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Sublittoral and Upper Bathyal Vetigastropods (Mollusca: Gastropoda) Dredged from the Ogasawara Islands

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Abstract. The sublittoral and upper bathyal vetigastropod fauna around the Ogasawara Islands is surveyed based on material collected via several dredging programs, mainly by the R/V *Koyo* of the Tokyo Metropolitan Fisheries Experiment Station, during the years 1976–2017 discontinuously. Ninety-three morphospecies are recognized among the material, including juvenile and incomplete specimens, and identified to at least generic level. Seventy are identified as previously named species, and 23 are considered to be probably undescribed. Fifty-one species (55%) are recorded for the first time in the Ogasawara Islands, including 22 (24%) new to Japanese waters. Twelve species (13%) are considered to be endemic to this area, and four are considered possibly endemic. Species that are new to the Ogasawara Islands as well as those with taxonomic discussion are illustrated in color, together with comparative specimens from other areas, mainly the Nansei Islands.

Key words: Ogasawara Islands, vetigastropods, sublittoral, bathyal, new records.

Introduction

The Ogasawara (Bonin) Islands are an oceanic island group located ca. 1000 km south of Tokyo Bay in a latitude range between 28°N and 26°N, and form the middle part of the Izu-Ogasawara (Bonin)-Mariana island arc. Although they fall in a subtropical climate zone within the same latitude range as the Okinawa-Amami Island groups, their marine faunas differ considerably because of the difference in the marine environments, especially the influence of the Kuroshio Current. In contrast to the extremely rich marine faunas of the Okinawa-Amami Islands, those of the Ogasawara and adjacent Northern Mariana Islands are known to be generally poor but distinctive (e.g., Vermeij *et al.*, 1983; Kurozumi and Asakura, 1994; Okutani and Saito, 2011). Vermeij *et al.* (1983) also pointed out some similarity between the upper shore gastropod fauna in the northern Marianas and that of Hawaii.

The gastropod fauna of the Ogasawara Islands was relatively documented, though mainly in the intertidal and upper sublittoral zones, in a series of comprehensive works by Fukuda (1993, 1994, 1995). A total of 1031 species of marine gastropods were recorded, including 21 "probably endemic" species. Although the total is comparable to that in Okinawa (1383 species: Kuroda, 1960), it includes many microgastropods and nudibranchs as well as a number of unidentified species that were not included in previous faunal accounts. The actual comparative diversity in the Ogasawara Islands is not high. Furthermore, species in the sublittoral to bathyal zones have not been well surveyed, not only in the Ogasawara Islands but also in many other regions in Japanese waters, especially the Nansei Islands, making it difficult to carry out detailed biogeographical comparisons.

This being so, the gastropod fauna of the Ogasawara Islands is here surveyed in detail, with special emphasis on the sublittoral and upper bathyal zones, based on the material

obtained by various dredging programs in connection with the research program "Comprehensive Studies of Fauna and Flora in Biodiversity Hotspots" carried out by the National Museum of Nature and Science. This project focuses on the founding and biological properties of biodiversity hotspots in Japan, and the Ogasawara Islands were selected because of the relatively high degree of endemism for Japan observed in their marine invertebrate fauna. Among gastropods, the clade Vetigastropoda was selected for analysis because of its lack of a widely dispersing teleplanic larval stage (Kay, 1984) and relatively high local speciation in comparison to other subgroups. Furthermore, taxonomic studies of vetigastropods have progressed recently in the tropical western Pacific (e.g., Poppe *et al*., 2006; Vilvans, 2009, 2017; Huang *et al.*, 2016), making it possible to compare with the results of this study.

For biogeographical comparison, specimens collected from the Nansei Islands (mainly around Amami-oshima) at equivalent depths in previous surveys (e.g., Shinohara *et al.*, 2005) were also examined for the present study, as well as published results of previous studies including some in Sagami Bay (Hasegawa *et al.*, 2001; Hasegawa, 2006).

Materials and Methods

Materials examined in the present study consist of numerous specimens accumulated via various independent dredging surveys and deposited in the National Museum of Nature and Science. Important sources include:

1) "Natural History of the Izu-Mariana Arc" (Natural History Research Project of the Japanese Islands, by the National Science Museum, Tokyo) in 1976 (18 stations: see Imajima, 1977 for overview);

2) "Relationship between shallow-sea animals and plate tectonics around the Japanese archipelago" (Kaken A: principal investigator M. Takeda) in 1995 (11 stations);

3) "Studies on the origin of biodiversity in the Sagami Sea Fossa Magna element and the Izu-Ogasawara (Bonin) Arc" (research project of the National Museum of Nature and Science) in 2008–2010 (91 stations: see Namikawa *et al.* 2011 for details);

4) "Comprehensive Studies of Fauna and Flora of Biodiversity Hotspots" (the present research) in 2014–2017 (93 stations).

Specimens collected via various cruises of research vessels such as the R/V *Soyo-Maru* and R/V *Tansei-Maru* and preserved in the museum were also taken into account, though excluding those collected at depths below 1000 m because of their incompleteness. All the stations (266 stations: including negative and deeper [＞1000 m] stations) are plotted in Fig. 1A to show the range of the research area. Most of the stations fall in the depth range of 0–200 m (Fig. 1B). Detailed data for positive stations are summarized in Table 1 (133 stations). Stations of some additional material obtained in the Nansei Islands during various research cruises for comparison are also summarized in Table 2.

Specimens were treated with varying methods, reflecting the length of the survey period, but most were primarily fixed in formalin. In recent surveys, however, live-collected specimens were lightly fixed by immersion in boiling water, and preserved in 99% ethanol for DNA analysis. Voucher specimens were deposited in the molluscan collection of the National Museum of Nature and Science with registration numbers. All the specimens were basically retained intact for subsequent detailed taxonomic studies.

All the specimens available were treated as the subject of taxonomic investigation, including juveniles, incomplete empty shells and even fragments. Specimens were roughly classified under a microscope, and smaller ones were more precisely examined based on photographs. Photographs were taken with a Nikon D7200 digital camera using lenses such as the Micro Nikkor 60 mm and a reversed Nikkor 20 mm with or without several extension rings. Stacks of at least ten shots were taken and combined with the aid of the focus stacking software CombineZP, then

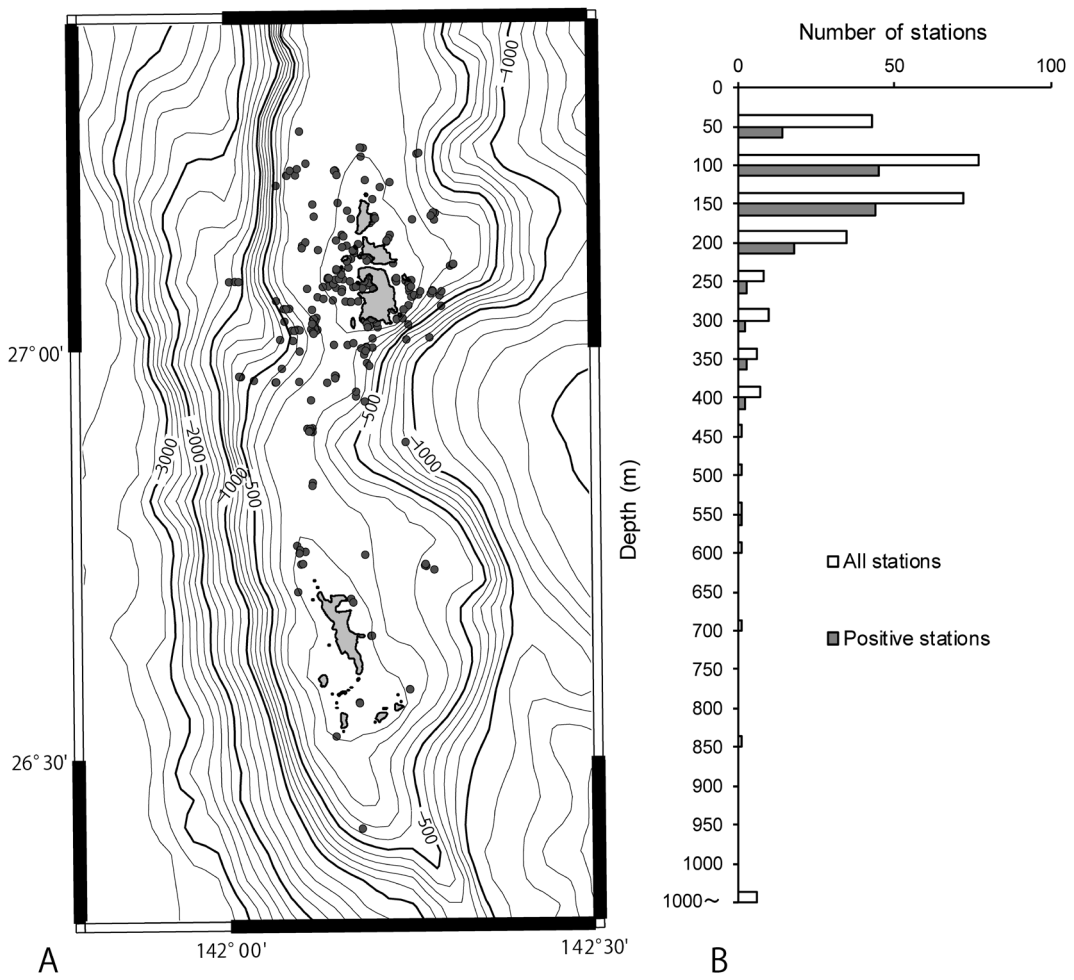

Fig. 1. Outline of survey stations. A. A map showing all the dredging sites by various research vessels (see Table 1 for details), including negative stations (yielding no vetigastropods). B. Vertical frequency distribution of survey stations (number of stations in every 50 m depth).

processed with Adobe Photoshop. High resolution digital images will be accessible using the registration number of each illustrated specimen on the database http://collection.db.kahaku.go.jp/musetheque/.

Abbreviations and institutional acronyms: fr—fragment(s) of shell; leg.—collected by; NSMT-Mo—National Museum of Nature and Science, molluscan collection; op—operculum; SL—shell length; TWP—tropical West Pacific; USNM—National Museum of Natural History, Smithsonian, Washington D.C.; ZMA Moll.—Zoölogisch Museum Amsterdam [now transferred to Naturalis], molluscan collection.

Results

More than 2700 vetigastropods (including ca. 170 imperfect specimens or identifiable fragments but excluding some poorly preserved ones) in 748 lots were classified into 93 morphospecies (hereinafter referred to as just species) belonging to 17 families.

Specimens from the Ogasawara Islands often differ to varying degrees from those of the presumed same species from other areas, and it can

Table 1. Positive stations of various dredge surveys around the Ogasawara Islands. Abbreviations: BD, biological dredge; KT, R/V *Tansei-Maru*; KY, R/V *Koyo*; OG, *Koyu-Maru VIII* (95 only); RD, Niino-style rock dredge; SO, R/V *Soyo-Maru*.

Station No.	Date	Gear	Position in		Position out		Depth (m)
KT-09-02-TW-1-1	2009/3/19	1 m BD	27°01.40′ N	142°07.41′ E	27°01.36′ N	142°07.47′ E	145–139
KT-09-02-TW-1-2	2009/3/19	1 m BD	27°01.37′ N	142°07.47′ E	27°01.34′ N	142°07.49′ E	138–138
KT-09-02-TW-1-4	2009/3/19	1 m BD	27°01.48′ N	142°05.97′ E	27°01.42′ N	142°06.02′ E	185–179
KT-09-02-TW-1-6	2009/3/19	1 m BD	27°01.43′ N	142°05.50′ E	27°01.35′ N	142°05.56′ E	297–310
KT-09-02-TW-2-4	2009/3/19	1 m BD	27°02.94′ N	142°07.17′ E	27°02.95′ N	142°07.25′ E	141–152
KY-08-04	2008/10/24	50 cm BD	27°03.60′ N	142°04.22′ E	27°03.78′ N	142°03.85′ E	211–214
KY-08-10	2008/10/27	50 cm BD	26°57.67′ N	142°06.06′ E	26°57.53′ N	142°06.07′ E	330–330
KY-08-17	2008/10/29	50 cm BD	27°05.02′ N	142°15.22′ E	27°04.86′ N	142°15.22′ E	70–69
KY-08-18	2008/10/29	50 cm BD	27°05.01′ N	142°14.89′ E	27°04.88′ N	142°14.87′ E	49–48
KY-08-19	2008/10/29	50 cm BD	27°06.07′ N	142°18.56′ E	27°06.06′ N	142°18.76′ E	175–176
KY-08-20	2008/10/29	50 cm BD	27°04.23′ N	142°15.19′ E	27°04.22′ N	142°15.06′ E	54–52
KY-08-21	2008/10/29	50 cm BD	27°03.84′ N	142°15.44′ E	27°03.70′ N	142°15.23′ E	95–98
KY-08-23	2008/10/30	50 cm BD	27°12.04′ N	142°04.28′ E	27°12.17′ N	142°04.29′ E	202–199
KY-08-25	2008/10/30	50 cm BD	27°07.31′ N	142°07.70′ E	27°07.03′ N	142°07.64′ E	129–127
KY-08-26	2008/10/30	50 cm BD	27°04.84′ N	142°08.93′ E	27°04.98′ N	142°09.15′ E	84–87
KY-09-01	2009/7/10	50 cm BD	27°02.23′ N	142°07.24′ E	27°02.12′ N	142°07.32′ E	137–137
KY-09-06	2009/7/10	1 m RD	27°01.80′ N	142°07.37′ E	27°01.90′ N	142°07.28′ E	136–137
KY-09-07	2009/7/10	50 cm BD	27°01.72′ N	142°07.39′ E	27°01.93′ N	142°07.28′ E	138–136
KY-09-08	2009/7/13	50 cm BD	26°45.20′ N	142°06.44′ E	26°45.38′ N	142°06.55′ E	98–102
KY-09-09	2009/7/13	50 cm BD	26°45.64′ N	142°05.75′ E	26°45.87′ N	142°05.88′ E	102–118
KY-09-12	2009/7/13	50 cm BD	26°42.24′ N	142°05.80′ E	26°42.30′ N	142°05.79′ E	97–103
KY-09-13	2009/7/14	50 cm BD	26°34.10′ N	142°10.79′ E			97–
KY-09-14	2009/7/14	50 cm BD	26°34.03′ N	142°10.80′ E	26°34.04′ N	142°10.81′ E	92–93
KY-09-15	2009/7/14	50 cm BD	26°24.79′ N	142°10.92′ E	26°24.81′ N	142°10.98′ E	107–109
KY-09-21	2009/7/15	50 cm BD	27°13.09′ N	142°90.19′ E	27°13.19′ N	142°09.23′ E	136–136
KY-09-22	2009/7/15	50 cm BD	27°14.79′ N	142°11.27′ E	27°14.86′ N	142°11.24′ E	91–93
KY-09-27	2009/7/15	50 cm BD	27°06.29′ N	142°13.88′ E	27°06.28′ N	142°14.01′ E	81–83
KY-09-28	2009/7/15	50 cm BD	27°07.05′ N	142°10.68′ E	27°07.02′ N	142°10.69′ E	52–52
KY-09-29	2009/7/16	50 cm BD	27°06.59′ N	142°10.25′ E	27°06.58′ N	142°10.21′ E	61–60
KY-09-30	2009/7/16	50 cm BD	27°07.22′ N	142°10.6′ E	27°07.28′ N	142°10.58′ E	52–50
KY-09-31	2009/7/16	50 cm BD	27°00.84′ N	142°16.81′ E	27°00.92′ N	142°16.56′ E	311–300
KY-09-34	2009/7/16	50 cm BD	27°02.34′ N	142°07.52′ E	27°02.55′ N	142°07.34′ E	139–141
KY-10-02	2010/7/5	50 cm BD	26°41.44′ N	142°10.33′ E	26°41.33′ N	142°10.39′ E	115–115
KY-10-03	2010/7/5	50 cm BD	26°45.32′ N	142°05.99′ E	26°45.30′ N	142°06.28′ E	106–92
KY-10-04	2010/7/5	50 cm BD	26°45.08′ N	142°05.94′ E	26°45.05′ N	142°06.20′ E	101–98
KY-10-06	2010/7/5	50 cm BD	26°44.29′ N	142°06.23′ E	26°44.29′ N	142°06.37′ E	76–73
KY-10-07	2010/7/6	50 cm BD	26°31.60′ N	142°08.85′ E	26°31.60′ N	142°08.94′ E	105–99
KY-10-09	2010/7/6	50 cm BD	26°35.02′ N	142°14.94′ E	26°34.98′ N	142°14.90′ E	90–82
KY-10-11	2010/7/6	50 cm BD	26°38.98′ N	142°11.85′ E	26°38.95′ N	142°11.96′ E	94–83
KY-10-15	2010/7/7	50 cm BD	27°12.41′ N	142°11.62′ E	27°12.43′ N	142°11.54′ E	72–64
KY-10-17	2010/7/7	50 cm BD	27°12.78′ N	142°05.14′ E	27°12.47′ N	142°05.14′ E	160–160
KY-10-18	2010/7/7	1 m RD	26°57.78′ N	142°02.33′ E	26°57.59′ N	142°02.03′ E	540–529
KY-10-19	2010/7/7	1 m RD	27°04.82′ N	142°08.95′ E	27°04.75′ N	142°09.06′ E	87–91
KY-10-21	2010/7/8	1 m RD	27°06.20′ N	142°18.82′ E	27°06.11′ N	142°18.73′ E	177–178
KY-10-23	2010/7/8	50 cm BD	27°06.22′ N	142°18.82′ E	27°06.04′ N	142°18.69′ E	178–179
KY-10-24	2010/7/8	50 cm BD	27°07.23′ N	142°10.7′ E	27°07.14′ N	142°10.73′ E	47–51
KY-10-26	2010/7/9	50 cm BD	27°04.68′ N	142°11.72′ E	27°04.68′ N	142°11.56′ E	36–40
KY-10-27	2010/7/9	50 cm BD	27°06.65′ N	142°10.42′ E	27°06.61′ N	142°10.29′ E	59–60
KY-10-30	2010/7/9	50 cm BD	27°00.14′ N	142°12.11′ E	27°00.16′ N	142°11.91′ E	147–139
KY-10-31	2010/7/9	50 cm BD	27°05.18′ N	142°08.48′ E	27°05.12′ N	142°08.39′ E	97–97
KY-13-01	2013/7/16	50 cm BD	27°00.14′ N	142°12.11′ E	26°59.92′ N,	142°11.82′ E	146–142
KY-13-03	2013/7/16	50 cm BD	27°01.73′ N	142°11.90′ E	27°01.92′ N	142°12.15′ E	113–92
KY-14-01	2014/6/23	50 cm BD	27°12.783′ N	142°05.882′ E	27°13.175′ N	142°05.916′ E	157–157
KY-14-02	2014/6/23	50 cm BD	27°13.239′ N	142°06.016′ E	27°13.685′ N	142°06.688′ E	157–157
KY-14-03	2014/6/23	50 cm BD	27°13.646′ N	142°06.743′ E	27°13.348′ N	142°06.446′ E	156–156
KY-14-04	2014/6/23	50 cm BD	27°15.997′ N	142°06.254′ E	27°15.693′ N	142°05.871′ E	171–170
KY-14-06	2014/6/23	50 cm BD	27°10.17′ N	142°10.133′ E	27°09.798′ N	142°09.942′ E	104–106
KY-14-07	2014/6/23	50 cm BD	27°09.564′ N	142°10.431′ E	27°09.257′ N	142°10.210′ E	69–75
KY-14-08	2014/6/24	50 cm RD	26°57.58′ N	142°08.358′ E	26°56.949′ N	142°08.454′ E	162–165
KY-14-09	2014/6/24	50 cm RD	27°00.359′ N	142°08.955′ E	26°59.966′ N	142°08.904′ E	150–155
KY-14-10	2014/6/24	50 cm BD	27°01.612′ N	142°12.565′ E			132–121
KY-14-11	2014/6/24	50 cm BD	27°01.948′ N	142°12.490′ E	27°01.806′ N	142°11.583′ E	107–89
KY-14-12	2014/6/25	50 cm BD	27°09.484′ N	142°15.468′ E			202–209
KY-14-13	2014/6/25	50 cm BD	27°09.743′ N	142°12.365′ E	27°09.872′ N	142°12.438′ E	76–87
KY-14-14	2014/6/25	50 cm BD			27°11.009′ N	142°12.218′ E	58–82
KY-14-15	2014/6/25	50 cm BD	27°12.226′ N	142°13.642′ E	27°12.724′ N	142°13.474′ E	166–161

Table 1. (continued)

Station No.	Date	Gear	Position in				Position out				Depth (m)
KY-14-16	2014/6/25	50 cm BD	27°11.878′	N	142°12.843′	E	27°12.346′	N	142°12.625′	E	129– 127
KY-14-17	2014/6/25	50 cm BD	27°09.247′	N	142°11.98′	E	27°09.612′	N	142°12.233′	E	59– 59
KY-16-01	2016/7/11	50 cm BD	27°01.536′	N	142°07.388′	E	27°01.855′	N	142°07.414′	E	133– 134
KY-16-02	2016/7/11	50 cm BD	27°02.126′	N	142°07.435′	E	27°02.445′	N	142°07.512′	E	134– 139
KY-16-06	2016/7/11	50 cm BD	27°13.104′	N	142°09.091′	E	27°13.173′	N	142°09.497′	E	135– 137
KY-16-07	2016/7/11	50 cm BD	27°12.784′	N	142°09.284′	E	27°12.867′	N	142°09.676′	E	138– 141
KY-16-11	2016/7/12	50 cm BD	27°03.959′	N	142°15.58′	E	27°04.014′	N	142°15.787′	E	81– 89
KY-16-13	2016/7/12	50 cm BD	27°05.032′	N	142°15.367′	E	27°04.825′	N	142°15.347′	E	84– 83
KY-16-14	2016/7/12	50 cm BD	27°09.407′	N	142°12.163′	E	27°09.718′	N	142°12.291′	E	57– 63
KY-16-18	2016/7/13	50 cm BD	27°06.467′	N	142°10.069′	E	27°06.565′	N	142°10.31′	E	59– 59
KY-16-23	2016/7/13	50 cm BD	27°00.033′	N	142°11.474′	E	27°00.062′	N	142°11.309′	E	135– 135
KY-16-24	2016/7/13	50 cm BD	27°00.142′	N	142°11.590′	E	27°00.105′	N	142°11.398′	E	137– 134
KY-16-31	2016/7/14	50 cm BD	27°04.255′	N	142°17.104′	E	27°04.255′	N	142°17.104′	E	141–
KY-16-33	2016/7/14	50 cm BD	27°04.219′	N	142°16.085′	E	27°04.286′	N	142°16.115′	E	87– 92
KY-16-37	2016/7/14	50 cm BD	27°04.573′	N	142°15.332′	E	27°04.466′	N	142°15.456′	E	80– 81
KY-17-01	2017/7/18	50 cm BD	26°58.115′	N	142°09.010′	E	26°57.905′	N	142°09.026′	E	152– 155
KY-17-02	2017/7/18	50 cm BD	26°57.903′	N	142°09.020′	E	26°58.167′	N	142°08.991′	E	155– 151
KY-17-03	2017/7/18	50 cm BD	26°56.915′	N	142°10.719′	E	26°56.556′	N	142°10.711′	E	194– 203
KY-17-04	2017/7/18	50 cm BD	26°56.915′	N	142°10.719′	E	26°56.556′	N	142°10.711′	E	194– 203
KY-17-05	2017/7/18	50 cm BD	26°56.188′	N	142°11.434′	E	26°55.940′	N	142°11.310′	E	385– 380
KY-17-08	2017/7/19	50 cm BD	27°07.892′	N	142°13.339′	E	27°07.807′	N	142°13.401′	E	54– 61
KY-17-09	2017/7/19	50 cm BD	27°08.380′	N	142°13.634′	E	27°08.609′	N	142°13.545′	E	117– 121
KY-17-10	2017/7/19	50 cm BD	27°08.116′	N	142°13.507′	E	27°08.016′	N	142°13.617′	E	105– 103
KY-17-15	2017/7/19	50 cm BD	27°09.760′	N	142°17.006′	E	27°09.889′	N	142°16.870′	E	298– 301
KY-17-16	2017/7/20	50 cm BD	27°04.215′	N	142°09.624′	E	27°04.069′	N	142°09.352′	E	74– 77
KY-17-17	2017/7/20	50 cm BD	27°03.735′	N	142°08.107′	E	27°03.496′	N	142°08.097′	E	86– 85
KY-17-18	2017/7/20	50 cm BD	27°02.257′	N	142°00.316′	E	27°01.968′	N	142°07.324′	E	136– 135
KY-17-19	2017/7/20	50 cm BD	27°01.909′	N	142°07.171′	E	27°01.664′	N	142°07.166′	E	138– 139
KY-17-22	2017/7/20	50 cm BD	27°00.679′	N	142°05.572′	E	27°00.544′	N	142°05.670′	E	348– 341
KY-17-23	2017/7/20	50 cm BD	27°01.276′	N	142°07.228′	E	27°01.491′	N	142°07.070′	E	147– 147
KY-17-25	2017/7/21	50 cm BD	27°00.091′	N	142°11.196′	E	27°00.160′	N	142°11.557′	E	136– 138
KY-17-26	2017/7/21	50 cm BD	26°59.619′	N	142°11.420′	E	26°59.623′	N	142°11.698′	E	148– 145
KY-17-27	2017/7/21	50 cm BD	26°58.995′	N	142°11.644′	E	26°59.169′	N	142°11.908′	E	178– 175
KY-17-28	2017/7/21	50 cm BD	26°58.785′	N	142°11.836′	E	26°58.939′	N	142°12.045′	E	194– 196
KY-17-29	2017/7/21	50 cm BD	26°44.934′	N	142°11.356′	E	26°56.140′	N	142°11.462′	E	383– 385
KY-17-31	2017/7/21	50 cm BD	27°00.463′	N	142°10.551′	E	27°00.455′	N	142°10.512′	E	137– 137
KY-17-32	2017/7/21	50 cm BD	27°00.795′	N	142°12.136′	E	27°00.778′	N	142°12.028′	E	151– 141
KY-17-33	2017/7/21	50 cm BD	26°59.897′	N	142°11.538′	E	26°59.932′	N	142°11.432′	E	140– 141
OG-76-02	1976/6	BD	27°03.5′	N	142°10.4′	E	27°03.6′	N	142°10.5′	E	36
OG-76-04	1976/6	BD	—								80
OG-76-05	1976/6	BD	27°05.5′	N	142°09.6′	E	27°05.5′	N	142°09.7′	E	65
OG-76-07	1976/6	BD	27°06.5′	N	142°11.7′	E	27°06.4′	N	142°11.6′	E	47
OG-76-08	1976/6	BD	27°06.9′	N	142°11.4′	E	27°06.8′	N	142°11.3′	E	45
OG-76-10	1976/6	BD	27°05.8′	N	142°09.2′	E	27°05.8′	N	142°09.3′	E	80
OG-76-11	1976/6	BD	27°07.5′	N	142°09.7′	E	27°07.4′	N	142°09.7′	E	75
OG-76-12	1976/6	BD	27°08.0′	N	142°09.2′	E	27°07.9′	N	142°09.1′	E	110
OG-76-13	1976/6	BD	27°08.3′	N	142°09.8′	E	27°08.2′	N	142°09.5′	E	95
OG-76-15	1976/6	BD	27°05.9′	N	142°09.2′	E	27°05.9′	N	142°09.3′	E	84
OG-76-17	1976/6	BD	—								42
OG-95-07	1995/1/14	BD	27°05.19′	N	142°11.90′	E					6– 39
OG-95-13	1995/1/17	BD	27°06.77′	N	142°12.13′	E					34
OG-95-16	1995/1/17	BD	27°05.13′	N	142°14.04′	E					45
OG-95-19	1995/1/17	BD	27°05.22′	N	142°14.12′	E					42
OG-95-22	1995/1/19	BD	27°01.87′	N	142°11.67′	E					48– 42
OG-95-23	1995/1/19	BD	27°01.64′	N	142°11.74′	E					75
OG-95-31	1995/1/20	BD	27°03.53′	N	142°09.93′	E					60
OG-95-32	1995/1/20	BD	27°02.25′	N	142°14.62′	E					116
OG-95-33	1995/1/20	BD	27°01.80′	N	142°15.07′	E					144– 130
OG-95-34	1995/1/20	BD	27°03.21′	N	142°15.11′	E					103
OG-95-35	1995/1/22	BD	27°04.58′	N	142°10.58′	E					61
OG-95-39	1995/1/22	BD	27°05.18′	N	142°09.41′	E					80– 84
OG-95-40	1995/1/22	BD	27°07.73′	N	142°11.01′	E					37
OG-95-41	1995/1/22	BD	27°08.41′	N	142°09.67′	E					102
OG-95-42	1995/1/22	BD	27°07.62′	N	142°10.06′	E					82 76
OG-95-44	1995/1/22	BD	27°05.79′	N	142°9.3′	E					90
SO-77-R8	1977/7/6	BD	27°26.0′	N	142°05.0′	E					194– 235
SO-90-HD-1	1990/7/1	BD	27°05.0′	N	142°11.5′	E					35 40

Table 2. Stations of additional surveys around the Nansei Islands for comparative material. Abbreviations: BD, biological dredge; DY, a tagboat *Daiyu-Maru*, Amami-oshima; KT, R/V *Tansei-Maru*; TY, T/V *Toyoshio-Maru*.

Station No.	Date	Gear	Position in		Position out		Depth (m)
DY-02-01	2002/6/26	50 cm BD	28°29.62′ N	129°30.03′E	28°29.11′ N	129°30.02′E	290
DY-02-03	2002/6/26	50 cm BD	28°29.22′ N	129°24.71′E	28°29.20′ N	129°24.48′E	490
DY-02-04	2002/6/27	50 cm BD	28°25.87′ N	129°22.25′E	28°25.47′ N	129°21.73′E	210
DY-03-04	2003/6/17	50 cm BD	28°25.23′ N	129°24.20′E	28°25.45′ N	129°24.55′E	148–155
DY-03-10	2003/6/20	50 cm BD	28°29.9′ N	129°33.44′E	28°30.90′ N	129°33.73′E	167–168
DY-04-01	2004/6/23	50 cm BD	28°17.35′ N	129°47.41′E	28°17.08′ N	129°47.77′E	198–205
DY-04-12	2004/6/25	50 cm BD	28°16.19′ N	129°35.31′E	28°16.47′ N	129°35.62′E	118–123
KT-02-03 St. B-2	2002/4/24	1 m BD	25°33.25′ N	126°10.64′E	25°33.01′ N	126°10.68′E	154–151
KT-04-24 St. G-3	2004/10/23	1 m BD	28°42.10′ N	129°58.29′E	28°42.20′ N	129°58.56′E	293–320
TY-01-7	2001/5/27	BT	28°8.95′ N	129°6.85′ E	28°08.53′ N	129°6.56′ E	288–311
TY-03-09	2002/5/22	BT	26°49.5′ N	127°42.0′ E			202–199
TY-03-13	2002/5/25	BT	26°33′ N	127°32.3′ E			237–223
TY-17-03-11(2)	2017/5/21	50 cm BD	28°52.98′ N	129°32.94′E	28°53.00′ E	129°32.79′E	165–166

be difficult to judge whether this represents intraspecific variation or different species. If the degree of difference of the Ogasawara population clearly exceeded the differences between other populations, it was judged to be a different species. However, more detailed taxonomic examination, including genetic analysis, is essential to clarify the precise relationships between these forms.

Another issue to be considered was whether species recorded so far only in the Ogasawara Islands are endemic to this area or not. If a species that morphologically closely resembles the Ogasawara specimens (a presumed sister species) is distributed in adjacent waters (e.g., the Nansei Islands, Mainland Japan or the TWP), the Ogasawara population was judge to be endemic. If the species in the Ogasawara Islands was represented by only a few specimens, and no comparable species were found in the surrounding waters, it was considered to be only possibly endemic because of the lack of enough information.

As a result, 70 among 93 species were identified as previously named species, and 23 were considered to be probably undescribed (Table 3). Fifty-one species (55%) were recorded for the first time in the Ogasawara Islands, including 22 (24%) recorded for the first time in Japanese waters. Twelve species (13%) were considered to be endemic to the Ogasawara Islands, and four are so far recorded only from this area (Table 4).

All the species are listed in systematic order in the following "Taxonomy" section. The systematic arrangement and scientific names basically follow Okutani (2017), although several nomenclatural changes are made as mentioned in the remarks accompanying each species. For each species, the number of specimens is given in parentheses (the number of live-collected specimens is indicated with an asterisk) as well as the depth range in brackets and the geographical distribution. Species recorded for the first time from the Ogasawara Islands and those with a taxonomic discussion are illustrated in the color plates. Some comparative material (of the same and sister species) from other areas, such as the Nansei Islands and Mainland Japan, are also illustrated.

Taxonomy

Family **Angariidae** Gray, 1857

Angaria rugosa (Kiener, 1838) ベニカタベ (Fig. 2A–C)

Material examined: KY-10-04 (1: Fig. 2B–C), NSMT-Mo 114053; KY-10-06 (1: Fig. 2A), NSMT-Mo 114054; [73–101 m].

Distribution: Kii Peninsula and southwards to TWP. **New to Ogasawara Islands**.

Remarks: In the family Angariidae, only "*A. atrata* (Reeve)" [= *A. neglecta* Poppe & Goto, 1993] has been recorded in the Izu and Ogasawara Islands (Nishimura, 1999: 30). Although *A. neglecta* is commonly found in the

Table 3. Summary of species recorded in the present study. *, new to Ogasawara Islands; **, new to Japan; fr, fragment; op, operculum.

Species name	No. of specimens total (live)/lot	Depth range (m)	Endemic to Ogasawara Id.	Distribution Records		
				Sagami-Izu	Nansei Islands	TWP
Family Angariidae						
Angaria rugosa (Kiener, 1838)*	2(0)/2	73–101			+	+
Family Phasianellidae						
Hiloa variabilis (Pease, 1861)*	7(0)/4	35–115		+	+	+
Phasianella solida (Born, 1780)	56(0) + 12fr/16	36–113		+	+	+
Family Colloniidae						
Collonista picta (Pease, 1868)*	116(0)/20	35–178		+	+	+
Collonista rubricincta (Mighels, 1845)	115(6)/14	35–160		+	+	−
Collonista verruca (Gould, 1845)**	1(0)/1	40		−	−	−
Homalopoma sp. 1**	11(0)/2	156–160		−	+	−
Homalopoma sp. 2**	3(0)/1	380–385	Y	−	−	−
Family Trochidae						
Trochus rota Dunker, 1860	3(0)/3	69–107		+	+	+
Clanculus bronni Dunker, 1860	3(0)/1	42		+	+	+
Clanculus cognatus (Pilsbry, 1903)	2(0)/2	75		+	+	+
Clanculus denticulatus (Gray, 1827)	31(0) + 17fr/14	35–107		−	+	+
Clanculus sp.**	10(0) + 3fr/11	65–137	Y	−	−	−
Jujubinus sp.**	64(2)/19	76–385		−	+	−
Kanekotrochus boninensis (Okutani, 2001)	91(0) + 9fr/21	48–171	Y	−	−	−
Tosatrochus attenuatus (Jonas, 1844)	2(0)/2	69–82		−	+	+
Alcyna ocellata A. Adams, 1860	12(0)/6	35–107		+	+	+
Synaptocochlea concinna (Gould, 1845)	11(0)/4	35–105		−	+	+
Microtis tuberculata H. Adams & A. Adams, 1850	3(0) + 1fr/1	89–107		−	+	+
Stomatella auricula Lamarck, 1816	4(0) + 12fr/4	36–107		+	+	+
Stomatella lintricula (A. Adams, 1850)*	1(0)/1	85		−	+	+
Stomatia phymotis Helbling, 1779	6(2)/5	6–59		+	+	+
Stomatolina angulata (A. Adams, 1850)*	3(0)/3	92–156		+	+	+
Stomatolina sp.	25(0)/7	45–107	Y	−	−	−
Conotalopia ornata (G. B. Sowerby III, 1903)*	3(0)/2	84–107		+	+	−
Ethalia guamensis (Quoy & Gaimard, 1834)	1(0)/1	42		−	+	+
Ethaliella floccata (G. B. Sowerby III, 1903)	1(0)/1	42		−	+	+
Ethminolia sp.	148(8) + 3fr/30	36–151	Y	−	−	−
Monilea belcheri (Philippi, 1849)	128(14) + 16fr/30	36–147		−	+	+
Pseudominolia tramieri Poppe, Tagaro & Dekker, 2006**	4(0)/2	127–330		−	−	+
Rossiteria nucleus (Philippi, 1849)	385(9) + 33fr/26	36–113		+	+	+
Sericominolia vernicosa (Gould, 1861)	109(13)/21	36–107		−	+	+
Family Solariellidae						
Archiminolia fulgens (Dall, 1907)*	2(0)/2	298–311		+	+	+
Archiminolia ziczac (Kuroda & Habe, 1971)*	5(0)/2	300–385		+	−	−
Bathymophila gravida Marshall, 1999**	26(0) + 4fr/1	529–540		−	−	+
Bathymophila sp. 2**	1(0)/1	141–151	Y?	−	−	−
Family Margaritidae						
Callogaza sericata (Kira, 1959)*	1(0)/1	380–385		+	−	+
Family Calliostomatidae						
Calliostoma takujii Kosuge, 1986	7(3)/4	98–385		−	−	+
Calliostoma sp. 1	33(0)/16	36–137	Y	−	−	−
Calliostoma sp. 2	10(0)/6	47–135	Y	−	−	−
Family Turbinidae						
Astralium provisorium Schepman, 1908**	86(6) + 1op/28	35–171		−	−	+
Bolma girgyllus (Reeve, 1861)*	2(1)/2	34–105		+	+	+
Bolma kiharai Kosuge, 1986	1(0)/1	175–178	Y	−	−	−
Bolma minutiradiosa Kosuge, 1983*	2(2)/2	202–311		−	+	+
Bolma persica (Dall, 1907))*	4(0)/2	136–310		+	+	+
Bolma tamikoana (Shikama, 1973)*	47(13) + 3op + 8fr/22	102–385		+	+	+
Bolma sp.	109(46) + 39op + 2fr/33	98–348	Y	−	−	−

Table 3. (continued)

Species name	No. of specimens total (live)/lot	Depth range (m)	Endemic to Ogasawara Id.	Distribution Records		
				Sagami-Izu	Nansei Islands	TWP
Turbo excellens G. B. Sowerby III, 1914	13(1) + 6op + 2fr/18	45–171		+	−	−
Turbo reevei Philippi, 1847	1(0)/1	42		+	+	+
Family Liotiidae						
Bathyliotina armata (A. Adams, 1861)*	2(0)/1	380–385		+	+	+
Liotina montamarina Okutani, 2001	67(1)/25	36–137	Y	−	−	−
Liotina sp. 1	83(1)/22	52–385		−	+	−
Liotina sp. 2	19(0)/11	47–156	Y	−	−	−
Family Skeneidae						
Cirsonella sp.**	3(0)/3	136–160		−	+	−
Leucorhynchia tricarinata Melvill & Standen, 1896	5(0)/2	35–84		−	+	+
Munditiella ammonoceras (A. Adams, 1863)	8(0)/4	35–107		+	+	+
Family Seguenziidae						
Ancistrobasis sp.**	1(0)/1	380–385	Y?	−	−	−
Visayasequenzia sp.	5(0)/2	115–156		−	+	−
Calliobasis sp.	1(0)/1	160	Y?	−	−	−
Family Chilodontidae						
Ascetostoma sp.**	15(0)/9	73–156	Y	−	−	−
Herpetopoma ludiviniae Poppe, Tagaro & Dekker, 2006 **	3(0)/1	380–385		−	−	+
Herpetopoma rubrum (A. Adams, 1853)*	8(0)/6	47–107		+	−	+
Perrinia concinna (A. Adams, 1864)*	7(1)/5	99–171		+	+	−
Pholidotrope asteroeides Vilvens, 2017**	5(1)/4	99–156		−	+	+
Tibatrochus sp.**	1(0)/1	160		−	+	+
Vaceuchelus favosus (Melvill & Standen, 1896)**	15(0)/6	35–156		−	−	+
Family Anatomidae						
Anatoma equatoria (Hedley, 1899)*	29(0)/2	160–540		−	+	+
Anatoma indonesica Bandel, 1998*	6(0)/3	107–160		−	+	+
Anatoma japonica (A. Adams, 1862)*	2(0)/1	529–540		+	+	+
Family Scissurellidae						
Scissurella evaensis Bandel, 1998*	11(3)/7	92–115		−	+	+
Sukashitrochus carinatus (A. Adams, 1862) *	10(4)/7	35–115		+	+	+
Family Larocheidae						
Trogloconcha sp.**	7(0)/1	160	Y?	−	−	+
Family Haliotiidae						
Haliotis sp.	6(0)/6	47–129	Y	−	−	−
Family Fissurellidae						
Diodora mus (Reeve, 1850)	5(0)/4	35–129		+	+	+
Diodora octagona (Reeve, 1850)	6(0)/6	87–166		−	+	+
Diodora quadriradiata (Reeve, 1850)	5(0)/1	42		+	+	+
Diodora semilunata Habe, 1953*	17(0)/7	36–110		+	+	−
Diodora sp.	162(8)/26	45–138		−	+	−
Macroschisma dilatata (A. Adams, 1851)	19(1)/9	35–107		+	+	+
Cranopsis propinqua (A. Adams, 1853)	6(0)/6	35–160		+	−	+
Emarginella sakuraii Habe, 1963	7(0)/7	36–137		−	+	−
Hemimarginula laevicostata (A. Adams, 1852)	88(0)/13	35–115		−	+	+
Laeviemarginula kimberi (Cotton, 1930)*	1(0)/1	117–121		+	+	+
Zeidora calceolina A. Adams, 1860*	3(0)/3	35–160		+	+	+
Emarginula choristes Dall, 1925*	33(1)/15	127–385		+	+	−
Emarginula curvata Schepman, 1908**	1(0)/1	300–311		−	+	+
Emarginula foveolata Schepman, 1908*	1(0)/1	330		+	+	+
Emarginula fragilis Yokoyama, 1920*	17(0)/12	84–540		+	+	+
Emarginula eximia A. Adams, 1863	7(0)/4	47–107		+	+	+
Emarginula maculata A. Adams, 1863*	112(4)/27	36–160		+	+	+
Emarginula sublaevis Schepman, 1908**	4(0)/3	330–385		+	+	+
Emarginula sp. 1	38(4)/21	47–202		−	+	−
Emarginula sp. 2**	2(0)/2	89–109		−	+	−

Table 4. Species endemic to the Ogasawara Islands and possible sister species, with their geographical distribution.

Species	Morphologically allied species	Distribution		
		Honshu	Nansei Id.	TWP
Homalopoma sp. 2	*Homalopoma hui* Huang *et al*., 2016	−	+	+
Clanculus sp.	*Clanculus buijsei* Poppe *et al*., 2006	−	−	+
Kanekotrochus boninensis	*Kanekotrochus infuscatus* (Gould, 1861)	+	−	−
Stomatolina sp.	*Stomatolina rubra* (Lamarck, 1822)	+	−	−
Ethminolia sp.	*Ethminolia nektonica* (Okutani, 1961)	+	+	−
Bathymophila sp. 2	?			
Calliostoma sp. 1	*Calliostoma simodense* Ikebe, 1942	+	−	−
Calliostoma sp. 2	?			
Bolma kiharai	*Bolma tamikoana* (Shikama, 1973)	+	+	+
Bolma sp. 1	*Bolma guttata* (A. Adams, 1863)	+	−	−
Liotina montamarina	*Liotina solidula* (Gould, 1859)	+	+	−
Liotina sp. 2	*Liotina loculosa* (Gould, 1859)	−	+	
Ancistrobasis sp.	?			
Calliobasis sp.	?			
Trogloconcha sp.	*Trogloconcha lammelinodosa* Geiger, 2012	−	−	+
Haliotis sp.	*Haliotis varia* Linnaeus, 1758	−	+	+

Izu Islands, there are no reliable records with voucher specimens or illustrations of the species in the Ogasawara Islands. The present material comprises only one adult in very poor condition and one juvenile shell, but it apparently differs from *A. neglecta* and is identifiable with *A. rugosa* in possessing finer sculpture and distinct subsutural ramps, and lacking of distinctive black-tipped spines. It is not clear whether the record of *A. neglecta* was based on the misidentification with *A. rugosa*, or two species are actually distributed in the Ogasawara Islands.

Family **Phasianellidae** Swainson, 1840

Hiloa variabilis (Pease, 1861) ベニバイ (Fig. 2D–E)

Material examined: OG-76-15 (1); SO-90-HD-1 (2); KY-10-02 (3: Fig. 2D–E), NSMT-Mo 114057; KY-10-7 (1); [35–115 m].

Distribution: Southern Hokkaido and southwards to TWP. **New to Ogasawara Islands**.

Remarks: Although Fukuda (1950: 5, pl. 47, fig. 841) recorded a similar possible undescribed species with a distinct spiral sculpture as "*Tricolia* sp." from the intertidal zone in the Ogasawara Islands, all the specimens in the present material could easily be identified as this species, though this represents the first record of it in this region. In temperate Japanese waters, including the Izu Islands (south to Hachijo-jima Island), two discontinuous forms are recognized in this species and this has been interpreted as sexual dimorphism (Robertson, 1985), but specimens from the Ogasawara Islands are uniform and agree well with the typical *H. variabilis*, as is also the case in the Nansei Islands.

Phasianella solida (Born, 1780) サラサバイ

Material examined: OG-76-04 (1ex.); OG-76-07 (2); OG-76-08 (2); OG-76-11 (10 + 3fr); OG-76-15 (4 + 9fr); OG-95-16 (1); OG-95-19 (1); OG-95-22 (1); KY-08-17 (1); KY-08-18 (1); KY-10-24 (2); KY-10-26 (1); KY-10-27 (1); KY-03-13 (2); KY-14-11 (25); KY-17-10 (1); [36–113 m].

Distribution: Boso Peninsula and southwards to TWP.

Family **Colloniidae** Cossmann, 1917

Collonista picta (Pease, 1868) ミナミサンショウスガイ（新称） (Fig. 2F–J)

[= *Collonista pilula* (Dunker, 1860) fide Fukuda (1995: pl. 5, fig. 38)]

Material examined: OG-76-02 (5); OG-76-05 (2); OG-76-07 (40: Fig. 2F–H), NSMT-Mo 114077; OG-76-08 (2); OG-76-11 (7); OG-76-15 (22); SO-90-HD-1 (4);

Fig. 2. A–C. *Angaria rugosa*; A, KY-10-04; B–C, KY-10-06. D–E. *Hiloa variabilis*; KY-10-02. F–J. *Collonista picta*; F–H, OG-76-07; I–J, KY-17-08. K–O. *Collonista rubricincta*; K–M, O, SO-90-HD1 (2 specimens); N, OG-76-75. P–S. *Collonista verruca*; P–Q, KY-10-26; R–S, Kopepe Beach, Chichi-jima Island, in intertidal zone. T–U. *Collonista amakusaensis*; holotype. Scales: A, 10 mm; B, 5 mm; C, 1 mm, F–J, 1 mm; K–O, 1 mm: P–U; 2 mm.

KY-09-29 (1); KY-10-02 (6); KY-10-06 (5); KY-10-11 (4); KY-10-15 (2); KY-10-21 (1); KY-10-24 (3); KY-10-27 (3); KY-14-03 (3); KY-14-08 (1); KY-17-05 (2); KY-17-08 (2: Fig. 2I–J), NSMT-Mo 114093; KY-17-17 (1); [35–178 m].

Distribution: Boso Peninsula and southwards to TWP. **New to Ogasawara Islands**.

Remarks: The taxonomy of the Japanese species of the family Colloniidae is confused, and detailed revision will be necessary to resolve it. The present species is often misidentified as a phenotype of the superficially similar *Bothropoma pilula* (Dunker, 1860) in museums and private collections, and it was actually recorded from the Ogasawara Islands by Fukuda (1995) as "*Collonista pilula*." Specimens previously recorded "*C. glareosa* (Gould, 1861)" from the Ogasawara Islands (Fukuda, 1953: 20) probably correspond to the *C. verruca* (and partly *C. rubricincta*; see below) in the present study, judged from the examination of related material. Accordingly this is the first firm record of this species from the Ogasawara Islands.

Collonista rubricincta (Mighels, 1845) ベニツブサンショウ (Fig. 2K–O)

Material examined: OG-76-15 (2: fig. 2N), NSMT-Mo 114095; SO-90-HD-1 (15: fig. 2K–M, O), NSMT-Mo 114096; KY-09-34 (1); KY-10-04 (1); KY-10-06 (7); KY-10-07 (5*); KY-10-09 (1); KY-10-15 (4); KY-10-17 (11); KY-10-31 (1); KY-14-03 (70); KY-14-11 (1); KY-17-10 (1); KY-17-25 (1*); [35–160 m].

Distribution: From Kii Peninsula to Nansei Islands, and Hawaii.

Remarks: Huang *et al.* (2016) described a very similar species, *C. thachi* Huang, Fu & Poppe, 2016, from the Philippines, and they stated that it can be distinguished from the present species by having a clear umbilicus and more elevated spiral ribs in addition to a different color pattern. Specimens from the Ogasawara Islands and other areas in Japanese waters more closely resemble *C. rubricincta*, which was originally described from Hawaii and is sometimes cited as endemic to that region. Specimens from the Ogasawara Islands exhibit a wide range of variation in color from white to red, like those in Hawaii. The white phenotype (e.g., from OG-76-15: Fig. 2O) was identified by Fukuda (1995: 20) as *Collonista glareosa* (Gould, 1861), as confirmed by the examination of voucher specimens.

Collonista verruca (Gould, 1845) フイリシラタマサンショウスガイ（新称）(Fig. 2P–S)

Material examined: KY-10-26 (1: Fig. 2P–Q), NSMT-Mo 114109; [0–40 m].

Additional material: Kopepe Beach, Chichi-jima Island, under boulders in intertidal zone, 11 July 2010, leg. K. Hasegawa (10 + 7*: Fig. 2R–S), NSMT-Mo 114771.

Distribution: Ogasawara Islands, and Hawaii. **New to Japan**.

Remarks: Although only one empty shell was found in the present material, live specimens were rather commonly found in the intertidal zone (Fig. 2R–S). These specimens closely resemble *Collonista amakusaensis* Habe, 1960 (Fig. 2T–U: holotype, NSMT-Mo 39787), which is distributed along the Pacific coast of mainland Japan, but is clearly distinguished by a more elongate shell with an elevated spire, different sculpture (spiral cords being narrower, with secondary spiral threads in the interspaces and bearing red spots), and completely closed umbilicus. They are, on the other hand, morphologically indistinguishable from the Hawaiian taxon, *C. verruca* (see Alf and Kreipl in Severns, 2011: pl. 12, fig. 9 for color photograph). Considering both the geographical distance between Hawaii and the Ogasawara Islands and the absence of records of this species in other areas, however, the Ogasawara population may be genetically distinct and represent the third species in this putative species group.

Homalopoma sp. 1 (Fig. 3D–E)

Material examined: KY-10-17 (1); KY-14-03 (8: Fig. 3D–E), NSMT-Mo 114111; [156–160 m].

Distribution: From the Kii Peninsula to Nansei Islands and Ogasawara Islands. **New to Japan**.

Remarks: This probably undescribed species has also been collected from off the Kii Penin-

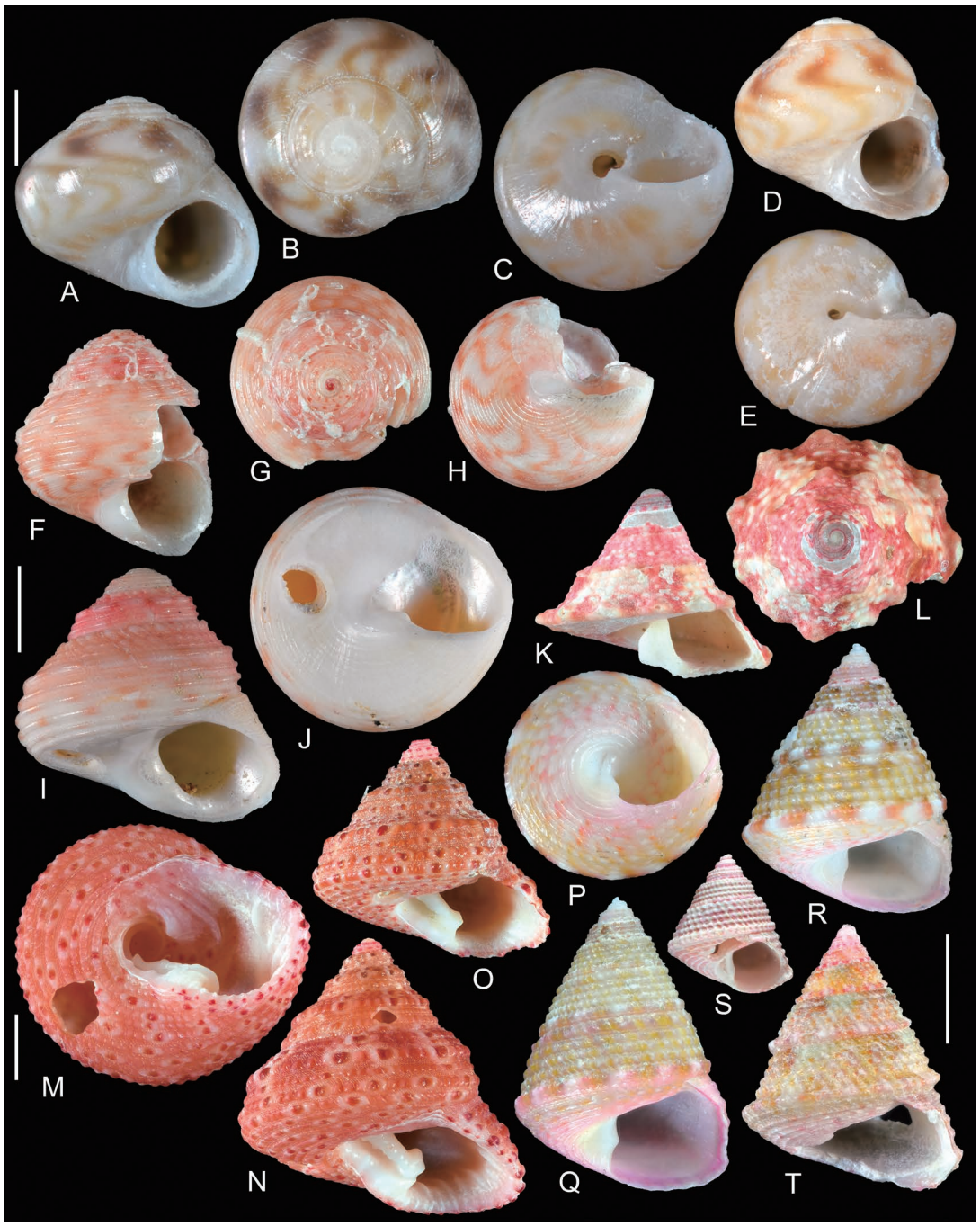

Fig. 3. A–E. *Homalopoma* sp. 1; A–C, off Amami-oshima Island, 288–311 m, TY-01-7; D–E, KY-14-03. F–H. *Homalopoma* sp. 2; KY-17-05. I–J. *Homalopoma hui*; off Amami-oshima Island, ca. 480 m, DY-02-03. K–L. *Trochus rota*; KY-14-11. M–O. *Clanculus* sp.; M–N, KY-10-06; O, KY-16-33. P–T. *Jujubinus* sp.; P–R, KY-09-21 (2 specimens); S, KY-10-7; T, Zyuho-Sone Bank, near Miyako Island, 162–151 m, KT-02-03 St. B-2. Scales: A–E, 2 mm; F–L, 2 mm; M–O, 2 mm; P–T, 2 mm.

sula (Hasegawa, personal observation) to the Nansei Islands (Amami-oshima Island: Fig. 3A–C, NSMT-Mo 114772).

Homalopoma sp. 2 (Fig. 3F–H)

Material examined: KY-17-05 (3), NSMT-Mo 114112; [380–385 m].

Distribution: Ogasawara Islands (endemic). **New to Japan**.

Remarks: The specimens in the present material are apparently related to *H. hui* Huang, Fu & Poppe, 2016, which was originally described from Taiwan and is also distributed in Japan from the Nansei Islands (Fig. 3I–J, NSMT-Mo 114773) north to Sagami Bay (Hasegawa, in preparation). However, in contrast to the low morphological variability of this species in other populations in its wide geographical range, specimens from the Ogasawara Islands differ considerably in having a significantly smaller and more globose shell with weaker and more crowded spiral sculpture and a dark red protoconch. They are thus considered to belong to a distinct undescribed species.

Family **Trochidae** Rafinesque, 1815

Trochus rota Dunker, 1860 ウズイチモンジ (Fig. 3K–L)

Material examined: OG-76-15 (1); KY-14-07 (1); KY-14-11 (1: Fig. 3K–L), NSMT-Mo 114115; [69–107 m].

Distribution: Boso Peninsula and southwards to TWP.

Remarks: Although this species is common in the intertidal zone in temperate Japanese waters, including the Izu Islands, it is very rare in the Ogasawara Islands and the present material comprises only very small immature shells. Identification was confirmed by direct comparison with the apical part of Japanese specimens. However, *T. rota* seems to be contiguous to *T. histrio* Reeve, 1848 (sensu Sasaki in Okutani, 2017: pl. 20, fig. 64 for a figure) that is said to be widely distributed in the TWP northwards to the Nansei Islands, and it is possible that the former represents a geographical form (in temperate Japanese waters) of the latter.

Clanculus bronni Dunker, 1860 コマキアゲエビス

Material examined: OG-76-17 (1); [42 m].

Distribution: Boso Peninsula and southwards to TWP.

Clanculus cognatus (Pilsbry, 1903) クルマチグサ

Material examined: OG-95-23 (1); KY-14-11 (1); [75 m].

Distribution: Boso Peninsula and southwards to TWP.

Clanculus denticulatus (Gray, 1827) テツイロナツモモ

Material examined: OG-76-04 (1fr); OG-76-07 (7); OG-76-08 (3fr); OG-76-15 (3 + 8fr); OG-76-11 (4fr); SO-90-HD-1 (1); OG-95-19 (1); KY-09-27 (1); KY-10-06 (1); KY-10-24 (1 + 1fr); KY-10-27 (1); KY-14-07 (1); KY-14-11 (13); KY-14-14 (1); [35–107 m].

Distribution: Yaku-shima Island and southwards to TWP.

Clanculus sp. (Fig. 3M–O)

[= *Clanculus gemmulifera pallidus* fide Fukuda (1993: pl. 5, fig. 59) non Pilsbry, 1903]

Material examined: OG-76-05 (1fr); OG-76-11 (1fr); OG-76-15 (1fr); OG-95-39 (1); KY-10-02 (1); KY-10-06 (3: Fig. 3M–N), NSMT-Mo 114138; KY-10-11 (1); KY-16-33 (1: Fig. 3O), NSMT-Mo 114140; KY-16-37 (1); KY-17-05 (1); KY-17-31 (1); [65–137 m].

Distribution: Ogasawara Islands (endemic). **New to Japan**.

Remarks: A fragment of this species was previously recorded as "*C. gemmulifera pallidus* Pilsbry, 1903" by Fukuda (1993: voucher material in OG-76-15), but complete specimens in the present material showed that they belong to an apparently different and distinct species. It is most closely similar to *Clanculus buijsei* Poppe, Tagaro & Dekker, 2006, that was originally described from the Philippines, but is readily distinguished by the non-canaliculate suture, more angulate periphery and wider umbilicus.

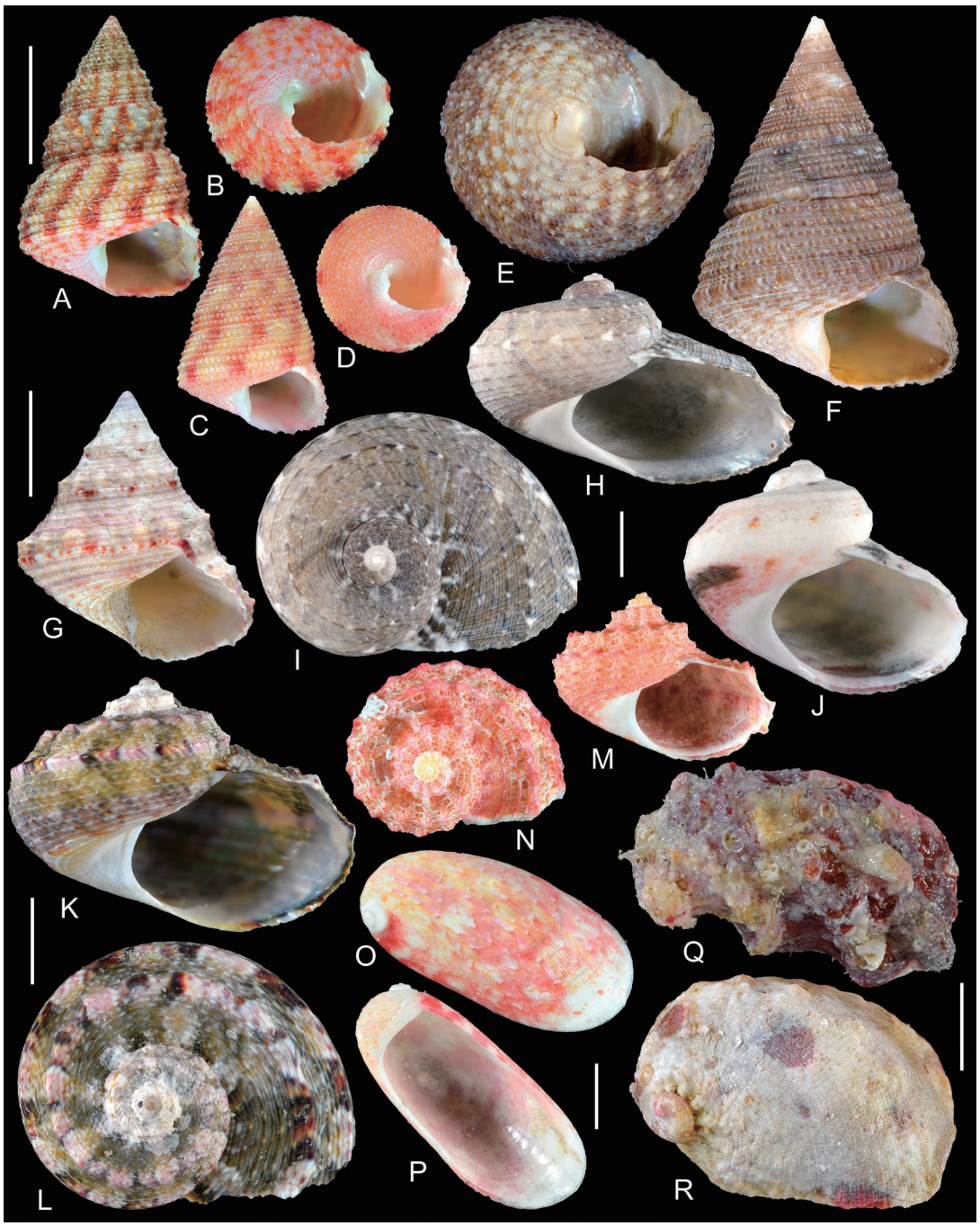

Fig. 4. A–D. *Kanekotrochus boninensis*; A–B, holotype; C–D, KY-09-27. E–F. *Kanekotrochus infuscatus*; off Isshiki, Aichi Prefecture, Sakurai Coll. G. *Tosatrochus attenuatus*; KY-08-17. H-J. *Stomatolina* sp.; H–I, KY-14-11; J, KY-08-17. K–L. *Stomatolina rubra*; Tsuji-jima Island, Amakusa, Kumamoto Prefecture. M–N. *Stomatolina angulata*; Ky-17-33. O–P. *Stomatella lintricula*; KY-17-17. Q–R. *Stomatia phymotis*; Q, KY-09-28; R, KY-14-17. Scales: A–F, 5 mm; G, 5 mm; H–K, 2 mm; M–N, 2 mm; O–P, 2 mm; Q–R, 5 mm.

Jujubinus sp. (Fig. 3P–S)

Material examined: KT-09-02-TW-01-02 (1); KY-09-12 (2); KY-09-13 (1*); KY-09-14 (1); KY-09-15 (1); KY-09-21 (4 + 1*: Fig. 3P–R), NSMT-Mo 114149; KY-10-04 (1); KY-10-06 (7); KY-10-07 (3: Fig. 3S), NSMT-Mo 114152; KY-10-17 (4); KY-10-31 (2); KY-14-03 (23); KY-14-08 (2); KY-17-05 (7); KY-17-17 (1); KY-17-29 (1); KY-17-31 (1); KY-17-33 (1); [76–385 m].

Distribution: Ogasawara and Nansei Islands. **New to Japan**.

Remarks: This species closely resembles *J. geographicus* and *J. hubrechti*, both recently described from the Philippines by Poppe *et al.* (2006), but is distinguished by its coarser sculpture and more convex whorls. Specimens with exactly the same characters have also been collected from the Okinawa Islands (Fig. 3T, NSMT-Mo 114774).

Kanekotrochus boninensis (Okutani, 2001) アラハダチグサ (Fig. 4A–D)

Material examined: OG-76-10 (1); OG-76-15 (4 + 7fr); KY-08-18 (1); KY-08-26 (13); KT-09-02-TW-01-01 (1); KY-09-08 (7); KY-09-09 (2); KY-09-27 (18: Fig. 4C–D), NSMT-Mo 114169; KY-09-28 (2); KY-10-03 (1); KY-10-04 (9); KY-10-06 (6); KY-10-27 (1); KY-14-04 (1); KY-14-06 (1); KY-14-16 (1); KY-16-13 (12); KY-17-05 (3); KY-17-17 (2 + 1fr); KY-17-31 (4 + 1fr); KY-17-33 (1); [48–171 m].

Distribution: Ogasawara Islands (endemic).

Remarks: This species was described from a seamount east of the Ogasawara Islands, at a depth of 90 m, in the genus *Prothalotia* Thiele, 1930 (Fig. 4A–B: holotype, NSMT-Mo 73046), but it is apparently related to the temperate Japanese species *Kanekotrochus infuscatus* (Gould, 1861) (Fig. 4E–F, NSMT-Mo 114775). Fukuda (1993: 22, pl. 5, fig. 56: voucher in OG-76-15) actually recorded a fragment of this species as "*Canthatidus* [sic; *Cantharidus*] *infuscatus*," and Bouchet (2015) transferred the species in the genus *Kanekotrochus* Habe, 1958 (type species by original designation: *Ziziphinus infuscatus* Gould, 1861). The present material revealed that it is common around the Ogasawara Islands, and shows a wide range of variation in the sculpture, and some of the specimens do approximately resemble *K. infuscatus*. The Ogasawara specimens can only be distinguished by their small size and uniform coloration with a distinct axial pattern. More detailed study will thus be necessary to clarify the taxonomic relationship between the two nominal taxa.

Tosatrochus attenuatus (Jonas, 1844) オニノハ (Fig. 4G)

Material examined: KY-08-17 (1: Fig. 4G), NSMT-Mo 114183; KY-14-14 (1); [69–82 m].

Distribution: Kii Peninsula and southwards to TWP.

Remarks: This species was recorded only by name (Nishimura, 1999), and this is the first firm record with a figure of the voucher specimen.

Alcyna ocellata A. Adams, 1860 キバベニバイ

Material examined: OG-76-07 (1); OG-76-15 (6); SO-90-HD-1 (2); KY-10-15 (1); KY-14-11 (1); KY-17-08 (1); [35–107 m].

Distribution: Boso Peninsula and southwards to TWP.

Synaptocochlea concinna (Gould, 1845) クモリチゴアシヤ

Material examined: OG-76-11 (1); OG-76-15 (4); SO-90-HD-1 (5); KY-10-07 (1); [35–105 m].

Distribution: Amami Islands and southwards to TWP.

Microtis tuberculata H. Adams & A. Adams, 1850 クジケアシヤガマ

Material examined: KY-14-11 (3 + 1fr); [89–107 m].

Distribution: Amami Islands and southwards to TWP.

Stomatella auricula Lamarck, 1816 ヒメアワビ

Material examined: OG-76-11 (1); KY-09-27 (1); KY-10-26 (1 + 12fr); KY-14-11 (1); [36–107 m].

Distribution: Boso Peninsula and southwards to TWP.

Stomatella lintricula (A. Adams, 1850) ウスヒメアワビ (Fig. 4O–P)

Material examined: KY-17-17 (1), NSMT-Mo 114200; [85 m].

Distribution: Kii Peninsula and southwards to TWP. **New to Ogasawara Islands**.

Remarks: Identification of this species is confused, and it has seldom been illustrated properly in Japanese literature. The specimen illustrated by Sasaki in Okutani (2017: pl. 23, fig. 2) as "*S. lintricula*" seems to be indistinguishable from *S. planulata* (Lamarck, 1816). The specimen in the present material agrees well with the figure of the possible type (Adams, 1854: pl. 173, fig. 22) in being small and having an oblong outline (not tapered apically). Similar specimens have been found in small numbers along the Pacific coast of mainland Japan based on the material deposited in the NSMT-Mo.

Stomatia phymotis Helbling, 1779 フルヤガイ (Fig. 4Q–R)

Material examined: OG-76-07 (1); OG-76-15 (2); OG-95-07 (1); KY-09-28 (1*: Fig. 4Q), NSMT-Mo 114204; KY-14-17 (1*: Fig. 4R), NSMT-Mo 114205; [6–59 m].

Distribution: Izu Peninsula and southwards to TWP.

Remarks: Fukuda (1993: pl. 7, fig. 81) recorded a juvenile specimen from a part of the present material (OG-76-15) as "*Stomatia* cf. *phymotis*." Mature specimens in the present material confirm the identification, and also show a wide range of variation in the general shape and strength of the spiral ribs.

Stomatolina angulata (A. Adams, 1850) シワアシヤガマ (Fig. 4M–N)

Material examined: KY-09-14 (1); KY-14-03 (1); KY-17-33 (1: Fig. 4 M–N), NSMT-Mo 114208; [92–156 m].

Distribution: Boso Peninsula and southwards to TWP. **New to Ogasawara Islands**.

Remarks: Although this species is common in the intertidal zone in the Nansei Islands, it is apparently uncommon in Sagami Bay and the Izu Islands, and is not listed in most faunal catalogues of the region (e.g., Kuroda *et al*., 1971; Nishimura, 1999; Ikeda and Kuramochi, 2010). However, it was found in material dredged around the Izu Peninsula at multiple stations (Hasegawa *et al*., 2001), similar to the case in the Ogasawara Islands.

Stomatolina sp. (Fig. 4H–J)

Material examined: OG-76-07 (2); OG-76-08 (5); OG-76-11 (2); OG-76-15 (3); KY-08-17 (1: Fig. 4J), NSMT-Mo 114213; KY-10-24 (2); KY-14-11 (10: Fig. 4H–I), NSMT-Mo 114215; [45–107 m].

Distribution: Ogasawara Islands (endemic).

Remarks: This species most closely resembles *S. rubra* (Lamarck, 1822) (Fig. 4K–L, NSMT-Mo 114776: immature specimen of similar size), which is common in temperate Japanese waters north to the Boso Peninsula, but it is clearly distinguished from the latter by its significantly smaller size (less than half in mature specimens) and the complete absence of nodular sculpture on the distinct spiral cord below the suture.

Conotalopia ornata (G. B. Sowerby III, 1903) ヒナシタダミ (Fig. 5A–C)

Material examined: OG-16-15 (1); KY-14-11 (2: Fig. 5A–C), NSMT-Mo 114217; [84–107 m].

Distribution: From southern Hokkaido south to Nansei Islands. **New to Ogasawara Islands**.

Remarks: Only some incomplete specimens were found among the present material, and they differ slightly from typical examples of this species in possessing a less angulate shoulder and weaker sculpture. However, identification was confirmed by comparison with many examples of this species collected from off Shimoda, Izu Peninsula (Hasegawa *et al.*, 2001), which show a wide range of variation both in shape (shoulder round to angulate) and sculpture (spiral cord distinct to absent).

Ethalia guamensis (Quoy & Gaimard, 1834) キサゴモドキ

Material examined: OG-76-17 (1); [42 m].

Distribution: Kii Peninsula and southwards to TWP.

Ethaliella floccata (G. B. Sowerby III, 1903) ハ

Fig. 5. A–C. *Conotalopia ornata*; KY-14-11. D–F. *Ethminolia* sp.; KY-08-21. G–H. *Ethminolia nektonica*; holotype. I–J. *Archiminolia ziczac*; KY-17-05. K–L. *Archiminolia fulgens*; KY-17-15. M–N. *Pseudominolia tramieri*; KY-14-16. O–P. *Bathymophila gravida*; KY-10-18. Q–R. *Bathymophila* sp.; KY-17-32. Scales: A–F, 2 mm; G–H, 2 mm; I–J, 2 mm; K–R, 2 mm.

ナゴショグルマ

Material examined: OG-76-17 (1); [42 m].

Distribution: Kii Peninsula and southwards to TWP.

Ethminolia sp. (Fig. 5D–F)

Material examined: OG-76-02 (1); OG-76-05 (2); OG-76-07 (25); OG-76-11 (1); OG-76-13 (2); OG-76-15 (17 + 3fr); OG-95-44 (1); KY-08-17 (1); KY-08-21 (1: Fig. 5D–F), NSMT-Mo 114228; KY-08-26 (2); KY-09-12 (2); KY-09-14 (4); KY-09-27 (10); KY-09-28 (1); KY-10-02 (4); KY-10-04 (4); KY-10-07 (4); KY-10-11 (1); KY-10-19 (5 + 2*); KY-10-31 (4); KY-14-06 (1); KY-14-10 (1*); KY-14-11 (16); KY-16-13 (4); KY-16-18 (3); KY-16-33 (1); KY-17-09 (1 + 1*); KY-17-10 (20 + 4*); KY-17-17 (1); KY-17-32 (1); [36–151 m].

Distribution: Ogasawara Islands (endemic).

Remarks: As already stated by Fukuda (1993: 24, pl. 6, fig. 65), this species is closely related to *E. nektonica* (Okutani, 1961) (Fig. 5G–H: holotype, NSMT-Mo 69540) but morphologically distinguishable by the narrower umbilicus encircled by coarser axial indentation, and the absence of spiral ribs on the base. *Ethminolia nektonica* is also distributed in the Nansei Islands, and the specimens in that region are indistinguishable from those in more temperate regions, including the type locality (off Kushikino, Kagoshima prefecture) (Hasegawa, personal observation). This all confirms the distinctiveness of the Ogasawara population. See also discussion for comparison between *E. nektonica* and *E.* sp.

Monilea belcheri (Philippi, 1849) ヘソワゴマ

Material examined: OG-76-02 (3fr); OG-76-04 (4 + 2fr); OG-76-05 (4 + 3fr); OG-76-07 (4); OG-76-08 (6 + 7fr); OG-76-15 (3 + 1fr); OG-76-17 (6); OG-95-16 (6); OG-95-19 (3); OG-95-22 (2); OG-95-23 (1); OG-95-31 (1); OG-95-34 (1); OG-95-35 (1); KY-08-17 (11 + 2*); KY-08-18 (3 + 2*); KY-08-25 (1); KY-09-29 (1); KY-10-24 (3); KY-10-30 (1); KY-13-03 (2); KY-14-06 (1); KY-14-07 (1); KY-14-11 (40); KY-14-14 (1); KY-14-17 (1 + 1*); KY-16-13 (3 + 5*); KY-16-14 (1 + 4*); KY-16-37 (1); KY-17-10 (1); [36–147 m].

Distribution: Kii Peninsula and southwards to TWP.

Pseudominolia tramieri Poppe, Tagaro & Dekker, 2006 ヘソワゴマモドキ（新称）(Fig. 5M–N)

Material examined: KY-08-10 (1); KY-14-16 (3: Fig. 5M–N), NSMT-Mo 114334; [127–330 m].

Distribution: Ogasawara Islands, and TWP. **New to Japan**.

Remarks: Specimens in the present material fall within the range of variation of this species from the Philippines shown by Poppe *et al.* (2006: pl. 74, figs. 1–4). This species has not been found in the similar dredging survey around the Nansei Islands.

Rossiteria nucleus (Philippi, 1849) コノボリガイ

Material examined: OG-76-02 (1); OG-76-04 (100); OG-76-05 (1); OG-76-07 (26); OG-76-08 (17 + 9fr); OG-76-11 (3); OG-76-15 (19 + 23fr); OG-76-17 (6); OG-95-16 (4); OG-95-22 (2); OG-95-23 (3); OG-95-40 (2); KY-08-17 (36); KY-08-18 (9); KY-09-29 (2); KY-10-24 (11 + 6*); KY-10-26 (1); KY-10-27 (1); KY-13-03 (4); KY-14-06 (6); KY-14-07 (3 + 1fr); KY-14-11 (100); KY-14-17 (1); KY-16-13 (9 + 3*); KY-17-16 (8); KY-17-17 (1); [36–113 m].

Distribution: Boso Peninsula and southwards to TWP.

Sericominolia vernicosa (Gould, 1861) ハブタエシタダミ

Material examined: OG-76-02 (2); OG-76-05 (1); OG-76-08 (7); OG-76-11 (5); OG-76-15 (5); KY-09-08 (2); KY-09-09 (7); KY-09-13 (1 + 1*); KY-09-14 (4*); KY-09-28 (3*); KY-09-29 (3); KY-10-04 (1*); KY-10-06 (4); KY-10-19 (1); KY-10-24 (4 + 1*); KY-10-27 (1); KY-10-31 (1); KY-14-11 (12); KY-16-11 (1*); KY-16-18 (2*); KY-17-17 (40); [36–107 m].

Distribution: Kii Peninsula and southwards to TWP.

Family **Solariellidae** Powell, 1951

Archiminolia fulgens (Dall, 1907) ヒカリシタダミ (Fig. 5K–L)

Material examined: KY-09-31 (1); KY-17-15 (1: Fig. 5K–L), NSMT-Mo 114328; [298–311 m].

Distribution: Boso Peninsula and southwards

to TWP. **New to Ogasawara Islands**.

Remarks: This is one of the commonest species occurring on the shelf and upper bathyal sandy bottom in temperate and subtropical Japanese waters, but it is apparently rather rare around the Ogasawara Islands, and is represented in the present material only by two empty shells.

Archiminolia ziczac (Kuroda & Habe, 1971) ヤガスリシタダミ (Fig. 5I–J)

Material examined: KY-09-31 (2); KY-17-05 (3: Fig. 5I–J), NSMT-Mo 114330; [300–385 m].

Distribution: From Boso Peninsula to Tosa Bay, Izu and Ogasawara Islands. **New to Ogasawara Islands**.

Remarks: This species is endemic to temperate Japanese waters, and commonly occurs on submarine banks along the Izu Islands south to the Kurose Bank near Hachijo-jima Island (Okutani, 1972, 1975). However, it has not been recorded in the Ogasawara Islands until this study.

Bathymophila gravida Marshall, 1999ジュズカケシタダミ（新称）(Fig. 5O–P)

Material examined: KY-10-18 (26 + 4fr), NSMT-Mo 114331; [529–540 m].

Distribution: Ogasawara Islands, and TWP (New Caledonia, Vanuatu) to New Zealand. **New to Japan**.

Remarks: The single lot of specimens agree well with the original description of *B. gravida*, which was described from off New Zealand (Norfolk Ridge and Three Kings Rise), and also with the specimen recorded from off Vanuatu (Vilvens, 2009: figs. 75–77). This is the first record of this species from the Northern Hemisphere, and represents a significant range extension to Japanese waters.

Bathymophila sp. (Fig. 5Q–R)

Material examined: KY-17-32 (1), NSMT-Mo 114332; [141–151 m].

Distribution: Known only from Ogasawara Islands. **New to Japan**.

Remarks: This species is very close to *B. aages* Vilvens, 2009 in general shape, but apparently differs in having a completely closed umbilicus and a well-developed smooth callus. It is represented only by one empty shell, and its distribution is uncertain because of the lack of enough information.

Family **Margaritidae** Thiele, 1924

Callogaza sericata (Kira, 1959) タカラシタダミ (Fig. 6A–B)

Material examined: KY-17-05 (1), NSMT-Mo 114335; [380–385 m].

Distribution: Sagami Bay and southwards to TWP. **New to Ogasawara Islands**.

Remarks: This species had been considered to be distributed only in the temperate Japanese and adjacent waters, from Sagami Bay to the East China Sea (Sasaki in Okutani, 2017), but it has also been commonly found in the Philippines (Poppe *et al.*, 2006: 95–96, pl. 42, figs. 1–4), suggesting a wide geographical distribution in the TWP.

Family **Calliostomatidae** Thiele, 1924

Calliostoma takujii Kosuge, 1986 オオサトエビス (Fig. 6G–H)

Material examined: KY-09-21 (1 + 1*); KY-10-04 (1); KY-17-05 (2); KY-17-25 (2*: Fig. G–H), NSMT-Mo 114339; [98–385 m].

Distribution: Ogasawara Islands, and TWP.

Remarks: This species was originally described from the Ogasawara Islands (Kosuge, 1986) and considered to be endemic to the area, but was subsequently recorded also from the Philippines (Poppe *et al.*, 2006).

Calliostoma sp. 1 アサヤケエビス (Fig. 6C–D)

Material examined: OG-76-02 (2); OG-76-07 (2); OG-76-11 (1); OG-76-15 (2); KY-08-26 (1); KY-09-08 (2); KY-09-27 (3: Fig. 6C–D), NSMT-Mo 114346; KY-09-28 (1); KY-10-06 (5); KY-10-15 (5); KY-10-27 (1); KY-14-11 (1); KY-16-33 (1); KY-17-16 (1); KY-17-17 (4); KY-17-31 (1); [36–137 m].

Distribution: Ogasawara Islands (endemic).

Remarks: This species was recorded as *Cal-*

Fig. 6. A–B. *Callogaza sericata*; KY-17-5. C–D. *Calliostoma* sp. 1; KY-09-27. E–F. *Calliostoma simodense*; Nanbara, Hachijo-jima Island. G–H. *Calliostoma takujii*; KY-17-25. I–K. *Calliostoma* sp. 2; I–J, OG-76-15; K, OG-76-07. L–Q. *Astralium provisorium*; L–N, KY-17-25; O–Q, off Cebu, the Philippines, Kawamura Coll. (N, Q: external view of operculum). Scales: A–B, 2 mm; C–D, 2 mm; E–F, 2 mm; G–K, 2 mm; L–Q, 5 mm.

liostoma simodense Ikebe, 1942 by Fukuda (1993: 22), but subsequently regarded by the same author (Fukuda, 1995: 34, pl. 43, fig. 53) as a different species (*Calliostoma* aff. *simodense* Ikebe, 1942). *Calliostoma simodense* (see Sasaki in Okutani, 2017: pl. 28, fig. 9 for a color picture) differs from the present species by having a larger shell with more inflated whorls, round periphery, a narrow but distinctly perforate umbilicus and weaker spiral ribs. However, specimens from Hachijo-jima Island (Fig. 6E–F, NSMT-Mo 114799) show some intermediate characters. Furthermore, *C. amamiensis* (Sakurai, 1994), which is distributed from Tosa Bay through the Nansei Islands to the Philippines (Sakurai, 1994), is also closely similar to these two, and may only be distinguished by the depressed shell with a more distinctly perforate umbilicus. More detailed study will thus be necessary to clarify the taxonomic relationships among this species complex.

Calliostoma sp. 2 トコナツエビス (Fig. 6I–K)

Material examined: OG-76-07 (5: Fig. 6K), NSMT-Mo 114356; OG-76-15 (1: Fig. 6I–J), NSMT-Mo 114357; KY-08-10 (1); KY-16-06 (1); KY-16-28 (1); KY-17-17 (1); [47–135 m].

Distribution: Ogasawara Islands (endemic).

Remarks: This species was also recorded from the Ogasawara Islands by Fukuda (1993: 22, pl. 5, fig. 54; 1995: 34, pl. 43, fig. 54) as "*Calliostoma* sp." Although it is easily recognizable, with characteristic coloration and sculpture for the genus, and not rare around the Ogasawara Islands, it has never been recorded from other regions. It is thus considered to be endemic to this region.

Family **Turbinidae** Rafinesque, 1815

Astralium provisorium Schepman, 1908 オトメカンス (Fig. 6L–N)

[= *Bolma* sp. fide Yamashita (1994: fig. 4) and Fukuda (1995: pl. 46, fig. 838)]

Material examined: OG-76-05 (1); OG-76-10 (1); SO-90-HD-1 (4); OG-95-44 (1); KT-09-02-TW-01-01 (3); KY-09-07 (1 + 1*); KY-09-08 (4 + 1*); KY-09-09 (10); KY-09-12 (3); KY-09-13 (3); KY-09-14 (3); KY-09-27 (1); KY-10-03 (3); KY-10-04 (11); KY-10-06 (3 + 1*); KY-10-07 (5); KY-10-11 (2 + 1*); KY-10-19 (6); KY-10-30 (1); KY-14-03 (1); KY-14-04 (1); KY-14-08 (1); KY-14-13 (2); KY-16-01 (1); KY-16-13 (1); KY-17-17 (12 + 1op); KY-17-25 (2*: Fig. 6L–N), NSMT-Mo 114388; KY-17-26 (1); [35–171 m].

Distribution: Ogasawara Islands and southwards to TWP. **New to Japan**.

Remarks: The specimens from the Ogasawara Islands morphologically agree with *Astralium roseobasis* Kreipl & Dekker, 2003, which was recently described from the Philippines but subsequently regarded as a synonym of *Astralium provisorium* (e.g., Poppe *et al*., 2014; Bouchet, 2017). Although this species is rather common in the sublittoral to upper bathyal depths around the Ogasawara Islands, it has not been recorded in the Nansei Islands by similar dredging survey. Considering the geographical gap in the distribution and some differences in the sculpture (see Fig. 6O–Q, NSMT-Mo 114778, for the figure of an example from the Philippines), it is possible that the Ogasawara population will turn out to be a different species.

Bolma girgyllus (Reeve, 1861) カミナリサザエ (Fig. 7L–M)

Material examined: OG-95-43 (1*); KY-10-07 (1: Fig. 7L–M), NSMT-Mo 114391; [34–105 m].

Distribution: Izu Peninsula and southwards to TWP. **New to Ogasawara Islands**.

Remarks: Two juvenile specimens represent the first record of this species from the Ogasawara Islands.

Bolma kiharai Kosuge, 1986 キハラカンス (Fig. 7A–E)

[= *Bolma myrica* Okutani, 2001 ヤマモモカンス **new synonym**]

Material examined: KY-17-27 (1: Fig. 7D–E), NSMT-Mo 114392; SO-77-R8(DG) (1); [175–235 m].

Distribution: Ogasawara Islands (endemic).

Remarks: *Bolma myrica* Okutani, 2001 (Fig. 7A–C: holotype, NSMT-Mo 73041) was described from the area midway between Chichi-

jima and Yomejima Islands at a depth of 325 m (Okutani, 2001), but is morphologically indistinguishable from *B. kiharai* Kosuge, 1986, which was described from off Haha-jima Island at a depth of about 200 m (Kosuge, 1986: 61–62, pl. 24, figs. 4–6). The former is thus regarded herein as a junior synonym of the latter. This species is characterized by its small size and granulate sculpture, but is very similar to juveniles of *Bolma tamikoae* (Shikama, 1973) (Fig. 7F–G). Because of the lack of enough specimens identifiable as *B. kiharai* to assess its intraspecific variation, however, the two taxa are nevertheless provisionally regarded as separate species.

Bolma minutiradiosa Kosuge, 1983 コグルマカンス (Fig. 7N–Q)

Material examined: KY-09-31 (1*: Fig. 7 N–P), NSMT-Mo 114393; KY-14-12 (1*: Fig. 7Q), NSMT-Mo 114394; [202–311 m].

Distribution: Amami Islands and southwards to TWP. **New to Ogasawara Islands**.

Remarks: Two live-collected specimens from the Ogasawara Islands differ slightly from the holotype of this taxon (Kosuge, 1983: pl. 44, figs. 1–4) from the Philippines and specimens illustrated by Kreipl and Alf in Poppe (2008: pl. 68, figs. 1, 2, 9) in having a narrow but clearly perforate umbilicus. However, specimens collected from the Amami Islands show continuous variation in the umbilicus, ranging from completely closed to clearly perforate (Fig. 7R–S, NSMT-Mo 114779), and the latter form could not be distinguished from the Ogasawara specimens.

Bolma persica (Dall, 1907) テンジクカンス (Fig. 7J–K)

Material examined: KT-09-02-TW-01-06 (1: Fig. 7J–K), NSMT-Mo 114395; KY-09-21 (3); [136–310 m].

Distribution: Kii Peninsula and southwards, Izu Islands (Hyotanse, Takase), to TWP. **New to Ogasawara Islands**.

Remarks: Four juvenile specimens in the present material differ slightly from the usual form of this species (e.g., Sasaki in Okutani, 2017: pl. 32, fig. 3) in having smaller, weaker and more numerous processes around the periphery, but agree well with the specimen illustrated from the Philippines by Kreipl and Alf in Poppe (2008: pl. 69, fig. 1), including the distinct coloration. They are thus considered to fall within the range of the variation of this species.

Bolma tamikoana (Shikama, 1973) サメハダカンス (Fig. 7F–I)

Material examined: KY-08-10 (2 + 1fr); KT-09-02-TW-01-04 (2); KT-09-02-TW-02-04 (1); KY-09-09 (2); KY-09-21 (2 + 2*); KY-10-30 (1op); KY-13-01 (1); KY-14-04 (1); KY-14-08 (1); KY-16-06 (6*: Fig. 7F–G), NSMT-Mo 114406; KY-16-07 (1*: Fig. 7H–I), NSMT-Mo 114407; KY-17-01 (1op); KY-17-03 (1 + 1fr); KY-17-04 (1); KY-17-05 (7 + 5fr); KY-17-18 (1); KY-17-19 (2); KY-17-23 (1); KY-17-25 (4*); KY-17-27 (3); KY-17-28 (4); KY-17-32 (2 + 1op + 1fr); [102–385 m].

Distribution: Kii Peninsula and southwards to TWP. **New to Ogasawara Islands**.

Remarks: This species shows a wide range of variation in the strength of the peripheral processes in other regions (e.g., Tosa Bay and the Philippines), but specimens from the Ogasawara Islands are rather uniform in shape and sculpture, as are the populations along the Izu Islands (Okutani, 1972, 1975).

Bolma sp. (Fig. 8A–G)

Material examined: KY-08-19 (1); KT-09-02-TW-01-01 (3 + 2op); KT-09-02-TW-02-04 (8); KY-09-01 (2); KY-09-06 (1); KY-09-07 (2); KY-09-08 (1); KY-09-21 (5 + 10*); KY-09-34 (6 + 2op); KY-10-17 (1); KY-10-30 (13 + 13op + 1fr: Fig. 8F–G), NSMT-Mo 114429; KY-14-01 (1op); KY-14-02 (1op); KY-14-04 (1 + 2op); KY-14-08 (3 + 4op); KY-14-09 (1); KY-14-16 (1op); KY-16-01 (2 + 1*); KY-16-02 (1op); KY-16-06 (5 + 18*); KY-16-07 (1*); KY-16-23 (1*); KY-16-24 (1*); KY-16-31 (7*: Fig. 8 D–E), NSMT-Mo 114442; KY-17-01 (1op); KY-17-18 (1 + 5op); KY-17-22 (1); KY-17-23 (2op); KY-17-25 (1 + 5*); KY-17-26 (5 + 2*: Fig. 8A–C), NSMT-Mo 114448; KY-17-27 (3op); KY-17-31 (1op); KY-17-33 (1fr); [98–348 m].

Distribution: Ogasawara Islands (endemic).

Remarks: This species was the commonest

Fig. 7. A–E. *Bolma kiharai*; A–C, holotype of *Bolma myrica* Okutani, 2001; D–E, KY-17-27. F–I. *Bolma tamikoana*; F–G, KY-16-06; H–I, KY-16-07. J–K. *Bolma persica*; KT-09-02 St. TW-01-06. L–M. *Bolma girgyllus*; KY-10-7. N–S. *Bolma minutiradiosa*; N–P, KY-09-31; Q, KY-14-12; R–S, off Amami-oshima Island, 290 m, DY-02-01. Scales: A–G, 5 mm; H–I, 10 mm; J–M, 5 mm; N–S, 2 mm.

among the present material (Table 6) and is apparently related to *B. guttata* (A. Adams, 1863), which is distributed along the Pacific coast of mainland Japan from the Boso Peninsula south to Tosa Bay (although its distribution in Tosa Bay could not be confirmed based on specimens preserved in NSMT-Mo). *Bolma guttata* was originally described from "Tatiyama" [= Tateyama, southern Boso Peninsula] (Adams, 1863) and is distributed along the Izu Islands south to the Kurose submarine bank near Hachijo-jima Island (Okutani, 1975) (Fig. 8H–J, NSMT-Mo 114780; from the type locality, off Tateyama). Some variations are recognized, especially in the strength of spines at the periphery, but basic characters are rather consistent. However, specimens from the Ogasawara Islands are distinctive in having non-granulate spiral cords that disappear on the base and a different color pattern. Furthermore, the operculum of the Ogasawara specimens differs from those in other localities in having a deep hole in the center of the outer surface (Fig. 8C; in comparison to 8J of *B. guttata*). The specimen illustrated by Yamashita (1994: fig. 3) as "*Bolma* (*Galeoastraea*) sp." represents an immature example of this species (Fig. 8F–G)).

Turbo excellens G. B. Sowerby III, 1914 ニシキサザエ

Material examined: OG-76-07 (1); OG-76-08 (1); OG-76-15 (2fr); KY-09-08 (1); KY-09-14 (1); KY-09-22 (1op); KY-09-27 (1); KY-09-28 (1); KY-09-29 (1); KY-09-30 (1); KY-10-06 (2); KY-14-03 (1); KY-14-04 (1op); KY-14-16 (1op); KY-14-17 (1op); KY-16-18 (1*); KY-17-10 (1); KY-17-17 (2op); [45–171 m].

Distribution: From Izu Peninsula to western Kyushu, and Ogasawara Islands.

Remarks: This species is endemic to temperate Japanese waters along the Pacific coast, and also along the Izu Islands. Specimens from the Ogasawara Islands agree well with those in other localities in general shell morphology, except for the size; they are consistently smaller (the largest specimen examined was 21.5 mm in SL) in comparison to the specimens from other localities, which usually exceed 25 mm and sometimes reach 30 mm.

Turbo reevii Philippi, 1847 タツマキサザエ

Material examined: OG-76-17 (1); [42 m].

Distribution: Izu Peninsula and southward, to TWP.

Family **Liotiidae** Gray, 1850

Bathyliotina armata (A. Adams, 1861) ミヒカリヒメカタベ (Fig. 8K–L)

Material examined: KY-17-05 (2), NSMT-Mo 114471; [380–385 m].

Distribution: Boso Peninsula and southwards to TWP. **New to Ogasawara Islands**.

Remarks: This species is rather common at sublittoral to upper bathyal depths along the Pacific coast of mainland Japan north to the Boso Peninsula, and is also distributed rather rarely in the Nansei Islands (Hasegawa, personal observation). This is the first record of this species not only from the Ogasawara but also the Izu-Ogasawara island arc.

Liotina montamarina Okutani, 2001 カイザンヒメカタベ (Fig. 8M–N)

Material examined: OG-76-05 (1); OG-76-07 (26); OG-76-11 (2); OG-95-42 (1); OG-95-44 (1); KY-08-17 (1); KY-08-20 (2); KY-08-21 (1); KY-08-26 (1); KY-09-27 (1); KY-09-28 (1); KY-10-06 (2); KY-10-11 (1 + 1*); KY-10-18 (1); KY-10-19 (6: Fig. 8M–N), NSMT-Mo 114486; KY-10-24 (3), KY-10-26 (1); KY-10-27 (5); KY-10-31 (2); KY-14-06 (1); KY-14-13 (1); KY-14-14 (1); KY-14-16 (1); KY-14-17 (1); KY-17-31 (2); [36–137 m].

Distribution: Ogasawara Islands (endemic).

Remarks: This species was originally described from a seamount located ca. 300 km east of the Ogasawara Islands, on the Pacific Plate across the Ogasawara Trench. Specimens in the present study from around the Ogasawara Islands agree well the type material (NSMT-Mo 73042–73044), and belong to the same species. Although this distinct species was commonly found around the Ogasawara Islands, no compa-

Fig. 8. A–G. *Bolma* sp.; A–C, KY-17-26; D–E, KY-16-31; F–G, KY-10-30 (C: diagonal view of the outer surface of operculum). H–J. *Bolma guttata*; off Sunosaki, Chiba Prefecture (J: diagonal view of the outer surface of operculum). K–L. *Bathyliotina armata*; KY-17-05. M–N. *Liotina montamarina*; KY-10-19. O–S. *Liotina* sp. 1; O–Q, KY-09-08; R–S, off Iejima Island, Okinawa Prefecture, 202–199 m, TY-03–09. Scales: A–B, D–E, 10 mm; C, J, 5 mm; F–G, 5 mm; H–I, 10 mm, K–N, 2 mm; O–S, 2 mm.

rable material has been collected from the Izu or Nansei Islands, and it is thus considered to be endemic to this region.

Liotina sp. 1 オガサワラヒメカタベ (Fig. 8O–Q)

Material examined: OG-76-15 (4); OG-95-33 (1); KY-08-25 (1); KY-08-26 (1); KY-09-08 (1: Fig. 8O–Q), NSMT-Mo 114501; KY-09-27 (1); KY-09-28 (1); KY-10-04 (1); KY-10-06 (1*); KY-10-07 (3); KY-10-11 (1); KY-10-17 (16); KY-10-18 (1); KY-10-19 (1); KY-10-31 (2); KY-14-03 (30); KY-14-08 (2); KY-17-02 (1); KY-17-03 (1); KY-17-04 (1); KY-17-05 (11); KY-17-17 (1); [52–385 m].

Distribution: Ogasawara and Nansei Islands.

Remarks: This species was reported for the first time from the Ogasawara Islands by Fukuda (1993: pl. 5, fig. 42) as *Liotinaria* sp., and the same specimen was also illustrated by Yamashita (1994: text-fig.) with a new Japanese name. It is clear from the present study that this species is rather common around the Ogasawara Islands and is also distributed in the Nansei Islands (Fig. 8R–S, NSMT-Mo 114781).

Liotina sp. 2 (Fig. 9A–E)

Material examined: OG-76-07 (3); OG-76-10 (1); OG-95-39 (2); KY-08-20 (2); KY-10-02 (1); KY-10-06 (3: Fig. 9D–E), NSMT-Mo 114524; KY-10-11 (2: Fig. 9A–C), NSMT-Mo 114525; KY-10-24 (1); KY-14-03 (1); KY-14-13 (1); KY-17-17 (2); [47–156 m].

Distribution: Ogasawara Islands (endemic).

Remarks: This species was recorded from the Ogasawara Islands by Fukuda (1995: 5, pl. 46, fig. 840) as "*Liotinaria* sp. B." It is closely related to *Liotina loculosa* (Gould, 1859) (Fig. 9F–H, NSMT-Mo 114782; I–J, holotype, USNM 1010), which is commonly found in the Nansei Islands in the intertidal zone, but it differs from the latter in having a distinct columellar fold and triplicate (not duplicate) spiral cords around the periphery. There is a considerable variation in the strength of sculpture within the population in the Ogasawara Islands, but they nevertheless consistently differ from *L. loculosa* and are here regarded as a distinct species.

Family **Skeneidae** W. Clark, 1851

Cirsonella sp. (Fig. 9 K–L)

Material examined: KY-09-21 (1); KY-10-17 (1); KY-14-03 (1: Fig. 9 K–L), NSMT-Mo 114532; [136–160 m].

Distribution: Ogasawara and Nansei Islands. **New to Japan**.

Remarks: Classification of minute skeneimorphs in the West Pacific is in a state of confusion, and numerous unidentified species are known. The present species is one such example, and it has been found not only from the Ogasawara Islands but also from the Nansei Islands (Fig. 9M, NSMT-Mo 114783).

Leucorhynchia tricarinata Melvill & Standen, 1896 ミツカドオトギノスガイ

Material examined: OG-76-15 (1); SO-90-HD-1 (4); [35–84 m].

Distribution: Amami Islands and southwards to TWP.

Munditiella ammonoceras (A. Adams, 1863) ワダチシタダミ

Material examined: SO-90-HD-1 (5); KY-09-27 (1); KY-09-29 (1) KY-10-27 (2) KY-14-11 (1); [35–107 m].

Distribution: Boso Peninsula and southwards to TWP.

Family **Seguenziidae** Verrill, 1884

Ancistrobasis sp. (Fig. 9 N–P)

Material examined: KY-17-05 (1), NSMT-Mo 114539; [380–385 m].

Distribution: Known only from Ogasawara Islands. **New to Japan**.

Remarks: Although only one incomplete shell was found in the present material, it was distinct enough to be separated from previously known species. It superficially resembles *Enida japonica* A. Adams, 1860 in the family Trochidae, but it is here placed in the seguenziid genus *Ancistrobasis* Dall, 1889 (type species: *Basilissa costulata* Watson, 1879 [= *Ancistrobasis reticulata* (Philippi, 1844)]) based on its minute size and

Fig. 9. A–E. *Liotina* sp. 2; A–C, KY-10-11: D–E, KY-10-6. F–J. *Liotina loculosa*; F–H, Tokunoshima Island, Amami Islands; I–J, holotype. K–M. *Cirsonella* sp.; K–L, KY-14-03; M, off Amami-oshima Island, 293–320 m, KT-04-24 St. G-3. N–P. *Ancistrobasis* sp.; KY-17-5. Q–U. *Visayaseguenzia* sp.; Q–S, KY-14-03; T–U, off Amami-oshima Island, 288–311 m, TY-01-07. V–X. *Calliobasis* sp.; KY-10-17. Y–Z. *Calliobasis lapu-lapui*; off Amami-oshima Island, 293-320 m, KT-04-24 St. G-3. Scales: A–J, 2 mm; K–M, 1 mm; N–P, 2 mm; R–Z, 1 mm.

general shape and especially the presence of a distinct tooth at the base of the aperture.

Visayaseguenzia sp. (Fig. 9Q–S)

Material examined: KY-10-02 (1); KY-14-03 (4: Fig. 9Q–S), NSMT-Mo 114541; [115–156 m].

Distribution: Ogasawara and Amami Islands. **New to Japan**.

Remarks: This species closely resembles *V. maestrattii* Poppe, Tagaro & Dekker, 2006 in general morphology, but clearly differs in having more inflated whorls and a wider umbilicus encircled by a granulate spiral cord. Specimens with exactly the same features as the present material have also been collected from the Nansei Islands (Fig. 9T–U, NSMT-Mo 114784). The specimen recorded from Amami-oshima (Ekawa and Arima, 2014: pl. 12, fig. 2) as *Visayaseguenzia maestrattii* [sic; = *maestratii*] Poppe, Tagaro & Dekker, 2006 may represent this species, but the figure was too unclear to allow precise identification.

Calliobasis sp. (Fig. 9V–X)

Material examined: KY-10-17 (1), NSMT-Mo 114542; [160 m].

Distribution: Known only from Ogasawara Islands. **New to Japan**.

Remarks: This species is superficially similar to *C. lapulapui* Poppe, Tagaro & Dekker, 2006, which has been collected from the Nansei Islands (Fig. 9Y–Z, NSMT-Mo 114785), but distinguished by the more depressed shell with coarser and spiny sculpture.

Family **Chilodontidae** Wenz, 1938

Ascetostoma sp. (Fig. 10A–B)

Material examined: OG-76-10 (1: Fig. 10A–B), NSMT-Mo 114543; OG-76-15 (2); KY-09-14 (1); KY-09-15 (1); KY-10-02 (1); KY-10-06 (2); KY-14-03 (1); KY-17-05 (2); KY-17-17 (4); [73–156 m].

Distribution: Known only from Ogasawara Islands. **New to Japan**.

Remarks: These specimens most closely resemble *A. ringens* (Schepman, 1908), but differ in their far smaller size (about a half in SL), more elongate shape with elevated spire, and weaker axial sculpture. Although this species is not rare around the Ogasawara Islands, it has not been found in the similar dredging survey around the Nansei Islands.

Herpetopoma ludiviniae Poppe, Tagaro & Dekker, 2006 アラボリサンショウガイモドキ（新称）(Fig. 10C–D)

Material examined: KY-17-05 (3), NSMT-Mo 114552; [380–385 m].

Distribution: Ogasawara Islands and southwards to TWP. **New to Japan**.

Remarks: The Ogasawara specimens completely agree with the holotype of this taxon, not only in the shape and sculpture but also in size. It has not been found in the Nansei Islands.

Herpetopoma rubrum (A. Adams, 1853) カバサンショウガイモドキ (Fig. 10E–H)

[= *Euchelus* sp. fide Fukuda, 1993: 24, pl. 6, fig. 68]

Material examined: OG-76-07 (2: Fig. 10E–F, NSMT-Mo 114553); OG-76-11 (1: Fig. 10G–H), NSMT-Mo 114554; OG-76-15 (2); KY-10-24 (1); KY-10-26 (1); KY-14-11 (1); [47–107 m].

Distribution: Fukushima Prefecture and southwards to TWP. **New to Ogasawara Islands**.

Remarks: Specimens from the Ogasawara Islands are generally small (up to 4 mm in SL), and usually uniformly dark brown in color (Fig. 10C–D), or sometimes whitish with brown speckles (Fig. 10E–F), in comparison to those from mainland Japan, which usually exceed 6 mm in SL and are often reddish brown in color. Nevertheless, they agree well in other conchological characters and are here considered to be conspecific.

Perrinia concinna (A. Adams, 1864) ヒメマキアゲエビス (Fig. 10I–J)

Material examined: T-09-02-TW-01-01 (1); KY-09-21 (1*); KY-10-07 (2); KY-14-04 (1: Fig. 10I–J), NSMT-Mo 114562; KY-17-25 (2); [99–171 m].

Distribution: From Boso Peninsula to Nansei

Islands. **New to Ogasawara Islands**.

Remarks: Specimens from the Ogasawara Islands agree well with typical examples of this species from temperate Japanese waters. However, specimens from the Nansei Islands (Fig. 10K, NSMT-Mo 114786) differ in having a more inflated shell with narrower suture, finer spiral cords and a stronger columellar tooth, and approach *P. cancellata* (Schepman, 1908) recorded from the Philippines (e.g., Poppe and Tagaro in Poppe, 2008: pl. 34, figs. 2, 6, 7). It is necessary to examine their taxonomic relationship to clarify the distribution of this species.

Pholidotrope asteroeides Vilvens, 2017 ホシガタマキアゲエビス（新称）(Fig. 10L–M)

Material examined: KY-09-21 (1*); KY-10-07 (1: Fig. 10L–M), NSMT-Mo 114565; KY-14-03 (2); KY-17-05 (1); [99–156 m].

Distribution: Amami Islands and southwards to TWP. **New to Japan**.

Remarks: This characteristic species was recently described from southern New Caledonia (Vilvens, 2017), and this is the first record of it in the Northern Hemisphere. It has also been obtained from off the Amami Islands (Fig. 10N, NSMT-Mo 114787).

Tibatrochus sp. (Fig. 10O–P)

[= *T. incertus* (Schepman, 1908) fide Poppe and Tagaro in Poppe, 2008: pl. 36, fig. 5]

Material examined: KY-10-17 (1), NSMT-Mo 114568; [160 m].

Distribution: Amami Islands and southwards to TWP. **New to Japan**.

Remarks: Two valid species are currently assigned to the genus *Tibatrochus* Nomura, 1940: *T. husaensis* Nomura, 1940 (type species) and *T. incertus* (Schepman, 1908). The present species agrees with the specimen illustrated as "*Tibatrochus incertus*" by Poppe and Tagaro in Poppe (2008), but it apparently differs from *T. incertus* by its small size (up to 2.3 mm in SL among the specimens examined), depressed shape and weaker sculpture. The same species has also been found in dredging samples from the Amami Islands (Fig. 10Q–R, NSMT-Mo 114788).

Vaceuchelus favosus (Melvill & Standen, 1896) ツブサンショウガイモドキ（新称）(Fig. 10S–T)

Material examined: OG-76-07 (1); OG-76-15 (4); SO-90-HD-1 (6: Fig. 10S–T), NSMT-Mo 114571; KY-09-27 (2); KY-10-02 (1); KY-14-03 (1); [35–156 m].

Distribution: Ogasawara Islands and southwards to TWP. **New to Japan**.

Remarks: Specimens in the present material fall well in the range of variation of this species recently shown by Vilvens (2017: 10–11, fig. A–J). This species is distributed widely in the western Pacific, from New Caledonia (type locality: Loyalty Islands), west to the Marquesas Islands and north to the Philippines. The present record represents a range extension to Japanese waters. Although it is not rare in the Ogasawara Islands, it has not been found in dredged material from the Nansei Islands.

Family **Anatomidae** McLean, 1898

Anatoma equatoria (Hedley, 1899) セキドウクチキレエビス (Fig. 11A–B)

Material examined: KY-10-17 (27: Fig. 11A–B), NSMT-Mo 114575; KY-10-18 (2); [160–540 m].

Distribution: Amami Islands and southwards to TWP. **New to Ogasawara Islands**.

Remarks: This species was recorded by Hasegawa (2005: 138, 140) from waters around the Nansei Islands at bathyal depths as "*Anatoma lamellata* (A. Adams, 1862)", but subsequently reidentified as the present nominal taxon (Hasegawa, 2015).

Anatoma indonesica Bandel, 1998 カワリボリクチキレエビス (Fig. 11C–D)

Material examined: KY-09-15 (1: Fig. 11C–D), NSMT-Mo 114577; KY-10-02 (1); KY-10-17 (4); [107–160 m].

Distribution: Okinawa Islands and southwards to TWP. **New to Ogasawara Islands**.

Remarks: This species was recorded from the Nansei Islands by Hasegawa (2005: 140, fig. 3),

Fig. 10. A–B. *Ascetostoma ringens*; OG-76-10. C–D. *Herpetopoma ludiviniae*; KY-17-5. E–H. *Herpetopoma rubrum*; E–F, OG-76-07; G–H, OG-76-11. I–K. *Perrinia concinna*; I–J, KY-14-04; K, off Amami-oshima Island,118–123 m, DY-04-12. L–N. *Pholidotrope asteroeides*; L–M, KY-10-07; N, off Amami-oshima, 293–320 m, KT-04-24 St. G-3. O–R. *Tibatrochus* sp.; O–P, KY-10-17; Q–R, off Amami-oshima, 293–320 m, KT-04-24 St. G-3. S–T. *Vaceuchelus favosus*; SO-90-HD1. Scales: A–H, 1 mm; I–K, 1 mm; L–T, 1 mm.

and this is the second record from Japanese waters.

Anatoma japonica (A. Adams, 1862) ニッポンクチキレエビス (Fig. 11E–F)

Material examined: KY-10-18 (2), NSMT-Mo 114580; [529–540 m].

Distribution: Boso Peninsula and southwards to TWP. **New to Ogasawara Islands**.

Remarks: Only two empty shells in rather poor condition were obtained from the same station at a depth of 545 m. They differ slightly from ordinary examples of this species, which are usually found at shallower depths, in being minute and depressed in shape, and the identification is thus provisional.

Family **Scissurellidae** Gray, 1847

Scissurella evaensis Bandel, 1998 イボクチキレエビス (Fig. 11G–H)

Material examined: KY-09-08 (1*); KY-09-14 (1*); KY-09-15 (2); KY-10-02 (1); KY-10-04 (1*); KY-10-07 (4: Fig. 11G–H), NSMT-Mo 114586; KY-10-31 (1); [92–115 m].

Distribution: Western Kyushu and southwards to TWP. **New to Ogasawara Islands**.

Remarks: This species was recently included in the Japanese fauna by Hasegawa in Okutani (2017: 771, pl. 41, fig. 1). The present material shows that it is not rare around the Ogasawara Islands.

Sukashitrochus carinatus (A. Adams, 1862) スカシエビス (Fig. 11I–J)

Material examined: SO-90-01 (2); KY-09-15 (1*); KY-09-28 (1*); KY-10-02 (1); KY-10-07 (3: Fig. 11I–J), NSMT-Mo 114592; KY-10-27 (2*); KY-10-31 (1); [35–115 m].

Distribution: Southern Hokkaido and southwards to TWP. **New to Ogasawara Islands**.

Remarks: This species was originally described from off Okushiri-jima Island in the Sea of Japan off southern Hokkaido and is rather common in shallow waters around temperate Japanese waters. Geiger (2012: 615) recently demonstrated that it is also distributed in tropical waters such as the Okinawa Islands, the Philippines and Fiji.

Family **Larocheidae** Finlay, 1927

Trogloconcha sp. (Fig. 11K–L)

Material examined: KY-10-17 (7), NSMT-Mo 114595; [160 m].

Distribution: Known only in Ogasawara Islands. **New to Japan**.

Remarks: Among the known species in the genus *Trogloconcha* Kase & Kano, 2002, this most closely resembles *T. lammelinodosa* Geiger, 2012 but is clearly distinguished by its high-spired shell and coarser sculpture. No comparable specimens to the present material have been reported from other areas, but this is probably because of its minute size. Its distribution and taxonomic relationship are thus not clear at present.

Family **Haliotidae** Refinesque, 1815

Haliotis sp. アナマモリ

Material examined: OG-76-07 (1); OG-76-11 (1); KY-10-06 (1); KY-10-24 (1); KY-14-11 (1); KY-14-16 (1); [47–129 m].

Distribution: Ogasawara Islands (endemic).

Remarks: All the specimens obtained by dredging were immature empty shells. Live and mature specimens have only been collected in the intertidal zone, where they are rather common under boulders or rocks. This species is similar to *H. varia* Linnaeus, 1758 and *H. ovina* Gmelin, 1791, which are widely distributed in the tropical Indo-West Pacific, but was morphologically separated from both by Fukuda (1993: 17; 1994: 58), and is considered to be endemic to this area.

Family **Fissurellidae** Fleming, 1822

Diodora mus (Reeve, 1850) アサテンガイ

Material examined: OG-76-15 (1); SO-90-HD1 (1); KY-14-11 (2); KY-14-16 (1); [35–129 m].

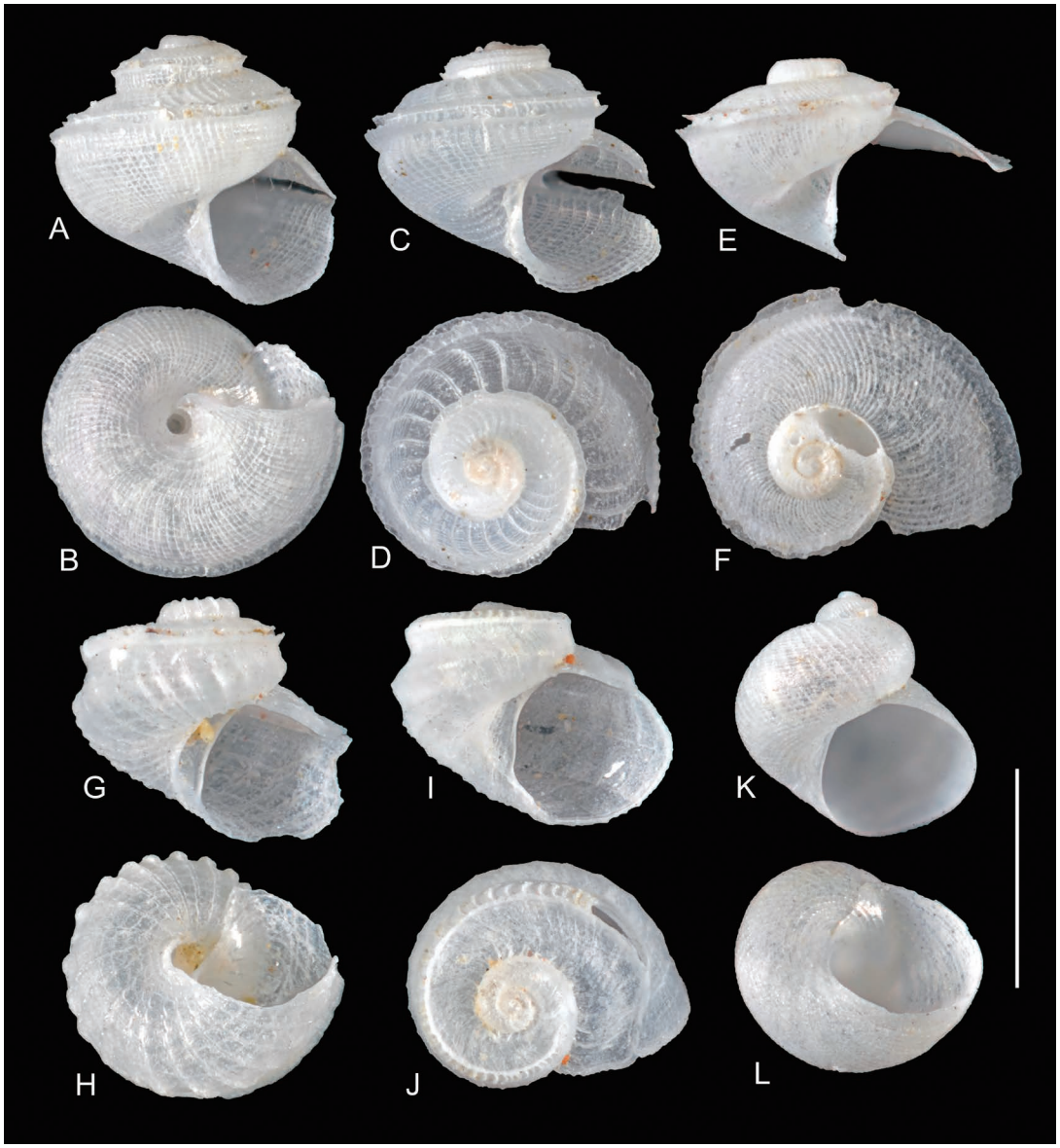

Fig. 11. A–B. *Anatoma equatoria*; KY-10-17. C–D. *Anatoma indonesica*; KY-09-15. E–F. *Anatoma japonica*; KY-10-18. G–H. *Scissurella evaensis*; KY-10-07. I–J. *Sukashitrochus carinatus*; KY-10-07. K–L. *Troglocon-cha lamellinodosa*; KY-10-17. Scales: 1 mm (all at the same scale).

Distribution: Boso Peninsula and southwards to TWP.

Diodora octagona (Reeve, 1850) カミクズヤガイ

Material examined: KY-08-25 (1); KY-10-07 (1); KY-10-19 (1); KY-10-31 (1); KY-14-06 (1); KY-14-15 (1); [87–166 m].

Distribution: Amami Islands and southwards to TWP.

Remarks: This species was recorded for the first time in Japanese waters from the Ogasawara Islands by Fukuda (1995: 4–5, pl. 46, fig. 832). It is widely distributed in the TWP, and also in the Nansei Islands (Hasegawa, personal observation:

one empty shell was collected from Amami-oshima at a depth of 87–94 m, DY-03–08).

Diodora quadriradiata (Reeve, 1850) テンガイ

Material examined: OG-76-17 (5); [42 m].

Distribution: Boso Peninsula and southwards to TWP.

Diodora semilunata Habe, 1953 ミカヅキテンガイ (Fig. 12A–B)

[= *D.* cf. *granifera* (Pease, 1861) fide Fukuda, 1993: 18, pl. 4, fig. 18]

Material examined: OG-76-02 (1: Fig. 12A), NSMT-Mo 114613; OG-76-07 (1); OG-76-11 (1: Fig. 12B), NSMT-Mo 114615; OG-76-12 (1); OG-76-15 (10); KY-10-15 (1); KY-17-10 (2); [36–110 m].

Additional material: Hyotan-jima, Ani-jima Island, intertidal, leg. M. Imajima, 12 VII 1969 (1*).

Distribution: From Sagami Bay to Nansei Islands, and Izu Islands. **New to Ogasawara Islands**.

Remarks: Specimens from the Ogasawara Islands were previously reported by Fukuda (1993) as "*D.* cf. *granifera* (Pease, 1861)", but the present study confirms that they are correctly identified as *D. semilunata*, based on the examination of additional material and comparison with examples from other localities, including the type locality. *Diodora semilunata* has been a rather ambiguous species, because of the absence of figures in the original description. Although Habe (1977) mentioned that the holotype and two paratypes of this nominal taxon were registered as NSMT-Mo 54898–54900, they are actually preserved in the Toba Aquarium (photographs of the types are available on line at http://www.aquarium.co.jp/shell/gallery/hyouzi.php?nakama = sukashigai). A specimen probably from the same source in the Kawamura Collection (NSMT-Mo 114791) is illustrated in Fig. 12E. This species is typically characterized by the fine sculpture, keyhole-shaped fissure, centrally arched "semilunate" shape in lateral view, and irregular brown mottled pattern. Immature specimens often possess an intact apex just posterior to the fissure, and this can be regarded as a distinguishing character from other species in the genus (Fig. 12A; C, NSMT-Mo 114789, from Hachijo-jima Island; D, NSMT-Mo 114790, from Amami-oshima Island). This species has been recorded in literature from the Kii Peninsula and southwards (Sasaki in Okutani, 2017), but it is actually distributed northwards to Sagami Bay (Izu-oshima Island), and also in Hachijo-jima Island (Fig. 12C), where it is common in beach drift (Hasegawa, personal observation). Some specimens from the Ogasawara Islands differ slightly from typical examples in having much finer radial ribs and a flatter outline (Fig. 12A), but seem to intergrade with the typical form. *Fissurella* (*Glyptus*) *sagax* G. B. Sowerby III, 1919, described from New Caledonia, may be a senior synonym of this taxon, but examination of its type material will be necessary to confirm this.

Diodora sp. (Fig. Fig. 12F–G)

Material examined: OG-76-05 (1); OG-76-07 (30); OG-76-08 (11); OG-76-11 (19); OG-76-15 (50); OG-95-23 (1: Fig. 12G), NSMT-Mo 114625; OG-95-34 (2); OG-95-41 (1); KY-09-08 (1); KY-09-12 (1); KY-09-21 (1); KY-09-27 (2); KY-09-28 (4* + 2); KY-09-29 (2* + 1); KY-09-30 (2* + 3); KY-10-02 (1); KY-10-06 (6); KY-10-19 (1); KY-10-24 (1); KY-10-27 (2); KY-14-11 (9); KY-17-08 (1); KY-17-09 (1); KY-17-10 (2); KY-17-17 (2: Fig. 12F), NSMT-Mo 114644; KY-17-25 (1); [45–138 m].

Distribution: Ogasawara and Nansei Islands.

Remarks: This species was recoded from the Ogasawara Islands as "*Diodora* sp." with an illustration by Fukuda (1993: pl. 4, fig. 21). It is rather common in the sublittoral zone, and shows wide variations in the shape and sculpture. Examination of specimens in NSMT-Mo revealed that it also occurs in Amami-oshima (Fig. 12H, NSMT-Mo 114792). Specimens from the latter locality slightly differ in possessing smoother sculpture with weaker radial ribs, but are indistinguishable at species level in overall morphology. Furthermore, they also closely resemble *Fissurella nigroocellata* Reeve, 1850 described from Ticao, the Philippines, except the absence of more distinct axial ribs, and the Japanese form may turn out to be a geographical

form of this taxon.

Macroschisma dilatata (A. Adams, 1851) ヒラスカシ

Material examined: OG-76-07 (1); OG-76-15 (4); SO-90-HD1 (1); KY-09-08 (4); KY-09-14 (1* + 1); KY-10-06 (2); KY-10-07 (1); KY-10-24 (1); KY-14-11 (3); [35–107 m].

Distribution: Northern Honshu and southwards to TWP.

Remarks: Some larger specimens rather closely resemble *M. sinensis* (A. Adams, 1851) and the presence of intermediate forms makes it difficult to distinguish between the two species. More detailed study will be necessary to clarify the taxonomic relationship between them.

Cranopsis propinqua (A. Adams, 1853) セムシマドアキガイ

Material examined: OG-76-15 (1); SO90-HD1 (1); KY-09-15 (1); KY-10-02 (1); KY-10-17(1); KY-14-11 (1); [35–160 m].

Distribution: Izu Peninsula and southwards to TWP.

Remarks: This species has been known in Japanese literature as *C. cumingii* (A. Adams, 1853), but examination of the type material revealed that it is correctly identified as this nominal taxon (Hasegawa, in preparation). It is distributed mainly in temperate waters in Japan, and is sometimes confused with the superficially similar tropical/ subtropical species *C. exquisita* (A. Adams, 1853), which is common in regions influenced by the Kuroshio Current (e.g., the Nansei Islands and Kii Peninsula). Based on examination of the NSMT collection, the same is true for Hachijo-jima Island, where *C. exquisita* is commonly found in beach drift, but *C. cumingii* is very rare, represented by only one specimen. In the Ogasawara Islands, however, only *C. cumingii* has been found but at multiple stations, suggesting a difference in the influence of the Kuroshio Current on species distribution in these regions.

Emarginella sakuraii Habe, 1963 ナガコバンスソキレ

Material examined: OG-76-02 (1); OG-76-07 (1); OG-76-11 (1); KY-10-04 (1); KY-16-06 (1); KY-17-05 (1); KY-17-31 (1); [36–137 m].

Distribution: Ogasawara and Nansei Islands.

Remarks: Although this species is not rare in either dredged material or beach drift in both the Ogasawara and Nansei Islands, it has not so far been found in other areas.

Hemimarginula laevicostata (A. Adams, 1852) フタカドスソキレ

Material examined: OG-76-07 (7); OG-76-08 (3); OG-76-11 (10); OG-76-13 (1); OG-76-15 (34); SO-90-HD1 (20); KY-09-27 (1); KY-10-02 (1); KY-10-24 (2); KY-10-26 (1); KY-14-11 (6); KY-17-10 (2); [35–115 m].

Distribution: Amami Islands and southwards to TWP.

Remarks: This species has been known in Japanese literature as *H. biangulata* (G. B. Sowerby III, 1901), but examination of type materials of this and related taxa revealed that it is correctly identified as this nominal taxon (Hasegawa, in preparation).

Laeviemarginula kimberi (Cotton, 1930) スソカケコザルアワビ (Fig. 12I)

Material examined: KY-17-09 (1), NSMT-Mo 114680; [117–121 m].

Additional material: E of Chichi-jima Island, at a depth of 10 m, leg. H. Tachikawa (1*).

Distribution: Kii Peninsula and southwards to NW Australia. **New to Ogasawara Islands**.

Remarks: The Japanese form was originally described as *Laeviemarginula membranacea* Habe, 1953 (type locality: Okinawa, the Ryukyus), but it was later synonymized with *L. kimberi* by the same author (Habe, 1977). The figure in the original description of *Emarginula kimberi* (Cotton, 1930: fig. 1) does agree well with the Japanese specimens, including the present material. Its type locality was Capricorn Group, NW Australia, but it has seldom been recorded in other regions in the TWP (e.g., the Philippines). On the other hand, it is widely distributed in subtropical Japanese waters, such as

Fig. 12. A–E. *Diodora semilunata*; A, OG-76-02; B, OG-76-11; C, Hachijo-jima Island,; D, Amami-oshima Island, Sakurai Coll.; E, Ryukyu [= Okinawa], Kawamura Coll. F–H. *Diodora* sp.; F, KY-17-17; G, OG-76-11; H, Amami-oshima Island, Sakurai Coll. I. *Laeviemarginula kimberi*; KY-17-09. J–L. *Zeidora calceolina*; J-K, SO-90-HD1; L, KY-10-11. M–N. *Emarginula choristes*; M, KY-08-04; N, KT-09-2-TW-01-04. Scales: A–E, 2 mm; F–H, 2 mm; I, 2 mm; J–L, 1 mm; M–N, 2 mm.

Kii Peninsula and Tosa Bay (Higo *et al*., 1999), and Hachijo-jima Island (Nishimura, 1999; for illustration http://town.oshima.tokyo.jp/~palais/page065.html: as *L. membranacea*), suggesting a possible antitropical distribution.

Zeidora calceolina A. Adams, 1860 フネスソキレガイ (Fig. 12J–L)

Material examined: SO-90-HD1 (1: Fig. 12J–K), NSMT-Mo 114681; KY-10-11 (1: Fig. 12L), NSMT-Mo 114682; KY-10-17(1); [35–160 m].

Distribution: Sagami Bay and southwards to TWP. **New to Ogasawara Islands**.

Remarks: This species is considered to be very variable in shape and sculpture, which is the case among the specimens from the Ogasawara Islands, as shown in the figures. Some nominal taxa have thus been regarded as synonyms, such as *Z. reticulata* A. Adams, 1862 and *Z. limatulaeformis* Horikoshi, 1944.

Emarginula choristes Dall, 1925 エボシスソキレ (Fig. 12M–N)

Material examined: KT-09-02-TW-01-04 (1: Fig. 12N), NSMT-Mo 114684; KY-08-04 (1: Fig. 12M), NSMT-Mo 114686; KY-08-10 (1); KY-08-23 (1); KY-10-17 (3); KY-10-23 (2); KY-14-03 (1); KY-14-08 (2); KY-14-16 (1); KY-17-05 (3 + 10^{1}); KY-17-15 (1); KY-17-22 (1); KY-17-27 (2); KY-17-28 (3); [127–385 m].

Distribution: From western Kyushu to Nansei Islands, and Izu Islands. **New to Ogasawara Islands**.

Remarks: Since its original description from the "eastern Sea of Japan" (Dall, 1925) [Albatross station 4917: actually, off Kuchino-erabu Island, East China Sea], this species has only occasionally been recorded in temperate Japanese waters, including the Izu Islands. However, it was found not to be rare in dredged material from the Ogasawara as well as Nansei Islands. It has not been recorded in other areas in the TWP.

Emarginula curvata Schepman, 1908 トアミスソキレ（新称）(Fig. 13A)

Material examined: KY-09-31 (1), NSMT-Mo 114699; [300–311 m].

Distribution: Amami Islands and southwards to TWP. **New to Japan**.

Remarks: Specimens from the Ogasawara and Nansei Islands (Fig. 13B, NSMT-Mo 114793) agree well with the holotype of this nominal taxon (Fig. 13C, ZMA Moll. 135872), described from the Sulu archipelago, Philippines at a depth of 522 m (Schepman, 1908). The specimen illustrated by Poppe (2008: pl. 7, fig. 1) as *E. curvata* from the Philippines is not this species but probably *E. fragilis*, as discussed below in the remarks of that species, and this is the first reliable record of this species since its description.

Emarginula foveolata Schepman, 1908 コウシスソキレ (Fig. 13D)

Material examined: KY-08-10 (1), NSMT-Mo 114700; [330 m].

Distribution: Boso Peninsula and southwards to TWP. **New to Ogasawara Islands**.

Remarks: Only one empty juvenile shell was found in the present material, but it is confidently identified as this species by the general shape and distinct sculpture (Fig. 13D). It is rather common along the Pacific coast of mainland Japan, and on sea mounts along the Izu Islands (Okutani, 1972, 1975). Specimens from temperate Japanese waters are often distinguished from those in tropical waters as the subspecies or species *Emarginula fujitai* Habe, 1953 (e.g., Sasaki in Okutani, 2017: 775, pl. 45, fig. 5), but it is difficult to separate them morphologically.

Emarginula fragilis Yokoyama, 1920 ハブタエスソキレ (Fig. 13E)

Material examined: OG-95-32 (1); OG-95-39 (1); KY-08-23 (1); KT-09-02-TW-01-02 (3); KY-09-12 (2); KY-09-14 (2); KY-10-07 (1); KY-10-18 (2); KY-10-23 (1); KY-10-30 (1: Fig. 13E), NSMT-Mo 114712; KY-17-05 (1); KY-17-17 (1); [84–540 m].

Distribution: Sagami Bay and southwards to TWP. **New to Ogasawara Islands**.

Remarks: Specimens from the Ogasawara Islands differ from those in temperate Japanese waters (Fig. 13G, NSMT-MoR 17419) in being

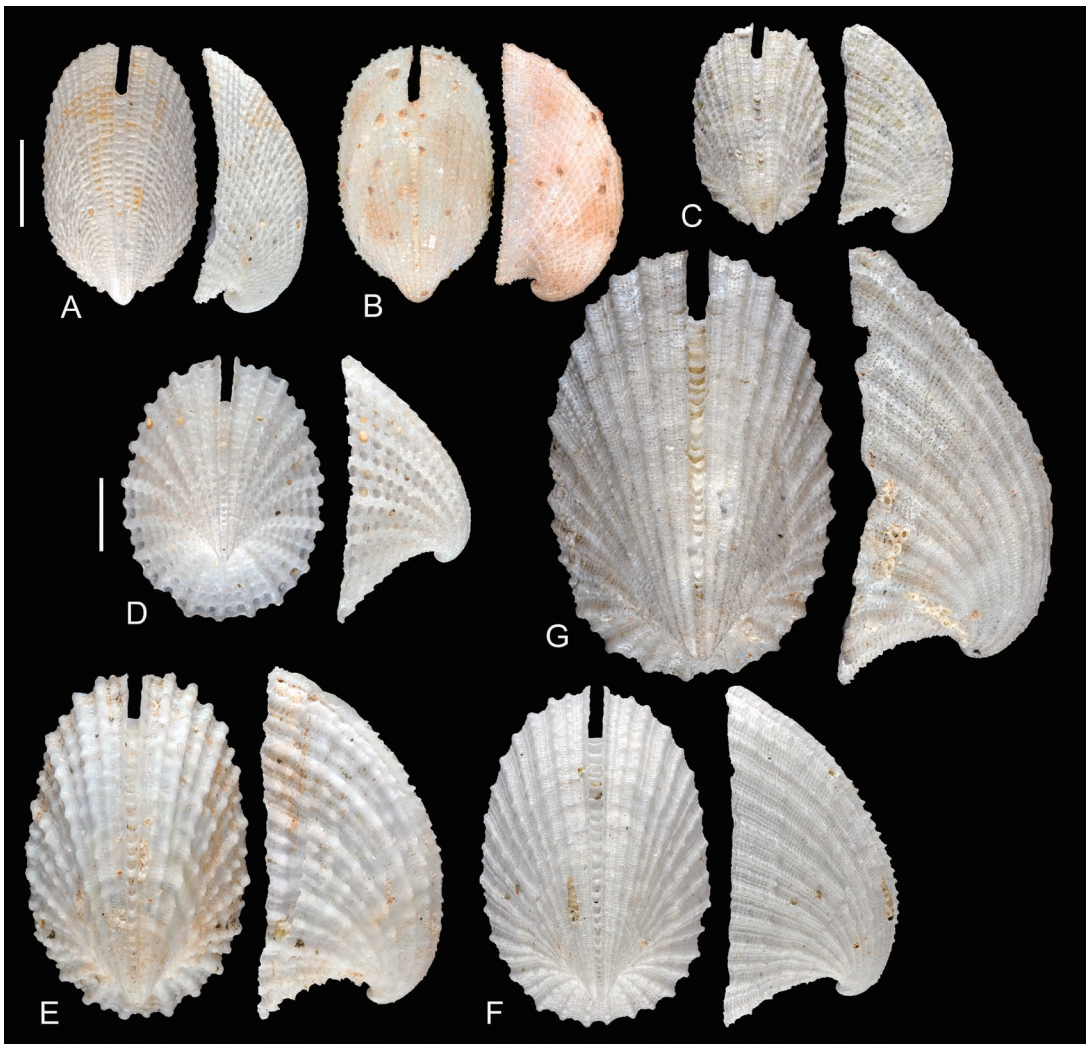

Fig. 13. A–C. *Emarginula curvata*; A, KY-09-31; B, off Amami-oshima Island, 137–142 m, DY-03-04; C, holotype. D. *Emarginula foveolata*; KY-08-10. E–G. *Emarginula fragilis*; E, KY-10-30; F, off Amami-oshima Island, 210 m, DY-02-04; G, Sagami Bay (voucher of Kuroda *et al.*, 1971: pl. 6, fig. 11). Scales: A–C, 2 mm; D–F, 2 mm.

smaller and possessing strong nodules on the radial ribs, but otherwise agree well. This species has been known to be distributed from the Boso Peninsula southwards to southwestern Shikoku (Higo *et al.*, 1999), but it actually also occurs in the Nansei Islands (Fig. 13F, NSMT-Mo 114794). Furthermore, the specimen illustrated from the Philippines as *Emarginula curvata* Schepman, 1908 by Poppe (2008: pl. 7, fig. 1) apparently represents the present species, which probably has a wide geographical distribution in the TWP. *Emarginula curvata* (Fig. 13A–C) can be distinguished from the present species by its thicker growth lines and more posteriorly situated apex. On the other hand, *Emarginula undulata* Melvill & Standen, 1903 described from Gulf of Oman closely resembles the present species, and more detailed examination of material from Indo-West Pacific will be necessary to clarify its taxonomy and geographical distribution.

Fig. 14. A–F. *Emarginula maculata*; A, OG-76-15; B, OG-76-12; C, KY-09-28; D, off Amami-oshima Island, 209–191 m, DY-04-01; E, off Amami-oshima, 155 m, DY-03-10; F, Sagami Bay (voucher of Kuroda *et al.*, 1971: pl. 6, fig. 4). G–J. *Emarginula sublaevis*; G, KY-17-22; H, KY-08-10; I, off Aguni-jima Island, Okinawa, 237–223 m, TY-03-13; J, holotype, ZMA Moll. 135875. K–L. *Emarginula* sp. 1; KY-17-10. M–N. *Emarginula* sp. 2; M, KY-14-11; N, Oshima-shin-sone Bank near Amami-oshima, 173–166 m, TY-17-03-11(2). Scales: A–I, M–N, 2 mm; J, 2 mm; K–L, 2 mm.

Emarginula eximia A. Adams, 1852 キヌジスソキレ

[= *Emarginula* sp. E fide Fukuda (1993: 19, pl. 4, fig. 28)]

Material examined: OG-76-15 (4); KY-10-24 (1); KY-14-11 (1); KY-14-17 (1); [47–107 m].

Distribution: Sagami Bay and southwards to TWP. **New to Ogasawara Islands**.

Remarks: A part of the present material was previously recorded as "*Emarginula* sp. E" by Fukuda (1993). This species has been known in Japanese literature as *E. concinna* A. Adams, 1852, but examination of type materials of this and related taxa revealed that it is correctly identified as this nominal taxon (Hasegawa, in preparation).

Emarginula maculata A. Adams, 1863 ダンダラスソキレ (Fig. 14A–C)

[= *Emarginula* sp. B fide Fukuda (1993: 19, pl. 1, fig. 25)]

Material examined: OG-76-02 (8); OG-76-05 (5); OG-76-07 (2); OG-76-08 (2); OG-76-10 (1);OG-76-11 (1); OG-76-12 (2: Fig. 14B), NSMT-Mo 114723; OG-76-13 (1); OG-76-15 (13: Fig. 14A), NSMT-Mo 114725; KY-09-12 (1); KY-09-14 (1* + 1); KY-09-15 (2); KY-09-21 (3); KY-09-28 (1* + 4: Fig. 14C), NSMT-Mo 114730; KY-10-02 (4); KY-10-04 (1); KY-10-06 (4); KY-10-11 (5); KY-10-17 (6); KY-10-19 (5); KY-10-27 (1); KY-10-31 (8); KY-14-03 (3); KY-04-06 (1); KY-14-11 (1); KY-17-10 (2); KY-17-17 (25); [36–160 m].

Distribution: Sagami Bay and southwards to TWP. **New to Ogasawara Islands**.

Remarks: Examination of the present material as well as specimens from other regions revealed that this species shows a remarkably wide range of variation in the profile and coloration of the shell. One typical phenotype possesses a depressed shell with the apex not protruding from the posterior margin and distinct greenish brown speckles (Fig. 14A), whereas the other possesses a highly arched shell with an apex clearly protruding from the posterior margin and uniformly greenish coloration (Fig. 14C). Both phenotypes are, however, connected by intermediate specimens (Fig. 14B). The same range of variation was recognized in the population in the Nansei Islands (Fig. 13D, NSMT-Mo 114795; E, NSMT-Mo 114796). The consistent character of this species is the distinct sculpture, which consists of densely arranged radial ribs and thread-like growth lines forming a granulate appearance. They also agree with specimens from temperate Japanese waters (Fig. 14F, NSMT-MoR 17482) and those from the TWP (e.g., Poppe, 2008: pl. 8, figs. 1, 3, 4). *Emarginula costulata* Deshayes, 1863, described from the Reunion Islands and distributed in Mozambique (Herbert, 1987) and the Red Sea (Albano *et al*., 2017), is also closely similar to this species, and may turn out to be a synonym (see Herbert, 1987: 11, figs. 39–42 for identification of this nominal taxon).

Emarginula sublaevis Schepman, 1908 ホソヤスソキレ (Fig. 14G–H)

[= *Emarginula hosoyai* Habe, 1953 **new synonym**]

Material examined: KY-08-10 (2: Fig. 14H), NSMT-Mo 114744; KY-17-05 (1); KY-17-22 (1: Fig. 14G), NSMT-Mo 114746; [330–385 m].

Distribution: Sagami Bay and southwards to TWP. **New to Japan**.

Remarks: Comparison with the holotype of *E. sublaevis* (Fig. 14J, ZMA Moll. 135875) confirmed the specimens from the Ogasawara as well as Nansei Islands (Fig. 14I, NSMT-Mo 114797) as this nominal taxon. These are the first records of *E. sublaevis* besides the holotype, which was obtained from Laut Banda, Maluku, Indonesia at a depth of 1224 m (Schepman, 1908). Furthermore, these specimens also reasonably agree well with *E. hosoyai*, which was described from Tosa Bay and is distributed north to Sagami Bay (Kuroda *et al.*, 1971), and the latter is regarded here as a junior synonym. Habe (1977) cited the holotype and paratype as NSMT-Mo 54812–54813, but they are actually preserved in Toba Aquarium (photograph of the holotype is available on line at http://www.aquarium.co.jp/shell/gallery/hyouzi.php?nakama = sukashigai). The distinguishing characters of this

species include the oblong shell, with tapered and strongly arched apical part, and distinct sculpture of widely spaced strong axial ribs with finer ribs in the interspaces and thread-like concentric ribs.

Emarginula sp. 1 (Fig. 14K–L)

[= *Emarginula* sp. C fide Fukuda (1993: 19, pl. 1, fig. 26)]

Material examined: OG-76-07 (3); OG-76-11 (1); OG-76-15 (4); OG-95-32 (1); KY-09-14 (1); KY-09-15 (3); KY-09-21 (1); KY-09-29(1*); KY-09-30 (1); KY-10-02 (3); KY-10-06 (4); KY-10-07(1*); KY-10-09(1*); KY-10-11 (2); KY-10-17 (1); KY-10-19 (3); KY-10-31 (1); KY-14-11 (1); KY-14-12 (1*); KY-17-10 (1: Fig. 14K–L), NSMT-Mo 114766; KY-17-17 (7); [47–202 m].

Distribution: Ogasawara and Nansei Islands.

Remarks: This probable undescribed species was recorded with an illustration from the Ogasawara Islands by Fukuda (1993) based on a part of the present material. This species can clearly be distinguished from other congeners by its minute rectangular shell with distinctive coarse sculpture and conspicuous whitish muscle scars on its inner side (Fig. 14L). Specimens that probably belong to the same species but slightly differ in size (exceeding 5 mm in shell length) are also found in beach drift in Amami-oshima Island (NSMT-Mo 114800), and it is probably distributed widely in the Nansei Islands.

Emarginula sp. 2 (Fig. 14M)

Material examined: KY-09-15 (1); KY-14-11 (1: Fig. 14M), NSMT-Mo 114769; [89–109 m].

Distribution: Ogasawara and Nansei Islands. **New to Japan**.

Remarks: This characteristic species is represented by two empty shells in the present material. These generally agree with those in the Nansei Islands (Fig. 14N, NSMT-Mo 114798), except for a slight difference in the outline. It is rather common in the latter area, and live specimens have usually been collected with sponges near the top of seamounts.

Discussion

Sampling efficiency

Fourteen of 93 species (15%) were represented by only one specimen, and 23 species (25%) were obtained from only one station (Fig. 15). Among them, five species were obtained at the same station, OG-76-17, which is located in Futami Bay on Chichi-jima Island and contains

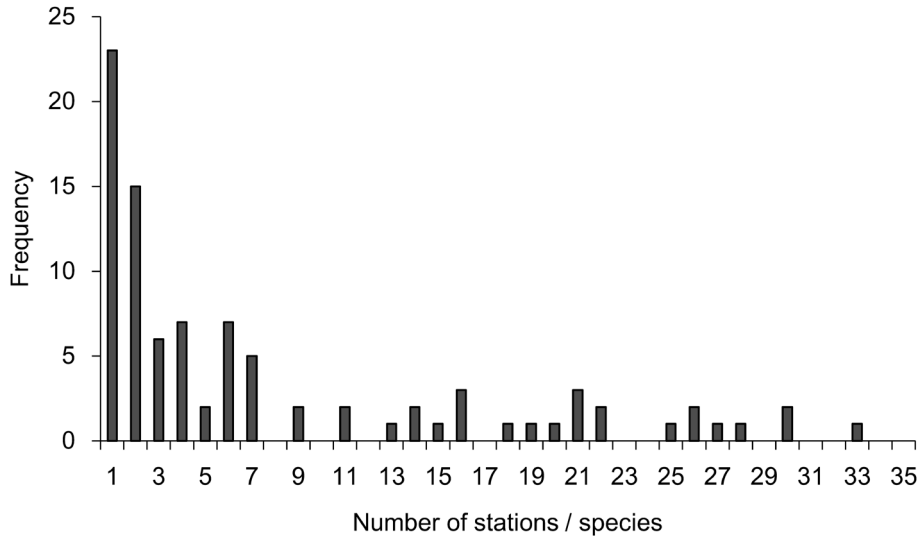

Fig. 15. Relationship between frequency and number of stations for each species. Species occurring at only one station counted 23, representing 25% of the total.

Table 5. Geographical distributions of species recognized in the present study. Numbers of species were calculated from Table 3.

Area	No. of sp.	% of total sp.
Sagam Bay/ Izu Islands	40	43%
Nansei Islands	64	69%
TWP	60	65%
Hawaii	7	8%

many intertidal species. It is thus probable that these species primarily inhabit the intertidal zone, and that they were rather accidentally accumulated at this station. On the other hand, the rest of the stations were located at greater depths: two in a depth range of 0–100 m, seven in a range of 100–200 m, and nine deeper than 200 m (corresponding to the bathyal zone). Nearly 90% of the species that occurred at depths less than 200 m were obtained at multiple stations (excluding st. OG-76-17), suggesting that the present result efficiently reflects the vetigastropod fauna in this depth range. However, the survey stations were set by selecting areas that are suitable for dredging and this may have constrained them within certain environmental conditions. Bottom environments are highly variable, especially around oceanic islands that are under the influence of complex bottom topography and ocean currents, and it is probable that a more complex fauna could be revealed by adopting other survey methods.

Biogeography

Looking at a summary of the geographical distributions of species recognized in the present study (Table 5), 74 species in total (80%) are distributed in the Nansei Islands (64 species) and/or TWP (60 species). Only two species (*Archiminolia ziczac* and *Turbo excellens*) are confined to temperate Japanese waters, besides the Ogasawara Islands. These numbers show the dominance of tropical/ subtropical elements in the vetigastropod fauna in the Ogasawara Islands.

Marine faunas of southern Japanese waters are influenced by the Kuroshio Current to various extents (e.g., Nishimura, 1992). This is evident in the Nansei Islands (the Ryukyu and Amami Islands), on the Pacific coasts of mainland Japan (especially around the tips of peninsulas, such as Kii and Izu Peninsulas) and in the Izu Islands, where a number of tropical/ subtropical species are distributed. On the other hand, the Ogasawara Islands are located far from the Kuroshio main stream, and are affected by various complicated ocean currents, sometimes coming directly from the TWP. In this context, it is noteworthy that at least six species (*Bathymophila gravida*, *Pseudominolia tramieri*, *Calliostoma takujii*, *Astralium provisorium*, *Herpetopoma ludiviniae* and *Vaceuchelus favosus*) are distributed both in the Ogasawara Islands and in the TWP, but probably not in the Nansei Islands. A typical example is *A. provisorium*, which was obtained at as many as 28 stations around the Ogasawara Islands but has not been found at all in the Nansei Islands during similar dredging surveys. However, because of the insufficiency of dredging surveys around the Nansei Islands, more detailed discussion is premature.

Turning to the comparison with the temperate Japanese fauna, comparable dredging surveys were carried out in Sagami Bay; around Shimoda, near the southern tip of Izu Peninsula (Hasegawa *et al.*, 2001: 50 stations, in a depth range of 3–218 m) and around the Miura Peninsula (Hasegawa, 2006: 55 dredge stations in addition to 56 gill net sites, in a depth range of 12–730 m). Ninety-nine vetigastropod species were recorded in total. The number is comparable to, but slightly more than that of the present study, and the two faunas (Sagami Bay and the Ogasawara Islands) share only 21 species. The mainstream of the Kuroshio Current flows between these two areas, and it apparently inhibits the southward transmission of temperate species (see below in “endemism” for more detailed discussion).

The unstable and inconsistent transport of tropical species by the Kuroshio Current combined with the barrier effect it has on the dispersal of temperate species make the marine fauna

Table 6. List of species occurring at more than 20 dredge stations.

Species name	Numbers of stations occurred	Depth range (m)	Endemic to Ogasawara Id.
Bolma sp.	33	98–348	Y
Ethminolia sp.	30	36–151	Y
Monilea belcheri (Philippi, 1849)	30	36–147	
Astralium provisorium Schepman, 1908	28	35–171	
Emarginula maculata A. Adams, 1863	27	36–160	
Rossiteria nucleus (Philippi, 1849)	26	36–113	
Diodora sp.	26	45–138	
Liotina montamarina Okutani, 2001	25	36–137	Y
Bolma tamikoana (Shikama, 1973)	22	102–385	
Liotina sp. 1	22	52–385	
Kanekotrochus boninensis (Okutani, 2001)	21	48–171	Y
Sericominolia vernicosa (Gould, 1861)	21	36–107	
Emarginula sp. 1	21	47–202	

Table 7. Distribution records of *Ethminolia nektonica* and related species in Japan.

Sources	Area	Depth (m)	No. of stations
Ethminolia nektonica			
Okutani (1961)	Kushikino, Kagoshima	89	1
Okutani and Sakurai (1968)	Kasumi, Hyogo, Sea of Japan	35	1
Tsuchida and Kitao (1987)	Shionomisaki, Kii Peninsula	75–115	6
Tsuchida and Kitao (1987)	Suruga Bay	100–134	3
Tsuchida and Kitao (1987)	Kumano-nada sea	81–82	1
Tsuchida and Kitao (1987)	Southern Kii Peninsula	72–101	3
Hasegawa *et al*. (2001)	Shimoda, Izu Peninsula	83–98	1
Hasegawa (2001)	Tosa Bay	100–125	7
Hasegawa (2005)	Nansei Islands	290–340	4
Ethminolia sp.			
Present study	Ogasawara Islands	36–151	30

of the Ogasawara Islands both distinctive and relatively poor. The gastropod fauna in general is characterized by the relatively small total number of species in comparison to other areas in the same latitude range, as mentioned in the introduction. The distinctiveness of the fauna is shown by the species compositions. Some dominant species in mainland Japan and the Nansei Islands are absent or very poorly represented in the Ogasawara Islands, such as *Cantharidus japonicus* (A. Adams, 1853) and *Enida japonica* A. Adams, 1860, both common in mainland Japan (e.g., Hasegawa *et al.*, 2001; Hasegawa, 2006), and *Archiminolia fulgens* and *Zetela mutabilis* (Schepman, 1908) in the Nansei Islands (Ekawa and Arima, 2014; Hasegawa, personal observation). On the other hand, a number of dominant species in the Ogasawara Islands are absent or rare in other areas, as represented by *Bolma* sp. and *Ethminolia* sp. Both species have been obtained from 30 stations or more around the Ogasawara Islands and are regarded as the most abundant species in this area (Table 6), but they have not been recorded in other regions. *Ethminolia* sp. is morphologically most closely related to *E. nektonica* (Okutani, 1961), which has been rather infrequently recorded in Japanese waters, from the Izu Peninsula to the Nansei Islands (Table 7). Among 13 species that occurred at more than 20 dredge stations (Table 6) and which constitute the top 15% of the most abundant species in this area, four were regarded as endemic to this area, and two are not known in other areas in Japan, showing clearly the distinctness of the fauna.

Endemism

Another characteristic of the vetigastropod

fauna in the Ogasawara Islands is the relative richness of endemic species. Twelve species (13% of the total) are regarded herein as endemic, with four additional species so far only recorded in this area. Besides them, three intertidal vetigastropods have been shown to be endemic to this area, i.e., *Lunella ogasawarana* Nakano, Takahashi & Ozawa, 2007 (Nakano *et al.*, 2007); *Monodonta perplexa boninensis* Asakura & Nishimura, 1987 (Asakura and Nishimura, 1987) and *Monodonta* cf. *australis* (Lamarck, 1822) (Asakura *et al.*, 1993). Some further species differ morphologically to some extent from those in other populations, but are rather provisionally held not to be separable at the species level in the present study (e.g., *Astralium provisorium* and *Herpetopoma rubrum*). If more detailed research is carried out in the future, some of these may also be found to be distinct species that are endemic to this area.

To some extent the high endemism found here stems from narrowing the target group to the vetigastropods. In contrast to other major gastropod clades, such as Caenogastropoda and Heterobranchia, which generally possess longer planktonic larval periods, species of the clade Vetigastropoda generally lack a widely dispersing larval stage (Kay, 1984) and they tend to have a relatively narrow geographical distribution. For instance, Herbert (2015) summarized the 245 species of Recent Vetigastropoda hitherto recorded from South Africa, which is situated at the western margin of the Indo-West Pacific marine biogeographical division, and only six of them (2%) are also recognized in the Japanese fauna. This contrasts clearly with the caenogastropod family Conidae, which has a long-term planktotrophic larval stage. Tenorio and Monterio (2008) listed 84 species of Conidae from South Africa, of which 45 (54%) also occur in Japanese waters. Vermeij *et al.* (1983) made a comparison between the molluscan fauna of Hawaii and the Northern Mariana Islands, and demonstrated that among 41 Archaeogastropoda [Vetigastropoda + Patellogastropoda] recorded in the Northern Mariana Islands, only 24% are also distributed in Hawaii, in contrast to Mesogastropoda and Neogastropoda, which share 70% and 59% species in common with the Hawaiian fauna respectively.

Even so, in view of the fact that no distinct endemic vetigastropod species are recognized in the surrounding island areas, such as the Izu and Nansei Islands, the high degree of endemism around the Ogasawara Islands is exceptional. This is apparently related to a susceptibility to genetic isolation in this area, due to the complex ocean currents discussed above. Based on the comparison of fish faunas, it has been suggested that the Kuroshio Current plays the role of a barrier to impede the southward dispersion of Japanese temperate marine organisms (Seno and

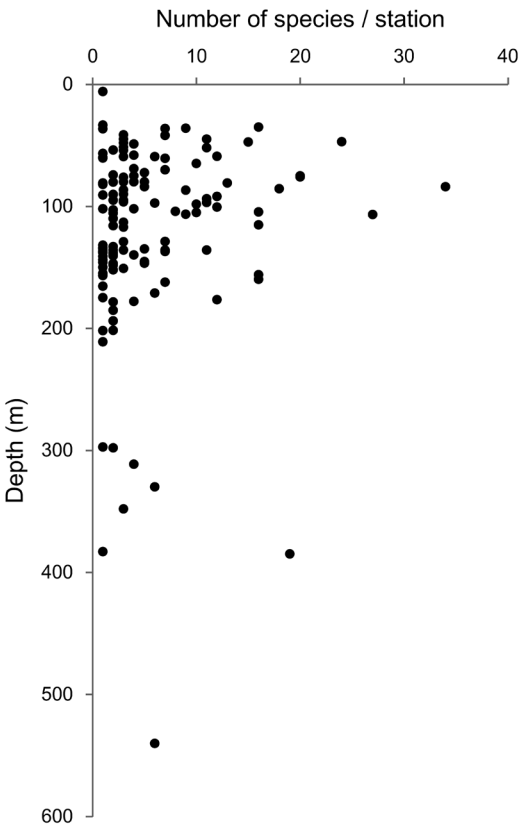

Fig. 16. Relationship between the number of species occurring at each station and depth. Each plot represents the number of species occurring at a station (vertical axis) in relation to the depth (horizontal axis).

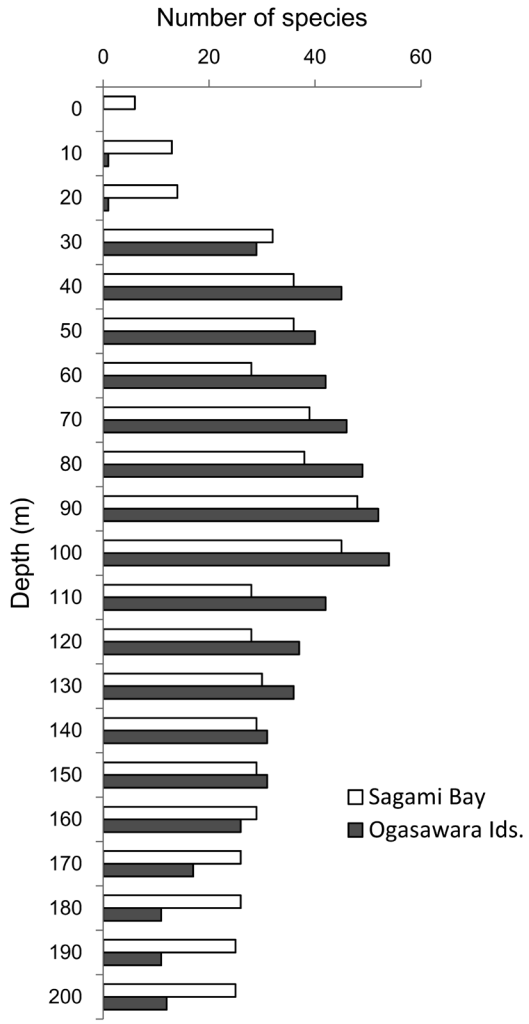

Fig. 17. Comparison of the numbers of vetigastropod species possibly occurring within every 10 m from 0 to 200 m depth in Sagami Bay and around the Ogasawara Islands. In calculating the number of species, each is considered to occur throughout it depth range, between the shallowest and the deepest records. Data for Sagami Bay after Hasegawa *et al.* (2001) from off Shimoda, Izu Peninsula, and Hasegawa (2005) from off Miura Peninsula.

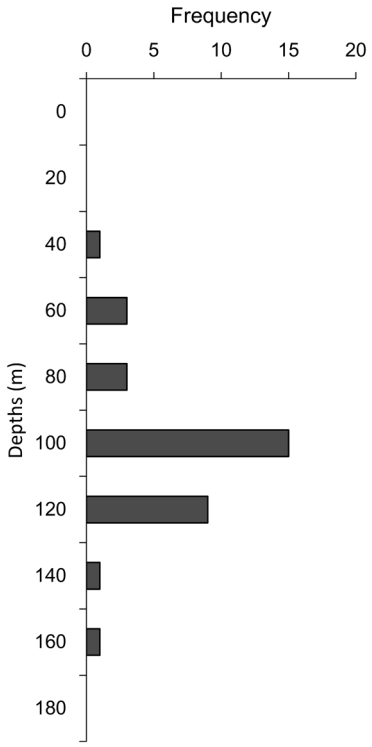

Fig. 18. Vertical distribution of *Ethminolia* sp. around the Ogasawara Islands. Number of positive stations at each 20 m depth increment.

Matsuura, 2007). Table 4 summarizes the geographical distributions of the possible sister species of the endemic species in the Ogasawara Islands. It is noteworthy that four (among 12) species are endemic to temperate Japanese waters, and seven species in total are distributed along the coast of mainland Japan. As mentioned above, the overall vetigastropod fauna in the Ogasawara Islands is most similar to that of the Nansei Islands (Table 5), and it shares only two species with the endemic temperate Japanese fauna. It is thus conceivable that isolation of a temperate species that migrated by some chance from the temperate zone to the Ogasawara Islands is one basis for speciation. However, possible sister species of some other endemic species are distributed in the TWP but not in other areas in Japanese waters (e.g., *Clanculus buijsei* and *Trogloconcha lammelinododa*), and more complex speciation mechanisms could thus also be involved in this region.

Vertical distribution

Despite the large number of dredge stations, they were largely concentrated in a limited depth range of 50–150 m (Fig. 1B) and thus not useful

for a quantitative analysis of the vertical distribution of species. However, there was a tendency for the number of species occurring in each station to be highest around the depth of 100 m (Fig. 16). The numbers of species possibly occurring every 10 m from 0 to 200 m depth were calculated and are shown in Fig. 17 (see explanation of the figure for the calculation method) and compared with those in Sagami Bay based on the data from Hasegawa *et al.* (2001) and Hasegawa (2006). The number gradually increases with depth, reaches a maximum at around 100 m, then decreases rather suddenly. The same trend was seen in Sagami Bay, but the graph was much flatter with a low peak.

Some species were obtained at a considerable number of stations, as many as 30 and more (Table 6), and these data provide clues for more detailed analysis. For instance, one of the endemic species, *Ethminolia* sp., was collected at 30 stations. The vertical distribution of the species (Fig. 18) encompasses a range of 36–151 m, with a peak at around 100 m. Its probable sister species, *E. nektonica*, has been recorded in a range of 35–134 m around mainland Japan, and between 290 and 340 m in the Nansei Islands (Table 7). It is noteworthy that the vertical distribution of *E.* sp. nearly corresponds to that of *E. nektonica* around mainland Japan. The vertical water temperature profile around the Ogasawara Islands is probably more similar to that in the Nansei Islands in the same latitude range, and adaptation to a different temperature zone may be a cause of morphological modification in addition to genetic isolation.

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小笠原諸島周辺からドレッジで採集された潮下帯及び上部漸深海帯の古腹足類

長谷川和範

東京都水産試験場（現東京都島しょ農林水産総合センター）の興洋での調査を中心とした，1976年～2017年に亘る様々なドレッジ調査によって得られた標本に基づいて，小笠原周辺海域の潮下帯及び上部漸深海帯の古腹足類相について調査・検討を行った．その結果，93の形態種が認められ，そのうち70種は既知種に同定され，23種は未記載種の可能性が高いことが明らかとなった．また，51種（全体の55%）は小笠原諸島から新記録となり，そのうち22種（24%）は日本新記録となることが分かった．12種（13%）は小笠原周辺海域に固有と判断され，そのほか4種は現時点でこの海域以外からは記録されていないが，情報不足のために固有性の判断は保留された．小笠原諸島から新記録となる種と分類学的な考察を行った種，及び比較対象とした本州や南西諸島の同種もしくは近似種の標本をカラー図版に示した．