	1	83.6	Iorigawa Fishing Port	Io 1 or 2	08 Dec. 2016	Set net
Gazza minuta	KPM-NI 41997	1	84.8	Iorigawa Fishing Port	Io 1 or 2	08 Dec. 2016	Set net
Gazza minuta	KPM-NI 41998	1	88.1	Iorigawa Fishing Port	Io 1 or 2	09 Dec. 2016	Set net
Gazza minuta	KPM-NI 42013	1	71.1	Iorigawa Fishing Port	Io 1 or 2	09 Dec. 2016	Set net
Gazza minuta	KPM-NI 42014	1	80.1	Iorigawa Fishing Port	Io 1 or 2	09 Dec. 2016	Set net
Gazza minuta	KPM-NI 42015	1	69.1	Iorigawa Fishing Port	Io 1 or 2	09 Dec. 2016	Set net
Gazza minuta	KPM-NI 42016	1	56.8	Iorigawa Fishing Port	Io 1 or 2	09 Dec. 2016	Set net
Gazza minuta	KPM-NI 42017	1	81.5	Iorigawa Fishing Port	Io 1 or 2	09 Dec. 2016	Set net
Gazza minuta	KPM-NI 42018	1	80.7	Iorigawa Fishing Port	Io 1 or 2	09 Dec. 2016	Set net
Gazza minuta	KPM-NI 42019	1	71.7	Iorigawa Fishing Port	Io 1 or 2	09 Dec. 2016	Set net
Gazza minuta	KPM-NI 42020	1	80.5	Iorigawa Fishing Port	Io 1 or 2	09 Dec. 2016	Set net
Gazza minuta	KPM-NI 42021	1	78.0	Iorigawa Fishing Port	Io 1 or 2	09 Dec. 2016	Set net
Gazza minuta	KPM-NI 42022	1	62.8	Iorigawa Fishing Port	Io 1 or 2	09 Dec. 2016	Set net
Gazza minuta	KPM-NI 42023	1	62.2	Iorigawa Fishing Port	Io 1 or 2	09 Dec. 2016	Set net
Gazza minuta	KPM-NI 42024	1	67.6	Iorigawa Fishing Port	Io 1 or 2	09 Dec. 2016	Set net
Gazza minuta	KPM-NI 42025	1	83.2	Iorigawa Fishing Port	Io 1 or 2	09 Dec. 2016	Set net
Gazza minuta	KPM-NI 42026	1	85.1	Iorigawa Fishing Port	Io 1 or 2	09 Dec. 2016	Set net
Gazza minuta	KPM-NI 42027	1	63.4	Iorigawa Fishing Port	Io 1 or 2	09 Dec. 2016	Set net
Gazza minuta	KPM-NI 42028	1	67.5	Iorigawa Fishing Port	Io 1 or 2	09 Dec. 2016	Set net
Gazza minuta	KPM-NI 42029	1	67.4	Iorigawa Fishing Port	Io 1 or 2	09 Dec. 2016	Set net
Gazza minuta	KPM-NI 42030	1	70.5	Iorigawa Fishing Port	Io 1 or 2	09 Dec. 2016	Set net
Gazza minuta	KPM-NI 42031	1	65.7	Iorigawa Fishing Port	Io 1 or 2	09 Dec. 2016	Set net
Gazza minuta	KPM-NI 42032	1	63.8	Iorigawa Fishing Port	Io 1 or 2	09 Dec. 2016	Set net
Gazza minuta	KPM-NI 42033	1	66.0	Iorigawa Fishing Port	Io 1 or 2	09 Dec. 2016	Set net
Gazza minuta	KPM-NI 42034	1	82.4	Iorigawa Fishing Port	Io 1 or 2	09 Dec. 2016	Set net
Gazza minuta	KPM-NI 42035	1	86.2	Iorigawa Fishing Port	Io 1 or 2	09 Dec. 2016	Set net
Gazza minuta	KPM-NI 42047	2	66.3–67.1	Meitsu Fishing Port	Me 1 or 2	16 Dec. 2016	Set net
Gazza minuta	KPM-NI 42051	1	88.7	Iorigawa Fishing Port	Io 1 or 2	17 Dec. 2016	Set net
Gazza minuta	KPM-NI 42053	1	81.7	Iorigawa Fishing Port	Io 1 or 2	17 Dec. 2016	Set net
Gazza minuta	KPM-NI 42099	3	71.4–73.0	Iorigawa Fishing Port	Io 1 or 2	16 Dec. 2016	Set net
Gazza minuta	KPM-NI 42100	2	77.0–83.2	Iorigawa Fishing Port	Io 1 or 2	16 Dec. 2016	Set net
Gazza minuta	KPM-NI 42101	3	66.5–75.3	Iorigawa Fishing Port	Io 1 or 2	16 Dec. 2016	Set net
Gazza minuta	KPM-NI 42102	3	71.4–80.5	Iorigawa Fishing Port	Io 1 or 2	16 Dec. 2016	Set net
Gazza minuta	KPM-NI 42107	1	71.7	Tomishima Fishing Port	To 2	23 Dec. 2016	Set net
Gazza minuta	KPM-NI 42125	1	70.6	Iorigawa Fishing Port	Io 1	01 Nov. 2016	Set net
Gazza minuta	KPM-NI 42126	1	38.2	Iorigawa Fishing Port	Io 1	01 Nov. 2016	Set net
Leiognathus equulus	KPM-NR 176728	1	ca 150.0	Iorigawa Fishing Port	Io 1 or 2	09 Sept. 2013	Set net
Leiognathus equulus	KYUM-PI 1373	1	40.4	Kita-gawa river	—	05 July 2005	—
Leiognathus fasciatus	KPM-NI 42049	1	91.6	Iorigawa Fishing Port	Io 1 or 2	17 Dec. 2016	Set net
Nuchequula nuchalis	KPM-NI 41935	1	79.0	Iorigawa Fishing Port	Io 1 or 2	12 Nov. 2016	Set net
Nuchequula nuchalis	KPM-NI 41936	1	116.4	Iorigawa Fishing Port	Io 1 or 2	12 Nov. 2016	Set net
Nuchequula nuchalis	KPM-NI 41938	1	43.0	Iorigawa Fishing Port	Io 1 or 2	12 Nov. 2016	Set net
Nuchequula nuchalis	KPM-NI 41949	1	111.4	Iorigawa Fishing Port	Io 1 or 2	12 Nov. 2016	Set net
Nuchequula nuchalis	KPM-NI 41963	2	40.8–44.4	Iorigawa Fishing Port	Io 1 or 2	18 Nov. 2016	Set net
Nuchequula nuchalis	KPM-NI 42052	1	87.7	Iorigawa Fishing Port	Io 1 or 2	17 Dec. 2016	Set net
Nuchequula nuchalis	KPM-NI 42054	1	114.0	Iorigawa Fishing Port	Io 1 or 2	17 Dec. 2016	Set net
Photopectoralis bindus	KPM-NI 41897	1	74.0	Meitsu Fishing Port	Me 1 or 2	18 Oct. 2016	Set net
Photopectoralis bindus	KPM-NI 42116	1	52.7	Meitsu Fishing Port	Me 1 or 2	28 Dec. 2016	Set net
Photopectoralis bindus	KPM-NI 42527	1	38.4	Iorigawa Fishing Port	Io 1	01 Agust 2016	Set net