

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

Kazunori Hasegawa

Department of Zoology, National Museum of Nature and Science,
4–1–1, Amakubo, Tsukuba, Ibaraki 305–0005, Japan
E-mail: hasegawa@kahaku.go.jp

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

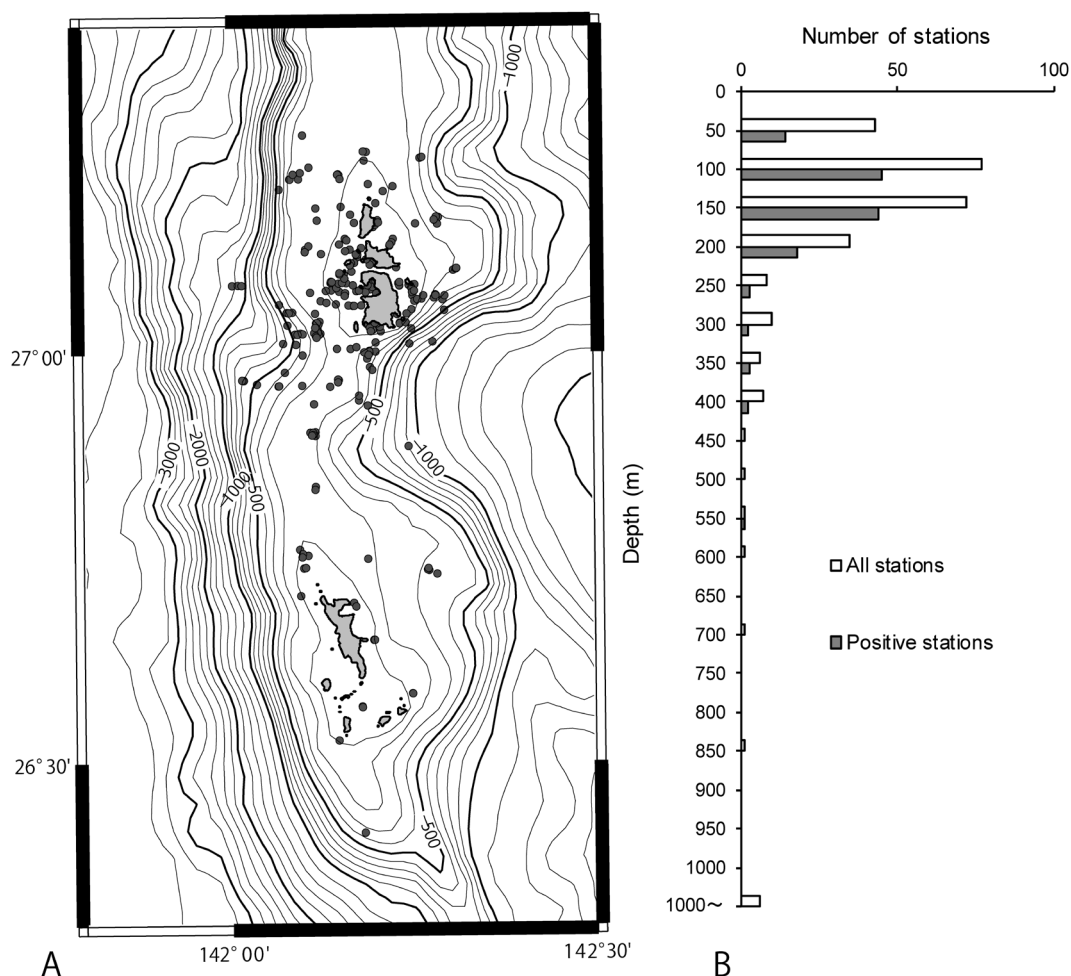


Fig. 1. Outline of survey stations. A. A map showing all the dredging sites by various research vessels (see Table 1 for details), including negative stations (yielding no vetigastropods). B. Vertical frequency distribution of survey stations (number of stations in every 50 m depth).

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 morpho-species (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-Marui*; KY, R/V *Koyo*; OG, *Koyu-Marui VIII* (95 only); RD, Niino-style rock dredge; SO, R/V *Soyo-Marui*.

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°09.19' 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-Marui*, Amami-oshima; KT, R/V *Tansei-Marui*; TY, T/V *Toyoshio-Marui*.

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 intra-specific 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 judged 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 system-

atic 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						
<i>Angaria rugosa</i> (Kiener, 1838)*	2(0)/2	73–101			+	+
Family Phasianellidae						
<i>Hiloe variabilis</i> (Pease, 1861)*	7(0)/4	35–115		+	+	+
<i>Phasianella solida</i> (Born, 1780)	56(0) + 12fr/16	36–113		+	+	+
Family Colloniidae						
<i>Collonista picta</i> (Pease, 1868)*	116(0)/20	35–178		+	+	+
<i>Collonista rubricincta</i> (Mighels, 1845)	115(6)/14	35–160		+	+	–
<i>Collonista verruca</i> (Gould, 1845)**	1(0)/1	40		–	–	–
<i>Homalopoma</i> sp. 1**	11(0)/2	156–160		–	+	–
<i>Homalopoma</i> sp. 2**	3(0)/1	380–385	Y	–	–	–
Family Trochidae						
<i>Trochus rota</i> Dunker, 1860	3(0)/3	69–107		+	+	+
<i>Clanculus bronni</i> Dunker, 1860	3(0)/1	42		+	+	+
<i>Clanculus cognatus</i> (Pilsbry, 1903)	2(0)/2	75		+	+	+
<i>Clanculus denticulatus</i> (Gray, 1827)	31(0) + 17fr/14	35–107		–	+	+
<i>Clanculus</i> sp.**	10(0) + 3fr/11	65–137	Y	–	–	–
<i>Jujubinus</i> sp.**	64(2)/19	76–385		–	+	–
<i>Kanekotrochus boninensis</i> (Okutani, 2001)	91(0) + 9fr/21	48–171	Y	–	–	–
<i>Tosatrochus attenuatus</i> (Jonas, 1844)	2(0)/2	69–82		–	+	+
<i>Alcyna ocellata</i> A. Adams, 1860	12(0)/6	35–107		+	+	+
<i>Synaptocochlea concinna</i> (Gould, 1845)	11(0)/4	35–105		–	+	+
<i>Microtis tuberculata</i> H. Adams & A. Adams, 1850	3(0) + 1fr/1	89–107		–	+	+
<i>Stomatella auricula</i> Lamarck, 1816	4(0) + 12fr/4	36–107		+	+	+
<i>Stomatella lintracula</i> (A. Adams, 1850)*	1(0)/1	85		–	+	+
<i>Stomatia phymotis</i> Helbling, 1779	6(2)/5	6–59		+	+	+
<i>Stomatolina angulata</i> (A. Adams, 1850)*	3(0)/3	92–156		+	+	+
<i>Stomatolina</i> sp.	25(0)/7	45–107	Y	–	–	–
<i>Conotalopia ornata</i> (G. B. Sowerby III, 1903)*	3(0)/2	84–107		+	+	–
<i>Ethalia guamensis</i> (Quoy & Gaimard, 1834)	1(0)/1	42		–	+	+
<i>Ethaliella floccata</i> (G. B. Sowerby III, 1903)	1(0)/1	42		–	+	+
<i>Ethminolia</i> sp.	148(8) + 3fr/30	36–151	Y	–	–	–
<i>Monilea belcheri</i> (Philippi, 1849)	128(14) + 16fr/30	36–147		–	+	+
<i>Pseudominolia tramieri</i> Poppe, Tagaro & Dekker, 2006**	4(0)/2	127–330		–	–	+
<i>Rossiteria nucleus</i> (Philippi, 1849)	385(9) + 33fr/26	36–113		+	+	+
<i>Sericominolia vernicosa</i> (Gould, 1861)	109(13)/21	36–107		–	+	+
Family Solariellidae						
<i>Archiminolia fulgens</i> (Dall, 1907)*	2(0)/2	298–311		+	+	+
<i>Archiminolia ziczac</i> (Kuroda & Habe, 1971)*	5(0)/2	300–385		+	–	–
<i>Bathymophila gravis</i> Marshall, 1999**	26(0) + 4fr/1	529–540		–	–	+
<i>Bathymophila</i> sp. 2**	1(0)/1	141–151	Y?	–	–	–
Family Margaritidae						
<i>Callogaza sericata</i> (Kira, 1959)*	1(0)/1	380–385		+	–	+
Family Calliostomatidae						
<i>Calliostoma takujii</i> Kosuge, 1986	7(3)/4	98–385		–	–	+
<i>Calliostoma</i> sp. 1	33(0)/16	36–137	Y	–	–	–
<i>Calliostoma</i> sp. 2	10(0)/6	47–135	Y	–	–	–
Family Turbinidae						
<i>Astraliun provisorium</i> Schepman, 1908**	86(6) + 1op/28	35–171		–	–	+
<i>Bolma girgillus</i> (Reeve, 1861)*	2(1)/2	34–105		+	+	+
<i>Bolma kiharai</i> Kosuge, 1986	1(0)/1	175–178	Y	–	–	–
<i>Bolma minitradiosa</i> Kosuge, 1983*	2(2)/2	202–311		–	+	+
<i>Bolma persica</i> (Dall, 1907)*	4(0)/2	136–310		+	+	+
<i>Bolma tamikaana</i> (Shikama, 1973)*	47(13) + 3op + 8fr/22	102–385		+	+	+
<i>Bolma</i> 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
<i>Turbo excellens</i> G. B. Sowerby III, 1914	13(1) + 6op + 2fr/18	45–171		+	–	–
<i>Turbo reevei</i> Philippi, 1847	1(0)/1	42		+	+	+
Family Liotiidae						
<i>Bathyliotina armata</i> (A. Adams, 1861)*	2(0)/1	380–385		+	+	+
<i>Liotina montamarina</i> Okutani, 2001	67(1)/25	36–137	Y	–	–	–
<i>Liotina</i> sp. 1	83(1)/22	52–385		–	+	–
<i>Liotina</i> sp. 2	19(0)/11	47–156	Y	–	–	–
Family Skeneidae						
<i>Cirsonella</i> sp.**	3(0)/3	136–160		–	+	–
<i>Leucorhynchia tricarinata</i> Melvill & Standen, 1896	5(0)/2	35–84		–	+	+
<i>Munditiella ammonoceras</i> (A. Adams, 1863)	8(0)/4	35–107		+	+	+
Family Seguenziidae						
<i>Ancistrobasis</i> sp.**	1(0)/1	380–385	Y?	–	–	–
<i>Visayasequenzia</i> sp.	5(0)/2	115–156		–	+	–
<i>Calliobasis</i> sp.	1(0)/1	160	Y?	–	–	–
Family Chilodontidae						
<i>Ascetostoma</i> sp.**	15(0)/9	73–156	Y	–	–	–
<i>Herpetopoma ludivinae</i> Poppe, Tagaro & Dekker, 2006**	3(0)/1	380–385		–	–	+
<i>Herpetopoma rubrum</i> (A. Adams, 1853)*	8(0)/6	47–107		+	–	+
<i>Perrinia concinna</i> (A. Adams, 1864)*	7(1)/5	99–171		+	+	–
<i>Pholidotrope asteroeides</i> Vilvens, 2017**	5(1)/4	99–156		–	+	+
<i>Tibatrochus</i> sp.**	1(0)/1	160		–	+	+
<i>Vaceuchelus fавosus</i> (Melvill & Standen, 1896)**	15(0)/6	35–156		–	–	+
Family Anatomidae						
<i>Anatoma equatoria</i> (Hedley, 1899)*	29(0)/2	160–540		–	+	+
<i>Anatoma indonesica</i> Bandel, 1998*	6(0)/3	107–160		–	+	+
<i>Anatoma japonica</i> (A. Adams, 1862)*	2(0)/1	529–540		+	+	+
Family Scissurellidae						
<i>Scissurella evaensis</i> Bandel, 1998*	11(3)/7	92–115		–	+	+
<i>Sukashitrochus carinatus</i> (A. Adams, 1862)*	10(4)/7	35–115		+	+	+
Family Larocheidae						
<i>Trogloconcha</i> sp.**	7(0)/1	160	Y?	–	–	+
Family Haliotiidae						
<i>Haliotis</i> sp.	6(0)/6	47–129	Y	–	–	–
Family Fissurellidae						
<i>Diodora mus</i> (Reeve, 1850)	5(0)/4	35–129		+	+	+
<i>Diodora octagona</i> (Reeve, 1850)	6(0)/6	87–166		–	+	+
<i>Diodora quadriradiata</i> (Reeve, 1850)	5(0)/1	42		+	+	+
<i>Diodora semilunata</i> Habe, 1953*	17(0)/7	36–110		+	+	–
<i>Diodora</i> sp.	162(8)/26	45–138		–	+	–
<i>Macroschisma dilatata</i> (A. Adams, 1851)	19(1)/9	35–107		+	+	+
<i>Cranopsis propinqua</i> (A. Adams, 1853)	6(0)/6	35–160		+	–	+
<i>Emarginella sakuraii</i> Habe, 1963	7(0)/7	36–137		–	+	–
<i>Hemimarginula laevicostata</i> (A. Adams, 1852)	88(0)/13	35–115		–	+	+
<i>Laeviemarginula kimberi</i> (Cotton, 1930)*	1(0)/1	117–121		+	+	+
<i>Zeidora calceolina</i> A. Adams, 1860*	3(0)/3	35–160		+	+	+
<i>Emarginula choristes</i> Dall, 1925*	33(1)/15	127–385		+	+	–
<i>Emarginula curvata</i> Schepman, 1908**	1(0)/1	300–311		–	+	+
<i>Emarginula foveolata</i> Schepman, 1908*	1(0)/1	330		+	+	+
<i>Emarginula fragilis</i> Yokoyama, 1920*	17(0)/12	84–540		+	+	+
<i>Emarginula eximia</i> A. Adams, 1863	7(0)/4	47–107		+	+	+
<i>Emarginula maculata</i> A. Adams, 1863*	112(4)/27	36–160		+	+	+
<i>Emarginula sublaevis</i> Schepman, 1908**	4(0)/3	330–385		+	+	+
<i>Emarginula</i> sp. 1	38(4)/21	47–202		–	+	–
<i>Emarginula</i> 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
<i>Homalopoma</i> sp. 2	<i>Homalopoma hui</i> Huang <i>et al.</i> , 2016	—	+	+
<i>Clanculus</i> sp.	<i>Clanculus buijsei</i> Poppe <i>et al.</i> , 2006	—	—	+
<i>Kanekotrochus boninensis</i>	<i>Kanekotrochus infuscatus</i> (Gould, 1861)	+	—	—
<i>Stomatolina</i> sp.	<i>Stomatolina rubra</i> (Lamarck, 1822)	+	—	—
<i>Ethminolia</i> sp.	<i>Ethminolia nektonica</i> (Okutani, 1961)	+	+	—
<i>Bathymophila</i> sp. 2	?			
<i>Calliostoma</i> sp. 1	<i>Calliostoma simodense</i> Ikebe, 1942	+	—	—
<i>Calliostoma</i> sp. 2	?			
<i>Bolma kiharai</i>	<i>Bolma tamikoana</i> (Shikama, 1973)	+	+	+
<i>Bolma</i> sp. 1	<i>Bolma guttata</i> (A. Adams, 1863)	+	—	—
<i>Liotina montamarina</i>	<i>Liotina solidula</i> (Gould, 1859)	+	+	—
<i>Liotina</i> sp. 2	<i>Liotina loculosa</i> (Gould, 1859)	—	+	
<i>Ancistrobasis</i> sp.	?			
<i>Calliobasis</i> sp.	?			
<i>Trogloncha</i> sp.	<i>Trogloncha lammelinodosa</i> Geiger, 2012	—	—	+
<i>Haliotis</i> sp.	<i>Haliotis varia</i> 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

Hiloea variabilis (Pease, 1861) ベニバヤ (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. *Hiloea 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); [35–178m].

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) ベニツブサンシヨウ (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*); [35–160m].

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ヨウスガイ (新称) (Fig. 2P–S)

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

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; [156–160m].

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-

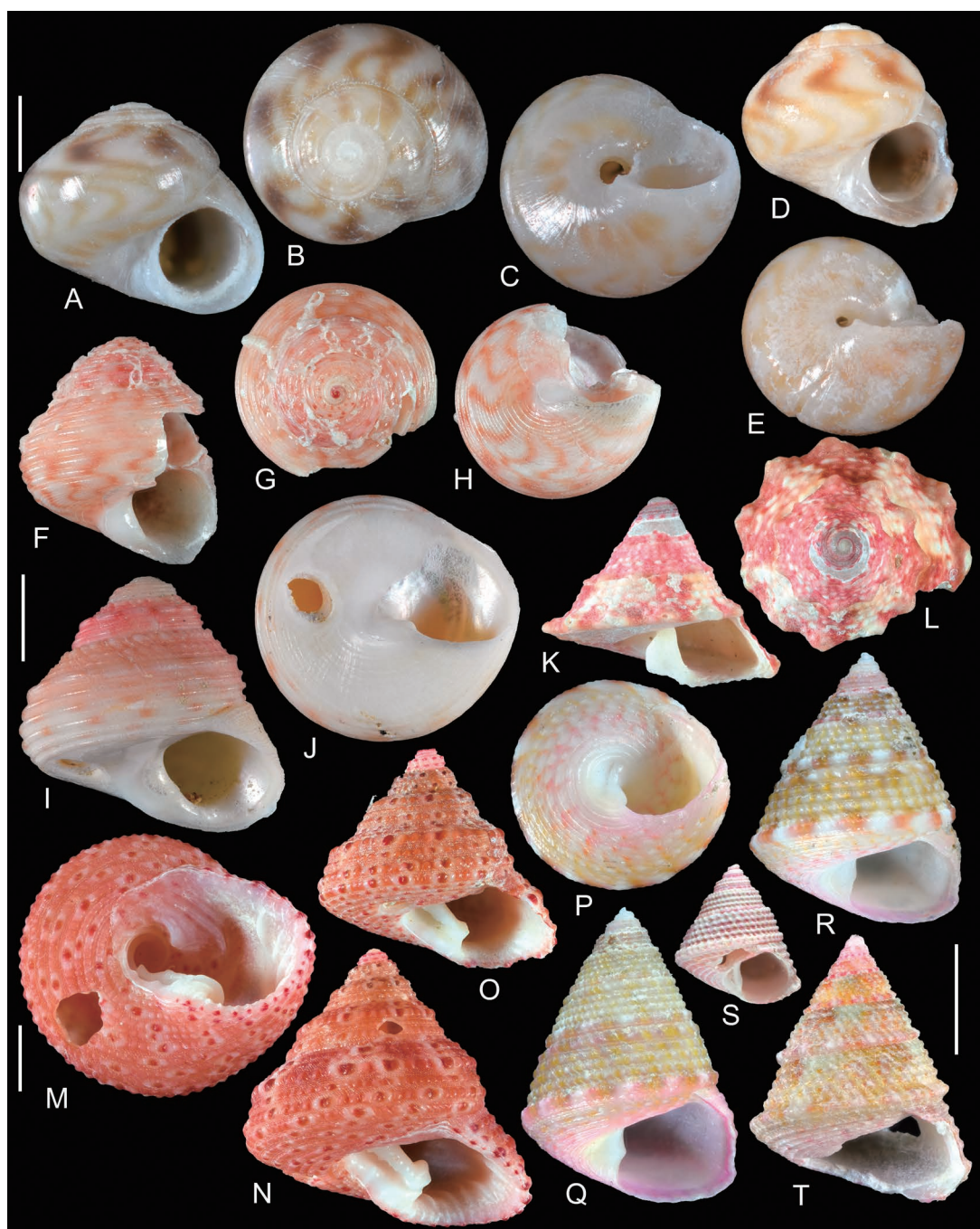


Fig. 3. A–E. *Homalopoma* sp. 1; A–C, off Amami-oshima Island, 288–311 m, TY-01-7; D–E, KY-14-03. F–H. *Homalopoma* sp. 2; KY-17-05. I–J. *Homalopoma hui*; off Amami-oshima Island, ca. 480 m, DY-02-03. K–L. *Trochus rota*; KY-14-11. M–O. *Clanculus* sp.; M–N, KY-10-06; O, KY-16-33. P–T. *Jujubinus* sp.; 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 repre-

sents 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-canalliculate suture, more angulate periphery and wider umbilicus.

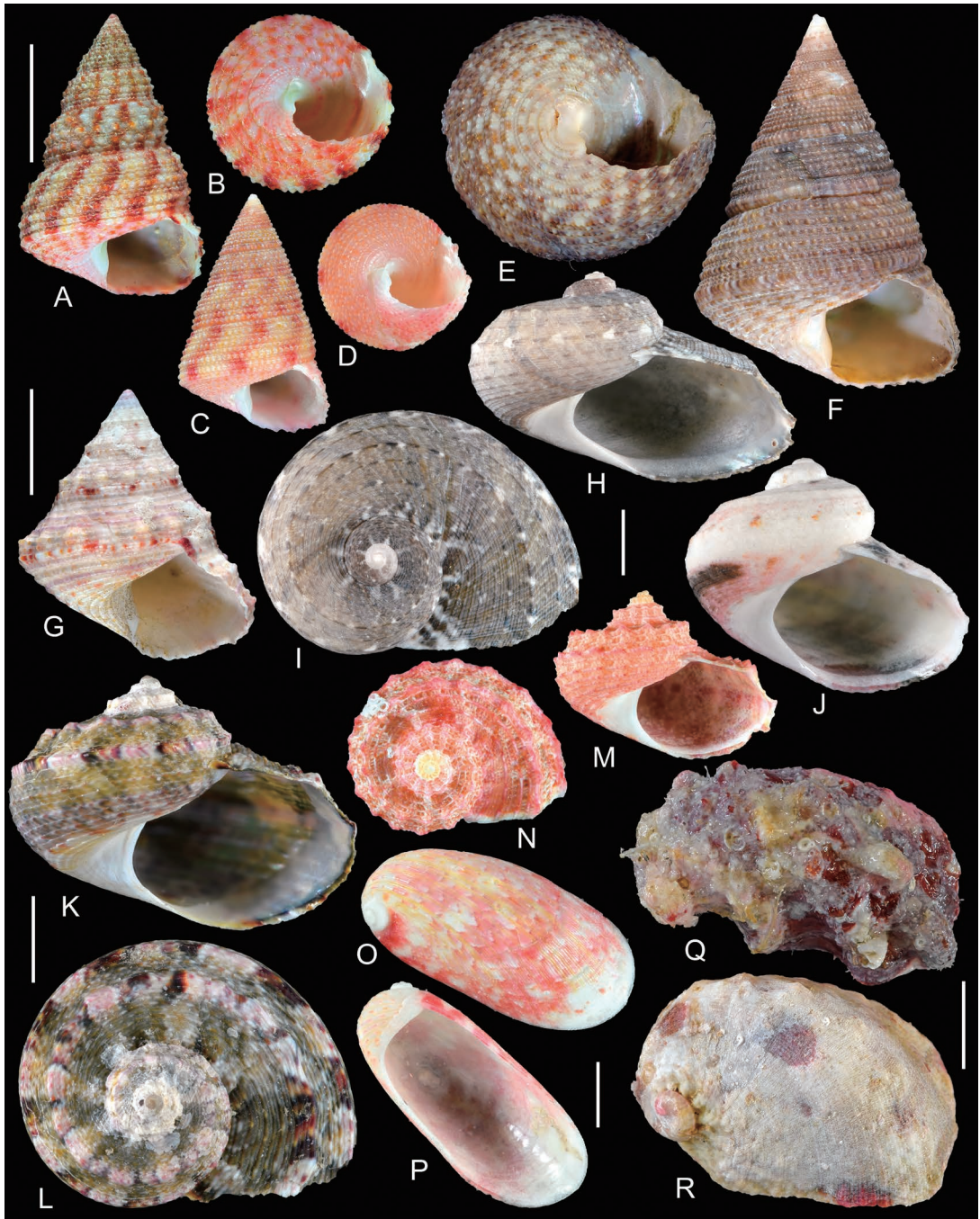


Fig. 4. A–D. *Kanekotrochus boninensis*; A–B, holotype; C–D, KY-09-27. E–F. *Kanekotrochus infuscatus*; off Isshiki, Aichi Prefecture, Sakurai Coll. G. *Tosatirochus attenuatus*; KY-08-17. H–J. *Stomatolina* sp.; H–I, KY-14-11; J, KY-08-17. K–L. *Stomatolina rubra*; Tsuji-jima Island, Amakusa, Kumamoto Prefecture. M–N. *Stomatolina angulata*; Ky-17-33. O–P. *Stomatella lintracula*; 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. hubrechtii*, 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.

Tosatirochus 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. lintrricula*" 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 gravaida*; 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.

ナゴシヨグルマ

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

Material examined: KY-10-18 (26 + 4 fr), 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. grandidi*, 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 appar-

ently 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. 6G–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

***Astraliium 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 *Astraliium roseobasis* Kreipl & Dekker, 2003, which was recently described from the Philippines but subsequently regarded as a synonym of *Astraliium 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 tamikoe* (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 tamikona*; 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 (Galeoastrea)* 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 lapulapui*; 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. maestratii* 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 maestratii* [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 dredged samples from the Amami

Islands (Fig. 10Q–R, NSMT-Mo 114788).

Vaceuchelus favosus (Melville & Standen, 1896) ツブサンシヨウガイモドキ (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),

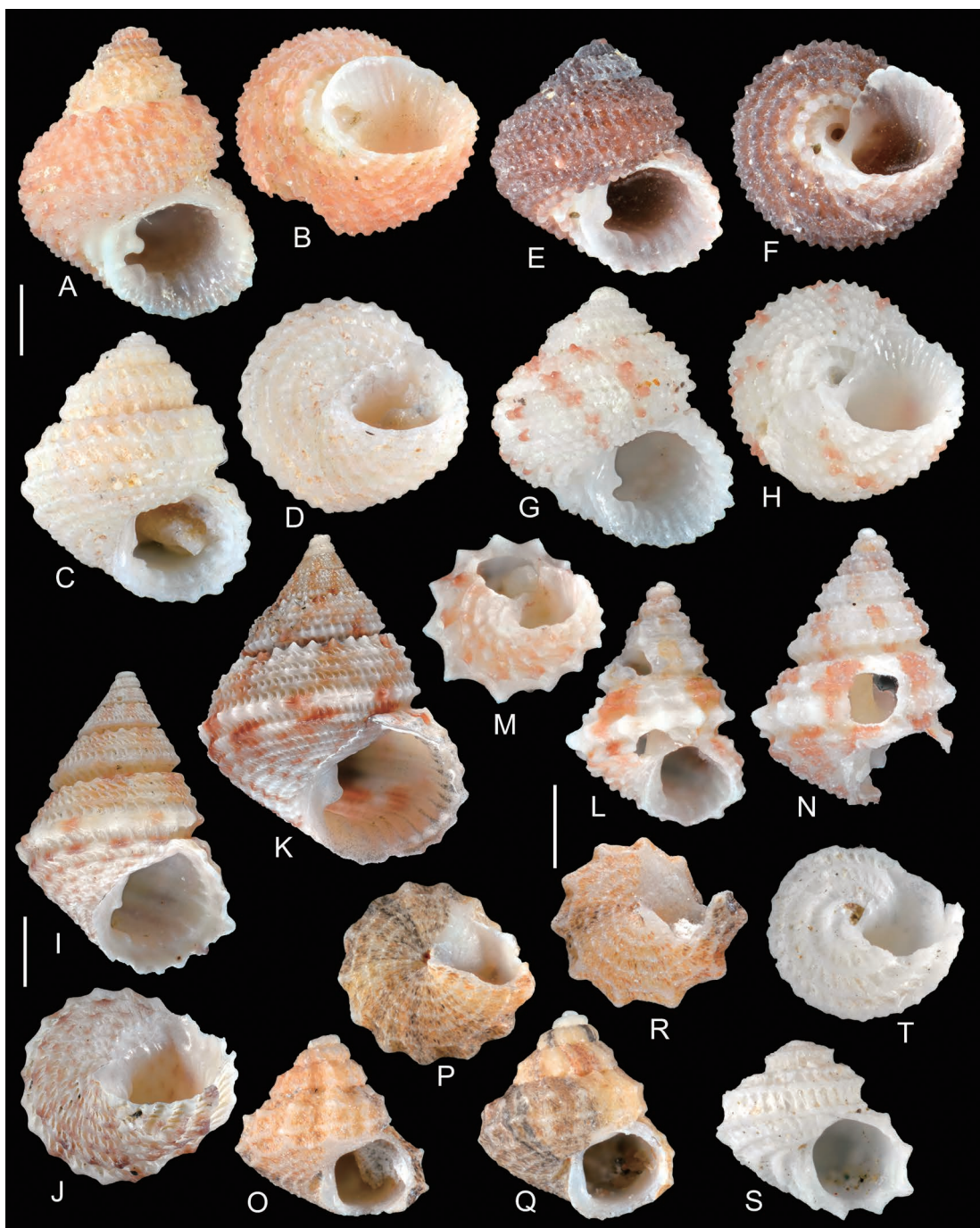


Fig. 10. A–B. *Ascetostoma ringens*; OG-76-10. C–D. *Herpetopoma ludivinia*; KY-17-5. E–H. *Herpetopoma rubrum*; E–F, OG-76-07; G–H, OG-76-11. I–K. *Perrinia concinna*; I–J, KY-14-04; K, off Amami-oshima Island, 118–123 m, DY-04-12. L–N. *Pholidotrope asteroeides*; L–M, KY-10-07; N, off Amami-oshima, 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 ordi-
nary 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 south-
wards 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 Philip-
pines and Fiji.

Family Larocheidae Finlay, 1927

Troглоconcha 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 *Troглоconcha* Kase & Kano, 2002, this
most closely resembles *T. lammelinodosa* Geiger,
2012 but is clearly distinguished by its high-
spired shell and coarser sculpture. No compara-
ble 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 pres-
ent.

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 com-
mon under boulders or rocks. This species is sim-
ilar to *H. varia* Linnaeus, 1758 and *H. ovina*
Gmelin, 1791, which are widely distributed in
the tropical Indo-West Pacific, but was morpho-
logically 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].

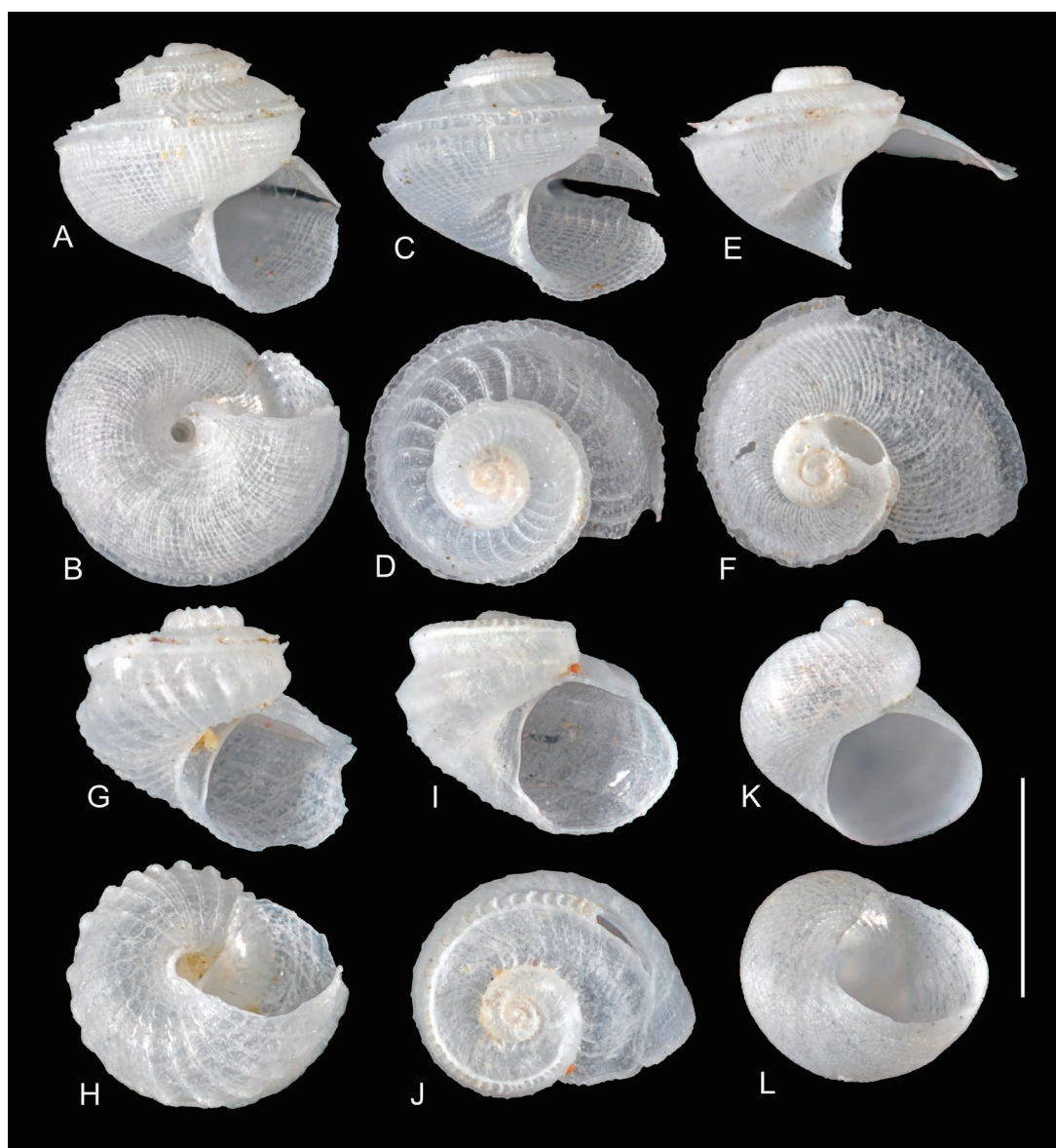


Fig. 11. A–B. *Anatoma equatoria*; KY-10-17. C–D. *Anatoma indonesica*; KY-09-15. E–F. *Anatoma japonica*; KY-10-18. G–H. *Scissurella evaensis*; KY-10-07. I–J. *Sukashitrochus carinatus*; KY-10-07. K–L. *Troglodonta lamellinodosa*; KY-10-17. Scales: 1 mm (all at the same scale).

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); [87–166m].

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. 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 recorded 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 laeviscostata (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. *Laevimarginula 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 + 10¹); 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); [47–202m].

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; [89–109m].

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

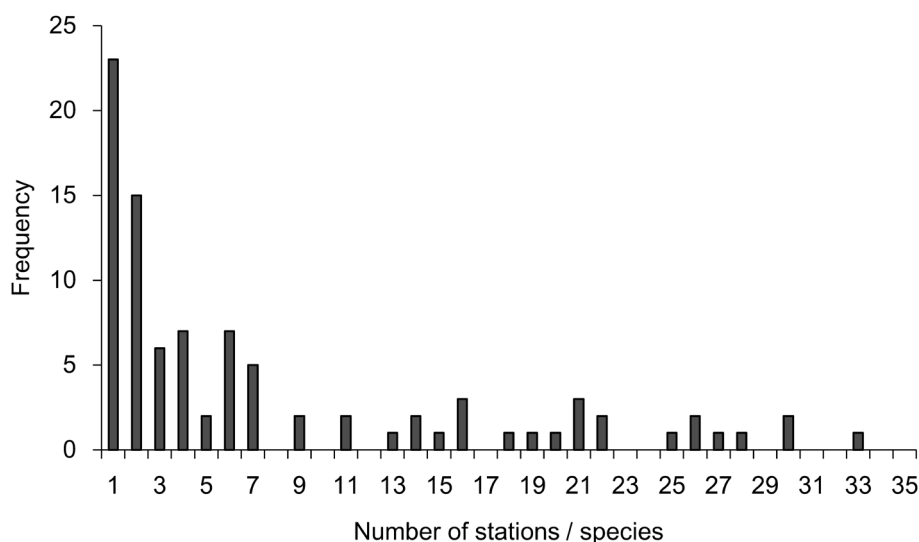


Fig. 15. Relationship between frequency and number of stations for each species. Species occurring at only one station counted 23, representing 25% of the total.

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 0–100m, seven in a range of 100–200m, and nine deeper than 200m (corresponding to the bathyal zone). Nearly 90% of the species that occurred at depths less than 200m 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 grandidiata*, *Pseudominolia tramieri*, *Calliostoma takujii*, *Astrarium provisorium*, *Herpetopoma ludivinae* 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 3–218m) and around the Miura Peninsula (Hasegawa, 2006: 55 dredge stations in addition to 56 gill net sites, in a depth range of 12–730m). 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.
<i>Bolma</i> sp.	33	98–348	Y
<i>Ethminolia</i> sp.	30	36–151	Y
<i>Monilea belcheri</i> (Philippi, 1849)	30	36–147	
<i>Astraliium provisorium</i> Schepman, 1908	28	35–171	
<i>Emarginula maculata</i> A. Adams, 1863	27	36–160	
<i>Rossiteria nucleus</i> (Philippi, 1849)	26	36–113	
<i>Diodora</i> sp.	26	45–138	
<i>Liotina montamarina</i> Okutani, 2001	25	36–137	Y
<i>Bolma tamikoana</i> (Shikama, 1973)	22	102–385	
<i>Liotina</i> sp. 1	22	52–385	
<i>Kanekotrochus boninensis</i> (Okutani, 2001)	21	48–171	Y
<i>Sericominolia vernicosa</i> (Gould, 1861)	21	36–107	
<i>Emarginula</i> sp. 1	21	47–202	

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

Sources	Area	Depth (m)	No. of stations
<i>Ethminolia nektonica</i>			
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 <i>et al.</i> (2001)	Shimoda, Izu Peninsula	83–98	1
Hasegawa (2001)	Tosa Bay	100–125	7
Hasegawa (2005)	Nansei Islands	290–340	4
<i>Ethminolia</i> 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., *Astraliium 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 Montorio (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

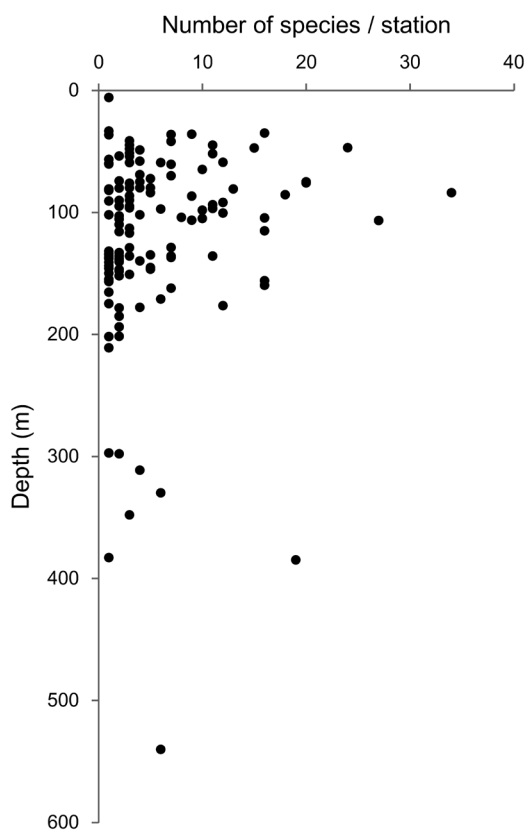


Fig. 16. Relationship between the number of species occurring at each station and depth. Each plot represents the number of species occurring at a station (vertical axis) in relation to the depth (horizontal axis).

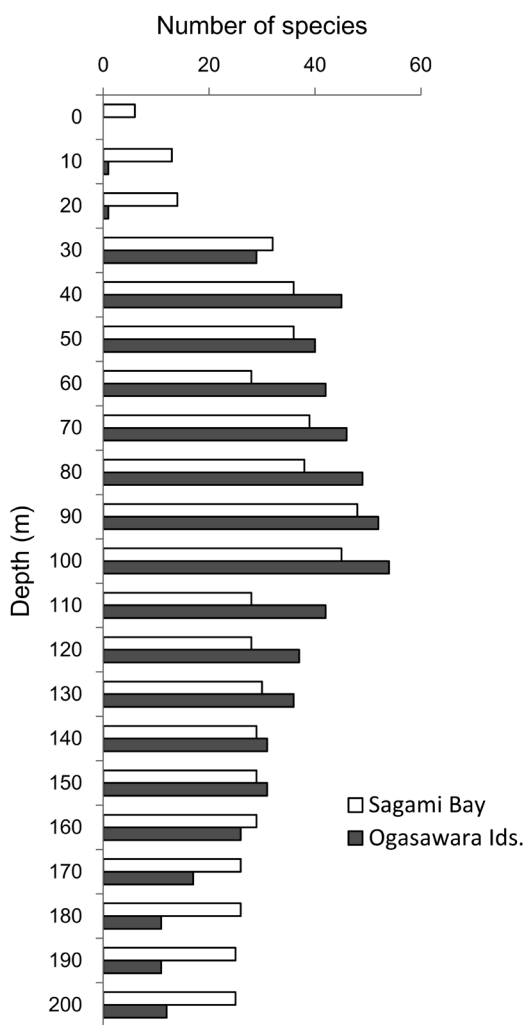


Fig. 17. Comparison of the numbers of vetigastropod species possibly occurring within every 10m from 0 to 200m depth in Sagami Bay and around the Ogasawara Islands. In calculating the number of species, each is considered to occur throughout its depth range, between the shallowest and the deepest records.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

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

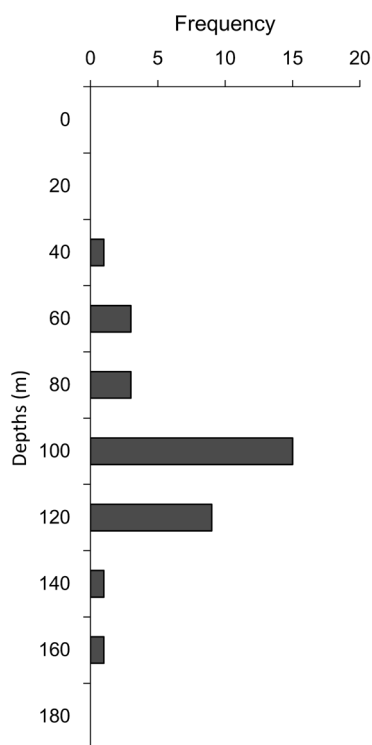


Fig. 18. Vertical distribution of *Ethminolia* sp. around the Ogasawara Islands. Number of positive stations at each 20m depth increment.

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 50–150m (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. nektionica*, 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. nektionica* 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.

Acknowledgments

I wish to express my sincere thanks to the captains and the crews of the research vessel *Koyo* of the Tokyo Metropolitan Fisheries Experimental Station (TMFES) during the years 2008–2017, which played the most important role in the field sampling, for their cooperation. Thanks are also due to Drs. Yuhei Tanaka and Kotaro Seno (TMFES) for arranging cruises and facili-

tating the samplings; the captain and the crew of the T/V *Toyoshio-maru* of Hiroshima University for their cooperation in obtaining additional material from the Nansei Islands; Mr. Jeroen Goud (Naturalis, Leiden) for facilitating the examination of Schepman's type material; Mr. Paul Callomon (Academy of Natural Sciences of Drexel University, Philadelphia) for valuable comments on the manuscript and linguistic corrections; Dr. Yoshimi Kubota (NSMT) for her help in preparing Fig. 1A. This work is a contribution from the projects "Comprehensive Studies of Fauna and Flora of Biodiversity Hotspots" and partly "Geological, biological, and anthropological histories in relation to the Kuroshio Current" of the National Museum of Nature and Science.

References

- Albano, P. G., P. A. J. Bakker, R. Janssen and A. Echner, 2017. An illustrated catalogue of Rudolf Sturany's type specimens in the Naturhistorisches Wien, Austria (NHMW): Red Sea gastropods. *Zoosystematics and Evolution*, **93**: 45–94.
- Adams, A., 1854. Monograph of Stomatellinae, a subfamily of Trochidae. In: Sowerby, G. B. (ed.), *Thesaurus Conchylorum, or Figures and Description of Shells*, **2** (part 15): 827–746, pls. 173–175.
- Adams, A., 1863. Description of a new genus and twelve new species of Mollusca. *Proceedings of the Zoological Society of London*, **1863**: 428–435.
- Asakura, A. and S. Nishihama, 1987. Studies on the biology and ecology of the intertidal animals of Chichijima Island in the Ogasawara (Bonin) Islands III: Description, form and habitat of the trochid snail, *Monodonta perplexa boninensis* n. subsp. in comparison with those in *Monodonta perplexa perplexa* (Pilsbry). *Venus, the Japanese Journal of Malacology*, **46**: 194–201.
- Asakura, A., S. Nishihama S. and Y. Kondo, 1993. Studies on the biology and ecology of the intertidal animals of Chichijima Island in the Ogasawara (Bonin) Islands. I. List of collected species with comments on some species. *Atoll Research Bulletin*, (383): 1–17.
- Bouchet, P., 2015. *Astrarium provisorium*. In: MolluscaBase. World Register of Marine Species at <http://www.marinespecies.org/aphia.php?p=taxdetails&id=581752> accessed on 2017-11-22.
- Bouchet, P., 2017. *Kanekotrochus* Habe, 1958. In: MolluscaBase (2017). World Register of Marine Species at <http://www.marinespecies.org/aphia.php?p=taxdetails>

- &id=456440 accessed on 2017-71-22.
- Cotton, B. C., 1930. A new species of the genus *Emarginula* from the Capricorn Group. *Records of the South Australian Museum*, 1: 241.
- Dall, W. H., 1925. Illustrations of unfigured types of shells in the collection of the United States National Museum. *Proceeding of the U.S. National Museum*, 66 (2554): 1–41, pls. 1–36.
- Ekawa, K. and Y. Arima, 2014. Shells dredged from Miyakozaki of Amami-oshima, Kagoshima Prefecture, southern Japan. *Kyushu-no-Kai [Shell of Kyushu]*, (82): 10–23. (In Japanese)
- Fukuda, H., 1993. Marine Gastropoda (Mollusca) of the Ogasawara (Bonin) Islands. Part 1: Archaeogastropoda and Neotaenioglossa. *Ogasawara Research, Tokyo Metropolitan University*, (19): 1–85.
- Fukuda, H., 1994. Marine Gastropoda (Mollusca) of the Ogasawara (Bonin) Islands. Part 1: Neogastropoda, Heterobranchia and fossil species, with faunal accounts. *Ogasawara Research, Tokyo Metropolitan University*, (20): 1–126.
- Fukuda, H., 1995. Marine Gastropoda (Mollusca) of the Ogasawara (Bonin) Islands. Part 3: Additional records. *Ogasawara Research, Tokyo Metropolitan University*, (21): 1–142.
- Geiger, D. L., 2012. Monograph of the Little Slit Shell. Volume 1. Introduction/ Scissurellidae. 728 pp. *Santa Barbara Museum of Natural History Monographs*, No.7. Santa Barbara Museum of Natural History.
- Habe, T., 1977. Catalogue of Molluscan Taxa Described by Tadashi Habe during 1939–1975, with Illustrations of Hitherto Unfigured Species. 185 pp. *Okinawebisu-no-kai*, Kashiwa.
- Hasegawa, K., 2001. Deep-sea gastropods of Tosa Bay, Japan, Collected by the R/V *Kotaka-Maru* and *Tansei-Maru* during the Years 1997–2000. *National Science Museum Monographs*, (20): 121–165.
- Hasegawa, K., 2005. A preliminary list of deep-sea gastropods collected from the Nansei Islands, southwestern Japan. *National Science Museum Monographs*, (29): 137–190.
- Hasegawa, K., 2006. Sublittoral and bathyal shell-bearing gastropods chiefly collected by the T/V *Rinkai-Maru* of the University of Tokyo around the Miura Peninsula, Sagami Bay, 2001–2004. *Memoirs of the National Science Museum*, (40): 225–281.
- Hasegawa, K., 2015. Re-identification of “*Anatoma lamellate*” in Japanese literature (Gastropoda: Anatomidae). *Chiribotan, Newsletter of the Malacological Society of Japan*, 45: 127–134. (In Japanese with English summary)
- Hasegawa, K., R. Ueshima and S. Hori, 2001. A preliminary list of sublittoral shell-bearing gastropods in the vicinity of Shimoda Bay, Izu Peninsula, central Honshu, Japan. *Memoirs of the National Science Museum*, (37): 203–228.
- Herbert, D. G., 1987. Taxonomic studies on the Emarginulinae (Mollusca: Gastropoda: Fissurellidae) of southern Africa and Mozambique. *Hemitoma, Clypidina, Tugali, Scutus, Zeidora* and two species of *Emarginula*. *South African Journal of Zoology*, 22: 1–13.
- Herbert, D. G., 2015. An annotated catalogue and bibliography of the taxonomy, synonymy and distribution of the Recent Vetigastropoda of South Africa (Mollusca). *Zootaxa*, 4049: 1–98.
- Higo, S., P. Callomon. and Y. Goto, 1999. Catalogue and Bibliography of the Marine Shell-bearing Mollusca of Japan. 749 pp. Elle Scientific Publications, Yao, Osaka.
- Huang, S.-I., I.-F. Fu and G. T. Poppe, 2016. Taiwanese and Philippine Colloniidae. Nomenclatural remarks and the description of 17 new species (Gastropoda: Colloniidae). *Visaya*, 4 (5): 4–42.
- Ikeda, H. and T. Kuramochi, 2010. A Catalogue of Mollusks of Sagami Bay. 100 pp. Hayama Shiosai Museum, Kanagawa. (In Japanese)
- Imajima, M., 1977. Serpulidae (Annelida, Polychaeta) collected around Chichi-jima (Ogasawara Islands). *Memoir of the National Science Museum*, (10): 89–111.
- Kay, A., 1984. Patterns of speciation in the Indo-West Pacific. In: Raven, P., F. Radovsky and S. H. Sohmer (eds.), *Biogeography of the Tropical Pacific, Proceedings of a Symposium*. pp. 15–31. Association of Systematics Collections and B. P. Bishop Museum.
- Kosuge, S., 1983. Descriptions of two new species of the genus *Bolma* from Philippines with a list of hitherto known species (Gastropoda Turbinacea). *Bulletin of the Institute of Malacology Tokyo*, 1: 129–132, pls. 44–45.
- Kosuge, S., 1986. Descriptions of two new archaeogastropods from the sea around Ogasawara (Bonin) Islands collected by precious coral fishing boat. *Bulletin of the Institute of Malacology Tokyo*, 2: 61–62, pl. 24.
- Kuroda, T., 1960. A Catalogue of Molluscan Fauna of the Okinawa Islands. iv + 106 pp. 3 pls. University of Ryukyus, Naha.
- Kuroda, T., T. Habe and K. Oyama, 1971. The Sea Shells of Sagami Bay. Collected by His Majesty the Emperor of Japan. xix + 741 [Japanese part] + 489 pp. [English part] + 51 [index] pp., 121 pls. Maruzen Co. Ltd., Tokyo.
- Kurozumi, T. and A. Asakura, 1994. Marine molluscs from the Northern Mariana Islands, Micronesia. *Natural History Research, Special Issue*, (1): 121–168.
- Namikawa, H., K. Yamaguchi, Y. Horii and Y. Tanaka, 2011. Outline of dredge surveys conducted from 2007 to 2010 by R/V *Takunan* and *Koyo* to elucidate the benthic marine invertebrate fauna of the area encompassing the Izu and Ogasawara Islands. *Memoir of the National Museum of Nature and Science*, (47): 1–9.
- Nakano, T., K. Takahashi and T. Ozawa, 2007. Description of an endangered new species of *Lunella* (Gastrop-

- oda, Turbinidae) from Ogasawara Islands, Japan. *Venus*, **66**: 1–10.
- Nishimura, K., 1999. Distribution of molluscan sea shells in the Izu-Ogasawara Islands and adjacent waters (the Tokyo Metropolitan Sea Area). *Report of the Tokyo Metropolitan Fisheries Experiment Station*, (211): 1–124, index 1–15 (In Japanese with English abstract).
- Nishimura, S. 1992. "Animal distribution in Japanese waters." In: Nishimura, S. (ed.), *Guide to Seashore Animals of Japan with Color Pictures and Keys*, Vol. I. pp. xi–xix. Hoikusha, Osaka. (in Japanese)
- Okutani, T., 1961. Description of *Solariella nektonica*, sp. nov. with special reference to its swimming behavior. *Venus, the Japanese Journal of Malacology*, **21**: 304–308.
- Okutani, T., 1972. Molluscan fauna on the submarine banks Zenisu, Hyotansei, and Takase, near the Izu-Shichito Islands. *Bulletin of Tokai Regional Fisheries Research Laboratory*, (72): 63–142, pls. 1–2.
- Okutani, T., 1975. Glimpse of benthic molluscan fauna occupying the submarine bank, Kurose, near Hachijojima Island, Japan. *Venus, the Japanese Journal of Malacology*, **33**: 185–205.
- Okutani, T., 2001. Six new bathyal and shelf trochoidean species in Japan. *Venus*, **60**: 121–127.
- Okutani, T. (ed.), 2017. *Marine Mollusks of Japan. The Second Edition*. 1375 pp. (in 2 volumes). Tokai University Press, Hiratsuka.
- Okutani, T. and H. Saito, 2011. A glimpse of shelf bivalve fauna of the Ogasawara Islands based on dredged samples by the R/Vs *Koyo* and *Tansei Maru* in the years 2008 through 2010. *Memoirs of the National Science Museum*, (47): 83–96.
- Okutani, T. and K. Sakurai, 1968. A new subspecies of *Solariella* from Japan Sea. *Venus, the Japanese Journal of Malacology*, **26**: 71–73.
- Poppe, G. T. (ed.), 2008. *Philippine Marine Mollusks. Volume I (Gastropoda—Part I)*. 759 pp. ConchBooks, Hackenheim.
- Poppe, G. T., S. P. Tagaro, and H. Dekker, 2006. The Seguenziidae, Chilodontidae, Trochidae, Calliostomatidae and Solariellidae of the Philippine islands. *Visaya, Supplement*, (2): 1–228.
- Poppe, G. T., S. P. Tagaro and P. Stahlschmidt, 2015. New shelled molluscan species from the Central Philippines I. *Visaya*, **4** (3): 15–59.
- Poppe, G. T., P. Poppe and S. P. Tagaro, 2014. 1000 Shells. Exceptionals from the Philippines. Volume I. 450 pp. ConchBooks, Hackenheim.
- Robertson, R., 1985. Archaeogastropod biology and the systematics of the genus *Tricolia* (Trochacea: Tricolidae) in the Indo-West Pacific. *Monographs of Marine Mollusca*, **3**: 1–103.
- Sakurai, K., 1994. Eight new species of trochid genera, *Tristichotrochus*, *Kombologion* and *Otukaia* (Calliostomatina) from Japan and adjacent waters. *Venus, the Japanese Journal of Malacology*, **53**: 287–296.
- Schepman, M. M., 1908. The Prosobranchia of the Siboga Expedition—Part II. Taenioglossa and Ptenoglossa. *Siboga-Expeditie Monographie*, **49** (1b): 109–231, pls. 10–16.
- Seno, and K. Matsuura, 2007. Fishes in Sagami Bay and the Kuroshio Current—Belt Conveyor or Barrier?—In: Fujita, T. and H. Namikawa (eds.), *Fauna Sagamiana*, pp. 121–133. Tokai University Press, Hadano. (In Japanese)
- Severns, M. (ed.), 2011. *Shells of the Hawaiian Islands. The Sea Shells*. 564 pp. ConchBook, Hackenheim.
- Shinohara, G., K. Hasegawa, A. Go, K. Nakaguchi, H. Horikawa and M. Takeda. 2005. An outline of "Research on Deep-Sea Fauna and Pollutants in Nansei Islands, 2001–2004." *National Science Museum Monographs*, (29): 1–15.
- Tenorio, M. J. and A. J. A. Monteiro, 2008. A conchological Iconography. The Family Conidae: The South African Species of *Conus*. 107 pp., 60 pls. ConchBooks, Hackenheim.
- Tsuchida, E. and K. Kitao, 1987. Studies on the molluscan fauna around Shionomisaki, southern tip of the Kii Peninsula, Pacific coast of Japan—III. On the systematic position of the "*Solariella*" *nektonica* Okutani. *Venus, the Japanese Journal of Malacology*, **45**: 258–263.
- Yamashita, K., 1994. A schnokeling report in Chichi-jima. *Hitachiobi, the Reports of the Tokyo Malacological Society*, (65): 6–22. (In Japanese)
- Vermeij, G. J., E. A. Kay and L. G. Eldredge, 1983. Molluscs of the Northern Mariana Islands, with special reference to the selectivity of oceanic dispersal barriers. *Micronesia*, **19**: 27–55.
- Vilvens, C., 2009. New species and new records of Solariellidae (Gastropoda: Trochoidea) from Indonesia and Taiwan. *Novapex*, **10**: 69–96.
- Vilvens, C., 2017. New species and new records of Chilodontidae (Gastropoda: Vetigastropoda: Seguenzioidea) from the Pacific Ocean. *Novapex, (Hors Serie II)*: 1–67.

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。