

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

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Abstract. The bivalve fauna on insular shelf of Ogasawara (Bonin) Islands was investigated on the basis of specimens dredged by the R/Vs *Koyo* and *Tansei Maru* during the years 2008 to 2010 at 44 stations between depths of about 40 m and 250 m around Ogasawara Islands. In total, 70 species (37 Pteriomorpha, 31 Heterodonta and 2 Anomalodesmata) were identified including those solved only to the generic level. The constituents of the present material represent a common hard- and rough-bottom fauna of tropical to warm-temperate zones, but show a faunal attenuation by lacking many shelf elements common in insular shelf fauna occupying Izu Islands.

Key words: Bivalves, shelf, dredge, Ogasawara Islands, faunal attenuation.

Introduction

Since the Ogasawara (Bonin) Islands are remote oceanic islands, diverse endemic animals and plants have been recorded. Among mollusks, some 37 species of terrestrial snails including 11 species of the Helicinidae and 14 of the Endodontidae are endemic (Ministry of Environment, 1991). Some intertidal snails are also regarded as endemic to these islands as well, such as, *Cellana mazatlandica*, *Nipponacmea boninensis* and *Lunella ogsawaraensis* among others, there may be more endemic mollusks in marine habitat around the Ogasawara Islands.

In spite of the fact that the intertidal and subtidal molluscan fauna of the Ogasawara Islands have been frequently investigated (e.g., Matsumoto *et al.*, 1970; Fukuda, 1993, 1994, 1995; Nishimura, 1999), the faunae of the shelf and greater depths have seldom been explored. This paper deals with bivalves which were sorted out from biological samples collected with a bottom dredge by the R/V *Koyo* of the Ogasawara Fisheries Center and the R/V *Tansei Maru* of the Ja-

pan Agency for Marine-Earth Science and Technology, to take a glance at bivalve fauna of insular shelf of Ogasawara Islands. This study was carried out under the research project “Studies on the origin of biodiversity in the Sagami Bay – Fossa Magna element and the Izu-Ogasawara (Bonin) Arc” conducted by the National Museum of Nature and Science, Tokyo.

Materials and Methods

Format: -The “Results” section lists the species, which are represented by live-taken specimens, and those obtained by only dead empty shells are not included herein. Under the entry of ‘Material examined’ forerunning scientific name and Japanese name (Jn.) includes KY station number prefixed by year (e.g. KY08-, KY09- and KY10-) and number of specimens with range of shell length (both in parentheses).

Localities: -The positions, depth, and date of collection for 44 positive stations for the R/Vs *Koyo* (2008, 2009 and 2010) and *Tansei Maru* (TW for KT-09-2) are shown in Table 1 and Fig. 1.

Table 1. Collecting data of positive stations for bivalve specimens under study.

Stn. No.	Gear	Date	Position in		Position out		Depth (m)
			Latitude	Longitude	Latitude	Longitude	
KY08-02	BD	24 Oct. 2008	27°07.881'N	142°06.670'E	27°08.038'N	142°06.799'E	151–153
KY08-03	BD	24 Oct. 2008	27°07.446'N	142°06.382'E	27°07.855'N	142°06.902'E	154–152
KY08-04	BD	24 Oct. 2008	27°03.599'N	142°04.218'E	27°03.783'N	142°03.848'E	211–214
KY08-05	RD	24 Oct. 2008	27°04.491'N	142°06.780'E	27°04.546'N	142°07.027'E	128–117
KY08-06	RD	24 Oct. 2008	27°04.644'N	142°08.518'E	27°04.691'N	142°08.683'E	88–88
KY08-15	RD	28 Oct. 2008	27°04.548'N	142°09.156'E	27°04.729'N	142°09.314'E	83–81
KY08-17	BD	29 Oct. 2008	27°05.022'N	142°15.217'E	27°04.856'N	142°15.212'E	70–69
KY08-18	BD	29 Oct. 2008	27°05.014'N	142°14.894'E	27°04.881'N	142°14.865'E	49–48
KY08-19	BD	29 Oct. 2008	27°06.073'N	142°18.563'E	27°06.062'N	142°18.756'E	175–176
KY08-20	BD	29 Oct. 2008	27°04.233'N	142°15.185'E	27°04.216'N	142°15.058'E	54–52
KY08-21	BD	29 Oct. 2008	27°03.840'N	142°15.436'E	27°03.703'N	142°15.228'E	95–98
KY08-22	BD	30 Oct. 2008	27°10.647'N	142°07.271'E	27°10.711'N	142°07.374'E	150–151
KY08-23	BD	30 Oct. 2008	27°12.043'N	142°04.283'E	27°12.172'N	142°04.286'E	202–199
KY08-24	BD	30 Oct. 2008	27°09.758'N	142°07.375'E	27°09.523'N	142°07.360'E	158–156
KY08-25	BD	30 Oct. 2008	27°07.308'N	142°07.700'E	27°07.032'N	142°07.635'E	129–127
KY08-26	BD	30 Oct. 2008	27°04.840'N	142°08.934'E	27°04.980'N	142°09.151'E	84–87
KY09-07	BD	10 July 2009	27°01.723'N	142°07.389'E	27°01.928'N	142°07.280'E	138–136
KY09-08	BD	13 July 2009	26°45.202'N	142°06.444'E	26°45.382'N	142°06.553'E	98–102
KY09-09	BD	13 July 2009	26°45.644'N	142°05.754'E	26°45.874'N	142°05.878'E	102–118
KY09-12	BD	13 July 2009	26°42.240'N	142°05.795'E	26°42.303'N	142°05.793'E	97–103
KY09-14	BD	14 July 2009	26°34.027'N	142°10.803'E	26°34.036'N	142°10.811'E	92–93
KY09-20	BD	15 July 2009	27°13.129'N	142°09.136'E	27°13.150'N	142°09.139'E	136–135
KY09-21	BD	15 July 2009	27°13.085'N	142°09.190'E	27°13.190'N	142°09.226'E	139–136
KY09-26	BD	15 July 2009	27°14.358'N	142°16.035'E	27°14.630'N	142°15.777'E	251–230
KY09-27	BD	15 July 2009	27°06.292'N	142°13.877'E	27°06.284'N	142°14.012'E	81–83
KY09-28	BD	15 July 2009	27°07.049'N	142°10.683'E	27°07.017'N	142°10.687'E	52–52
KY09-29	BD	16 July 2009	27°06.585'N	142°10.247'E	27°06.579'N	142°10.211'E	61–60
KY09-30	BD	16 July 2009	27°07.220'N	142°10.603'E	27°07.280'N	142°10.578'E	52–50
KY10-02	BD	5 July 2010	26°41.327'N	142°10.391'E	26°41.441'N	142°10.327'E	115–115
KY10-03	BD	5 July 2010	26°45.323'N	142°05.986'E	26°45.297'N	142°06.282'E	106–92
KY10-04	BD	5 July 2010	26°45.068'N	142°05.877'E	26°45.054'N	142°06.202'E	101–98
KY10-09	BD	6 July 2010	26°35.058'N	142°14.961'E	26°34.981'N	142°14.901'E	104–82
KY10-11	BD	6 July 2010	26°38.989'N	142°11.822'E	26°38.950'N	142°11.956'E	93–83
KY10-19	LRD	7 July 2010	27°04.830'N	142°08.919'E	27°04.746'N	142°09.064'E	88–91
KY10-24	BD	8 July 2010	27°07.251'N	142°10.696'E	27°07.142'N	142°10.732'E	46–51
KY10-25	BD	9 July 2010	27°04.772'N	142°11.674'E	27°04.756'N	142°11.728'E	42–42
KY10-26	BD	9 July 2010	27°04.675'N	142°11.743'E	27°04.683'N	142°11.556'E	35–40
KY10-27	BD	9 July 2010	27°06.646'N	142°10.428'E	27°06.610'N	142°10.290'E	59–60
KY10-31	BD	9 July 2010	27°05.199'N	142°08.498'E	27°05.118'N	142°08.391'E	98–67
TW01-01	BD	19 Mar. 2009	27°01.395'N	142°07.412'E	27°01.360'N	142°07.467'E	145–139
TW01-05	BD	19 Mar. 2009	27°01.440'N	142°06.138'E	27°01.376'N	142°06.179'E	173–188
TW02-02	BD	19 Mar. 2009	27°02.997'N	142°04.997'E	27°02.988'N	142°05.043'E	182–187
TW02-03	BD	19 Mar. 2009	27°03.030'N	142°05.294'E	27°03.000'N	142°05.395'E	166–166
TW02-04	BD	19 Mar. 2009	27°02.942'N	142°07.166'E	27°02.948'N	142°07.251'E	141–152

KY: R/V *Koyo*; TW: R/V *Tansei Maru*; BD: 50 cm Biological Dredge; RD: 50 cm Rock Dredge; LRD: 1 m Rock Dredge

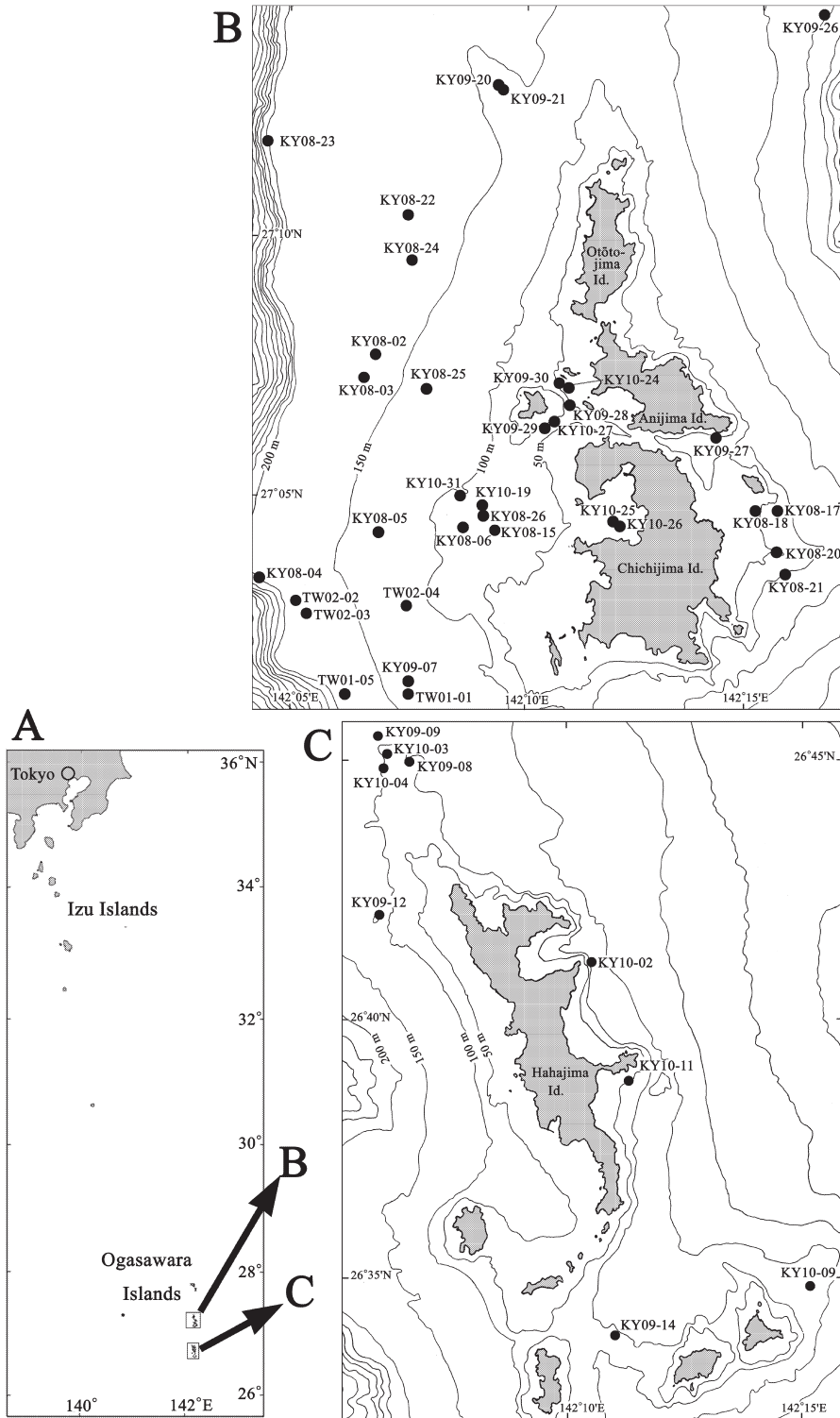


Fig. 1. Surveyed area. A, location of Ogasawara Islands; B-C, positive stations for bivalve mollusks under study around Chichijima Island area (B) and Hahajima Island area (C).



Fig. 2. Pteriomorpha (Arcoida to Limoida). 1, *Arca ventricosa*, KY09-07, SL=19.3 mm; 2, *Acar plicata*, KY09-30, SL=13.4 mm; 3, *Hawaiarca uwaensis*, KY08-21, SL=5.5 mm; 4, *Mimarcaria aizoi*, KY09-30, SL=15.6 mm; 5, *Bentharca xenophorica*, KY08-03, SL=12.0 mm; 6, *Samacar pacifica*, KY09-21, SL=11.7 mm; 7, *Glycymeris (Tucetilla) amamiensis*, KY08-05, SL=7.0 mm; 8, *Septifer rudis*, KY09-21, SL=15.6 mm; 9, *Hormomya mutabilis*, KY09-29, SL=7.2 mm; 10, *Modiolus margaritaceus*, KY09-28, SL=18.5 mm; 11, *Amygdalum pearsei*, KY08-17, SL=13.7 mm; 12, *Amygdalum soyoae*, KY10-31, SL=18.2 mm; 13, *Botula silicula*, KT-09-2, TW-01-1, SL=14.1 mm; 14, *Lithophaga (Labis) erimitica*, KY09-30, SL=14.0 mm; 15, *Pteria loveni*, KY10-09, SL=19.6 mm; 16, *Malleus (Malvufundus) irregularis*, KY09-28, SL=34.0 mm; 17, *Isognomon legumen*, KY09-30, SL=17.1 mm; 18, *Streptopinna saccata*, KY10-27, SL=16.8 mm; 19, *Atrina (Servatrina) penna*, KY09-29, SL=36.5 mm+; 20, *Lima ogasawarenis*, KY08-26, SL=12.9 mm; 21, *Lima kawamurai*, 09-30, SL=13.8 mm; 22, *Lima profunda*, KY09-30, SL=13.8 mm; 23, *Mantellum perfragile*, KY08-26, SL=4.5 mm.

Results: TaxonomyClass **BIVALVIA**Subclass **Pteriomorphia**Order **Arcoida**Family **Arcidae**

Arca ventricosa Lamarck, 1819 [Jn.: Ōtakanoha] (Fig. 2-1)

Material examined. KY09-7 (1: 19.3).

Remarks. A sole specimen in the present material is an immature one, which may represent *A. mauia takii* Hatai, Niino and Kotaka, 1952 (Jn.: Hōrai-washinoha) described from off Hachijo Island.

Acar plicata (Dillwyn, 1817) [Jn.: Koshirogai] (Fig. 2-2)

Materials examined. KY09-29 (1: 14.1); KY09-30 (1: 13.4); KY10-04 (1: 6.8).

Hawaiarca uwaensis (Yokoyama, 1928) [Jn.: Otogino-washinoha] (Fig. 2-3)

Materials examined. KY08-06 (1: 4.6); KY 08-21 (1: 5.5).

Mimarcaria aizoi (Sakurai, 1969) [Jn.: Ryūgū-washinoha] (Fig. 2-4)

Materials examined. KY09-30 (2: 15.6, 17.2); TW-01-01 (1: 4.4).

Bentharca xenophorica (Kuroda, 1930) [Jn.: Kumasaka-yadori-egai] (Fig. 2-5)

Materials examined. KY08-02 (3: 9.2–9.8); KY08-03 (52: 5.4–12.9); KY08-24 (37: 3.6–9.0).

Samacar pacifica (Nomura and Hatai, 1940) [Jn.: Mino-egai] (Fig. 2-6)

Materials examined. KY08-02 (1: 14.0); KY09-7 (3: 5.4–11.7); KY09-9 (1: 8.5); KY09-21 (3: 7.7–11.7); TW-01-01 (2: 5.7–11.0); TW-02-02 (1: 3.5); TW-02-03 (1: 4.4).

Family **Glycymeridiidae**

Glycymeris (Tucetilla) amamiensis Kuroda, 1930

[Jn.: Yasurime-tamaki] (Fig. 2-7)

Material examined. KY08-05 (1: 7.0).

Remarks. This species was ever collected from banks Zenisu and Takase in Izu Islands (Okutani, 1972). However, none of confamilial species, *Tucetona shinkurosensis* Hatai, Niino and Kotaka, 1952, which is a common species from insular shelf and reefs in Izu Islands, occurred in the present materials from Ogasawara region except a single water-worn valve.

Order **Mytiloida**Family **Mytilidae**

Septifer rudis Dall, Bartsch and Rehder, 1938 [Jn.: Ara-hime-igai] (Fig. 2-8)

Materials examined. KY09-20 (166: 7.8–17.9); KY09-21 (76: 7.7–18.6).

Remarks. Two dense patches were scooped.

Hormomya mutabilis (Gould, 1861) [Jn.: Hibarigai-modoki] (Fig. 2-9)

Material examined. KY09-28 (1+1 fractured: 7.2).

Modiolus margaritaceus (Nomura and Hatai, 1940) [Jn.: Mame-hibarigai] (Fig. 2-10)

Materials examined. KY08-15 (1: 7.3); KY08-20 (2: 7.4, 8.9); KY09-8 (1: 8.3); KY 09-28 (14: 4.3–18.3); KY09-29 (2+1 fractured: 6.7–11.2); KY09-30 (1: 15.8); KY10-24 (2: 5.0, 13.2); KY10-26 (1: 17.0).

Amygdalum pearsei Newcomb, 1870 [Jn.: Maboroshi-gai] (Fig. 2-11)

Materials examined. KY08-15 (3: 7.8–16.2); KY08-17 (1: 13.7); KY10-03 (1: 10.7).

Amygdalum soyoae Habe, 1958 [Jn.: Yukizorahotogisu] (Fig. 2-12)

Materials examined. KY09-08 (1: 9.0); KY09-14 (2+1 fractured: 5.3); KY 10-31 (1: 18.2); TW-02-02 (1: 6.4).

Botula silicula (Lamarck, 1819) [Jn.: Nuri-makura] (Fig. 2-13)

Material examined. Tw-01-01 (1: 14.1).

Lithophaga (Labis) erimitica Kuroda and Habe, in Kuroda, Habe and Oyama, 1971 [Jn.: Kakureishimate] (Fig. 2-14)

Material examined. KY09-29 (1: 8.7); KY 09-30 (3: 10.3–14.0).

Order **Pterioida**
Family **Pteriidae**

Pteria loveni (Dunker, 1873) [Jn.: Fukura-suzume] (Fig. 2-15)

Materials examined. KY10-09 (1: 19.6); KY10-19 (1: 13.7).

Family **Malleidae**

Malleus (Malvufundus) irregularis (Joussaume, 1894) [Jn.: Hiryo] (Fig. 2-16)

Materials examined. KY09-7 (1: 9.3); KY09-20 (19: 5.8–16.5); KY09-21 (39: 7.9–18.0); KY09-28 (2+6 youngs: 8.8–18.8); KY09-29 (8 youngs: 5.7–14.3); KY09-30 (1: 13.2); KY10-19 (1: 6.4).

Family **Isognomonidae**

Isognomon legumen (Gmelin, 1791) [Jn.: Shiroaori] (Fig. 2-17)

Materials examined. KY09-29 (1: 17.5); KY09-30 (1: 17.1).

Family **Pinnidae**

Atrina (Servatrina) penna (Reeve, 1858) [Jn.: Hane-tairagi] (Fig. 2-19)

Materials examined. KY09-28 (3 youngs and fractured: 13.7–41.5); KY09-29 (1: 36.5+); KY09-30 (1: 33.5+).

Remarks. Identification of such very young, heavily fractured specimens is tentative. The shells of the present specimens are ornamented by spined radial ridges and light brown stripes. Rosewater (1961) claimed that this is conspecific with *A. pectenata*. However, *A. penna* lives on

coarse sandy shelf in oceanic environment, whereas *A. pectenata* lives in subtidal muddy bottom in embayment environment. Also, hinge line of *A. penna* is convex, contrarily that of *A. pectenata* is concave.

Streptopinna saccata (Linnaeus, 1758) [Jn.: Kagero-gai] (Fig. 2-18)

Material examined. KY10-27 (1: 16.8).

Order **Limoida**
Family **Limidae**

Lima ogasawarenis Habe, 1993 [Jn.: Ogasawaraminogai] (Fig. 2-20)

Materials examined. KY08-26 (1: 12.9); KY09-29 (1: 4.4); KY09-30 (1: 8.7).

Lima kawamurai Masahito and Habe, 1972 [Jn.: Kawamura-yukimino] (Fig. 2-21)

Material examined. KY09-14 (1: 13.8); TW-01-01 (2: 3.9, 4.6).

Lima profunda Masahito, Kuroda and Habe in Kuroda, Habe and Oyama, 1971 [Jn.: Yûbi-minogai] (Fig. 2-22)

Material examined. KY08-26 (1 juv.: 4.5).

Remarks. A sole specimen is very small measuring 3.5 mm SL and 5.8 mm SH, but is characterized in having over 30 spined radial ribs.

Mantellum perfragile Habe and Kosuge, 1966 [Jn.: Kgero-minogai] (Fig. 2-23)

Material examined. KY08-26 (1: 4.5).

Remarks. This species was originally described from Pelileu Island, Palau.

Order **Pectinoida**
Family **Pectinidae**

Chlamys squamata (Gmelin, 1791) [Jn.: Nishiki-gai] (Fig. 3-1)

Materials examined. KY08-26 (1: 13.2); KY09-28 (1: 8.8); KY09-30 (1: 11.0).

Chlamys squamosa (Gmelin, 1791) [Jn.: Ryukyuu-

nadeshiko] (Fig. 3-2)

Materials examined. KY10-24 (1: 7.4); KY10-25 (1: 6.7).

Remarks. The tentative identification was made on the basis of rather small number of primary radial ribs and apparent shagreen sculpture.

Chlamys jousseaumei (Bavay, 1904) [Jn.: Nikiuro-nadeshiko] (Fig. 3-3)

Materials examined. KY09-7 (1: 5.6); KY09-14 (1: 4.5); KY09-28 (9: 4.0–13.5); KY09-30 (3: 9.1–9.7); Tw-02-03 (1: 6.4).

Semipallium tigris (Lamarck, 1819) [Jn.: Nishiki-ōgi] (Fig. 3-4)

Materials examined. KY08-20 (1: 6.8); KY08-26 (2: 14.9, 15.9).

Mimachlamys senatoria (Gmelin, 1791) [Jn.: Hime-hiōgi] (Fig. 3-6)

Materials examined. KY08-15 (3: 3.5–8.0); KY08-25 (1 juvenile: 4.7); KY09-29 (2: 7.0, 8.6).

Cryptopecten nux (Reeve, 1853) [Jn.: Isasa-hiyoku] (Fig. 3-5)

Materials examined. KY10-04 (1: 6.4); KY10-31 (1: 10.7).

Family **Propeamussiidae**

Parvamussium intuscostatum (Yokoyama, 1920) [Jn.: Motori-nishiki] (Fig. 3-7)

Material examined. KY08-04 (1: 7.4).

Family **Spondylidae**

Spondylus candidus Lamarck, 1819 [Jn.: Yasurimengai] (Fig. 3-8)

Materials examined. KY09-28 (2 adults and 4 young: 10.1–36.8); KY09-30 (1: 13.4).

Spondylus occidens (Sowerby, 1903) [Jn.: Ō-nadeshiko] (Fig. 3-9)

Material examined. TW-01-01 (1: 5.9).

Spondylus imperialis Chenu, 1845 [Jn.: Mihikari-

shōjō] (Fig. 3-10)

Material examined. KY09-7 (1: 11.7).

Order **Osteroidea**

Family **Anomiidae**

Anomia chinensis Philippi, 1849 [Jn.: Namimagashiwa] (Fig. 3-11)

Material examined. KY09-30 (1: 15.0).

Family **Plicatulidae**

Plicatula muricata Sowerby, 1873 [Jn.: Mogurano-te] (Fig. 3-12)

Materials examined. KY08-03 (14: 7.7–18.0); KY08-19 (10: 4.8–18.9); KY08-21 (1: 4.7); KY08-22 (1: 6.5); KY08-24 (5: 5.3–20.5); KY08-25 (10: 3.8–7.6); KY09-7 (1: 7.6); KY09-21 (1: 4.9); KY10-31 (1: 8.5); Tw-01-05 (5: 5.1–10.5).

Plicatula australis Lamarck, 1819 [Jn.: Kasurishigaki-modoki] (Fig. 3-13)

Materials examined. KY10-02 (3: 3.9–8.2).

Family **Glyphaeidae**

Hyotissa chemnitzii (Hanley, 1846) [Jn.: Benigaki] (Fig. 3-14)

Materials examined. KY09-28 (3: 4.3–7.8).

Subclass **Heterodonta**

Order **Veneroida**

Family **Lucinidae**

Notomyrtea soyoae Habe, 1951 [Jn.: Watazokotsukigai] (Fig. 4-1)

Material examined. KY08-15 (1: 8.8).

Family **Carditidae**

Cardita leana Dunker, 1860 [Jn.: Tomaya-gai] (Fig. 4-2)

Material examined. KY09-30 (1: 25.7).

Cardita kyushuensis (Okutani, 1963) [Jn.: Nikiuro-tomaya] (Fig. 4-3)

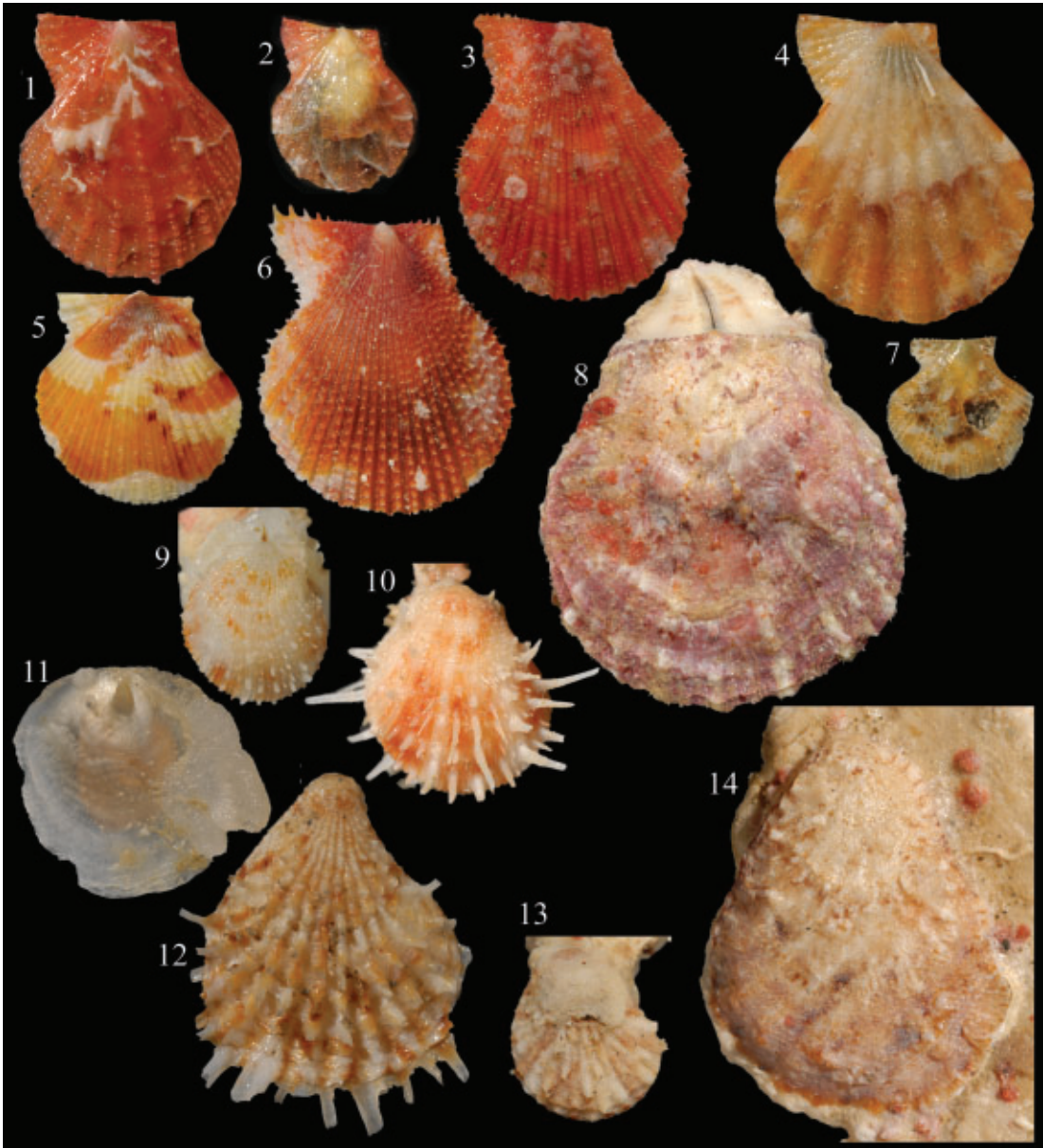


Fig. 3. Pteriomorpha (Pectinoida to Ostreoida). 1, *Chlamys squamata*, KY09-30, SL=11.0 mm; 2, *Chlamys squamosa*, KY10-15, SL=6.7 mm; 3, *Chlamys jousseaumei*, KY09-28, SL=13.5 mm; 4, *Semipallium tigris*, KY08-26, SL=15.9 mm; 5, *Cryptopecten nux*, KY10-31, SL=10.7 mm; 6, *Mimachlamys senatoria*, KY09-29, SL=8.6 mm; 7, *Parvamussium intuscostatum*, KY08-04, SL=7.4 mm; 8, *Spondylus candidus*, KY09-28, SL=36.4 mm; 9, *Spondylus occidentis*, KT-09-2, TW-01-1, SL=5.9 mm; 10, *Spondylus imperialis*, KY09-07, SL=11.7 mm; 11, *Anomia chinensis*, KY08-30, SL=15.0 mm; 12, *Plicatula muricata*, KY08-03, SL=18.0 mm; 13, *Plicatula australis*, KY10-02, SL=8.2 mm; 14, *Hyotissa chemnitzii*, KY09-29, SL=16.0 mm.

Materials examined. KY 09-28 (1: 13.4); TW-02-03 (1: 20.1).

Family **Chamidae**

Chama japonica Lamarck, 1819 [Jn.: Kikuzaru] (Fig. 4-4)

Materials examined. KY09-08 (1: 7.8); KY09-14 (1: 3.7); KY09-28 (5: 7.5–16.4); KY09-29 (2: 5.3–11.8); KY10-04 (1: 6.9); KY10-19 (1: 7.4).

Family **Cardiidae**

Frigidocardium torresi (E.A. Smith, 1885) [Jn.: Asahi-zaru] (Fig. 4-5)

Materials examined. KY08-15 (3: 4.9–9.5); KY09-12 (1: 15.1); KY09-14 (1: 4.8); KY10-11 (1: 7.6); KY10-19 (1: 6.1); KY10-31 (1: 10.5); Tw-02-04 (1: 11.8).

Nemocardium bechei (Reeve, 1847) [Jn.: Kingyo] (Fig. 4-6)

Material examined. KY08-21 (1: 19.2).

Microcardium sakuraii Habe, 1961 [Jn.: Sakurainkingyo] (Fig. 4-7)

Material examined. KY08-21 (1: 8.0).

Laevicardium undatopictum (Pilsbry, 1904) [Jn.: Madara-chigotori] (Fig. 4-8)

Materials examined. KY10-19 (1: 9.3); KY10-31 (4: 10.3–12.9).

Fragum sp. (Fig. 4-9)

Material examined. KY10-26 (1: 5.0).

Family **Mactridae**

Mactra iridescens Kuroda and Habe, 1958 [Jn.: Niji-minatogai] (Fig. 4-10)

Materials examined. KY08-17 (1: 15: 0); KY08-18 (7: 6.3–15.5); KY10-24 (2: 5.5, 11.9).

Mactra ornata Gray, 1837 [Jn.: Beni-hamaguri] (Fig. 4-11)

Materials examined. KY10-26 (2: 23.0, 23.4).

Family **Tellinidae**

Pharaonella sieboldi (Deshayes, 1855) [Jn.: Benigai] (Fig. 4-12)

Material examined. KY10-26 (1: 16.5).

Clathrotellina pretium (Salisbury, 1834) [Jn.: Amime-zakura] (Fig. 4-13)

Material examined. KY10-26 (1: 6.1).

Cadella narutoensis Habe, 1960 [Jn.: Maru-kusabizara] (Fig. 4-14)

Materials examined. KY08-17 (2: 9.0, 9.8); KY08-18 (1: 11.4); KY 08-20 (1: 10.5); KY09-27 (1: 9.0); KY10-24 (2: 7.0, 9.7).

Exotica tokubeii (Habe, 1961) [Jn.: Kome-zakura] (Fig. 4-15)

Materials examined. KY10-25 (9: 4.0–8.2).

Bathytellina citrocarnea Kuroda and Habe in Habe, 1958 [Jn.: Wadatsumi-zakura] (Fig. 4-16)

Materials examined. KY10-26 (4: 9.2–15.6); KY10-26 (3: 6.9–8.0).

Nitidotellina pallidula (Lischke, 1871) [Jn.: Hatsu-zakura] (Fig. 4-17)

Material examined. KY10-26 (1: 8.6).

Nitidotellina sp. (Fig. 4-18)

Materials examined. KY10-26 (2: 11.9, 16.9).

Family **Psammobiidae**

Gari sibogai Prashad, 1932 [Jn.: Hoso-ashigai] (Fig. 4-19)

Material examined. KY08-21 (1: 17.1).

Gari sp. aff. ***pallida*** Deshayes, 1855 (Fig. 4-20)

Material examined. KY10-27 (1: 22.4).

Family **Veneridae**

Callanitis hiraseana Kuroda, 1930 [Jn.: Yume-hamaguri] (Fig. 4-21)

Material examined. KY08-17 (1: 7.9).



Fig. 4. Heterodonta and Anomalodesmata. 1, *Notomyrtea soyoae*, KY08-15, SL=8.8 mm; 2, *Cardita leana*, KY09-30, SL=25.7 mm; 3, *Cardita kyushuensis*, KT09-2, TW02-03, SL=20.1 mm; 4, *Chama japonica*, KY09-28, SL=7.5 mm; 5, *Frigidocardium torresi*, KY09-14, SL=11.9 mm; 6, *Nemocardium bechei*, KY08-29, SL=19.2 mm; 7, *Microcardium sakurarii*, KY08-21, SL=8.0 mm; 8, *Laevicardium undatopictum*, KY10-19, SL=9.3 mm; 9, *Fragum* sp., KY10-26, SL=5.0 mm; 10, *Mactra iridescens*, KY08-29, SL=15.6 mm; 11, *Mactra ornata*, KY10-26, SL=23.4 mm; 12, *Pharaonella sieboldi*, KY10-26, SL=16.5 mm; 13, *Clathrotellina pretium*, KY10-26, SL=6.1 mm; 14, *Cadella narutoensis*, KY08-17, SL=9.8 mm; 15, *Exotica tokubeii*, KY10-25, SL=7.4 mm; 16, *Bathytellina citro-*

Veremolpa laevicostata (Kuroda, 1960) [Jn.: Ōgikanoko-asari] (Fig. 4-22)

Materials examined. KY08-20 (1: 8.3); KY08-25 (1: 7.8); KY09-30 (1: 10.0).

Veremolpa minuta Yokoyama, 1922 [Jn.: Adeyaka-kanoko-asari] (Fig. 4-23)

Materials examined. KY10-26 (2: 7.9, 8.9).

Glycydonta marica japonica (Kira, 1954) [Jn.: Nishiki-asari] (Fig. 4-24)

Materials examined. KY08-25 (1: 6.0); KY09-12 (1: 4.4).

Gafrarium sp. (Fig. 4-25)

Material examined. KY. 08-15 (1 juv.: 5.2).

Circe (Redicirce) sulcata Gray, 1838 [Jn.: Tomoshiraogai] (Fig. 4-26)

Material examined. KY10-26 (1: 13.8).

Callocardia sp. (Fig. 4-27)

Materials examined. KY08-03 (1: 12.9); KY08-15 (1: 7.4).

Dosinella sp. (Fig. 4-28)

Materials examined. KY08-18 (1: 9.5); KY10-24 (2: 10.3, 11.2).

Remarks. Three specimens may represent an undescribed species, which is characterized by having pinkish umbo, non-colored lunule, very delicate and crowded commarginal threads, sharply thin ventral margin and subtruncated posterior margin.

Paphia lischkei Fischer-Piette and Métvier, 1971 [Jn.: Sudaregai] (Fig. 4-29)

Material examined. KY10-26 (1: 18.2).

Order Myoida Family Corbulidae

Varicorbula rotalis (Hinds, 1843) [Jn.: Kodakigai] (Fig. 4-30)

Material examined. KY08-18 (4: 5.8–7.6); KY10-26 (12: 4.9–6.8)..

Family Gastrochaenidae

Gastrochaena cuneiformis Spengler, 1783 [Jn.: Tsukue-gai] (Fig. 4-31)

Material examined. KY09-28 (1: 11.0).

Order Anomalodesmata Family Myochamiidae

Myadoropsis dissimilis Habe, 1960 [Jn.: Hiroyamazaki-suemonogai] (Fig. 4-32)

Materials examined. KY08-21 (2: 7.1, 7.7).

Family Cuspidariidae

Cuspidaria sp. (Fig. 4-33)

Materials examined. KY08-25 (2: 7.3, 9.8); KY10-02 (1: 4.5).

Remarks. Three small specimens represent a probable undescribed species close to *C. kurodai* Okutani, 1975 from the Kurose bank, but the final identification was not yet made.

General Discussion

From 16 *Koyo* stations in 2008, 12 in 2009, 11 in 2010, and 5 *Tansei Maru* stations, 70 species of

Fig. 4. continued from opposite page. *carnea*, KY10-26, SL=15.6 mm; 17, *Nitidotellina pallidula*, KY10-26, SL=8.6 mm; 18, *Nitidotellina* sp., KY10-26, SL=16.9 mm; 19, *Gari sibogai*, KY08-21, SL=17.1 mm; 20, *Gari* sp. aff. *pallida*, KY10-27, SL=22.4 mm; 21, *Callanitis hiraseana*, KY08-17, SL=7.9 mm; 22, *Veremolpa laevicostata*, KY09-30, SL=10.0 mm; 23, KY10-26, SL=8.9 mm; 24, *Glycydonta marica japonica*, KY08-25, SL=6.0 mm; 25, *Gafrarium* sp., KY08-15, SL=5.2 mm; 26, *Circe (Redicirce) sulcata*, KY10-26, SL=13.8 mm; 27, *Callocardia* sp. KY08-03, SL=12.9 mm; 28, *Dosinella* sp., KY08-18, SL=9.5 mm; 29, *Paphia lischkei*, KY10-26, SL=18.2 mm; 30, *Varicorbula rotalis*, KY08-18, SL=6.3 mm; 31, *Gastrochaena cuneiformis*, KY09-28, SL=11 mm; 32, *Myadoropsis dissimilis*, KY08-21, SL=7.7 mm; 33, *Cuspidaria* sp., KY08-25, SL=9.8 mm.

bivalve mollusks were identified, including those identified into only the generic level. Among them 37 (52.8%) belong to the subclass Pteriomorpha, 31 (44.2%) to the Heterodonta, and only two (2.8%) to the Anomalodesmata. None of Protobranchiate species occurred. Almost all pteriomorph species are byssate or cemented epibiontic, only *Pinna* and *Streptopinna* are byssate endobiontic and *Lithophaga* is cryptic. Among the heterodonts, only *Cardita* is byssate, *Chama* is cemented, and *Gastrochaena* is a borer, while all remaining taxa are non-byssate, endobionts, thus, about 42.8% (30 species) among the present collection are free-living, otherwise more or less sedentary.

The faunal constituents are mostly shelf species in subtropical to warm-temperate, and similar to those living on banks and insular shelf of Izu (Shichitō) Islands reported by Okutani (1972, 1975). For example, *Arca ventricosa*, *Samacarpacifica*, *Septifer rudis* (as *keenae*), *Amygdalum soyoae*, *Modiolus margaritaceus*, *Malleus irregularis*, *Atrina penna*, *Spondylus occidens* (as *anacanthus*), *Chlamys jousseaumei*, *Plicatula muricata*, *Cardita kyushuensis*, *Frigidocardium torresi* (as *eos*), etc. occur here as well as there. However, some frequent species occurring on Izu Islands banks seldom appear in the present collection, such as *Tucetona shinkuroensis* (except a water-worn odd valve), *Chlamys empressae*, *C. princepsae*, *C. lemniscata*, *Cryptopecten vesiculosus*, *C. bullatus*, *Lima fujitai* among others. This may represent a faunal attenuation due to geo-topography of such a remote oceanic islands as was demonstrated by Kay (1967, 1979) for the Hawaiian Islands molluscs.

One of the interesting findings among the insu-

lar bivalves may be *Mantellum perfragile* which was originally described from the Palau Islands and the first discovery from the Japanese waters representing a tropical element.

The lack of the protobranchiate taxa and poverty of anomalodesmaceans seems to be common among bivalve faunas in intertidal to insular shelf of Ogasawara and neighboring waters that are predominated by hard and well-sorted rough bottom (Table 2).

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References

- Fukuda, H. 1993. Marine Gastropoda (Mollusca) of the Ogasawara (Bonin) Islands. Part I: Archaeogastropoda and Neotaenioglossa. *Ogasawara Research*, (19): 1–86.
 Fukuda, H. 1994. Marine Gastropoda (Mollusca) of the Ogasawara (Bonin) Islands. Part 2: Neogastropoda, Heterobranchia and fossil species, with faunal accounts. *Ogasawara Research*, (20): 1–126.
 Fukuda, H. 1995. Marine Gastropoda (Mollusca) of the Ogasawara (Bonin) Islands. Part 3: Additional records.

Table 2. Comparison of bivalve fauna by subclass in shallow water zones in Ogasawara with relevant previous studies.

	Protobranchia	Pteriomorpha	Heterodonta	Anomalodesmacea	Stratum
Matsumoto <i>et al.</i> (1970)	0	21	16	0	Intertidal
Nishimura (1999)*	0	46	64	0	Intertidal to shelf
Okutani (1972, 1975)**	0	39	24	8	Insular shelf
This study	0	37	31	2	Insular shelf

* Excluding literature citations (only those collected by the author) were counted.

** All from Izu Islands for comparative reference.

- Ogasawara Research*, (21): 1–142.
- Kay, A. E. 1967. The composition and relationships of the marine molluscan fauna of the Hawaiian Islands. *Venus: Japanese Journal of Malacology*, 25: 96–104.
- Kay, A.E. 1979. Hawaiian Marine Shells. Reef and Shore Fauna of Hawaii. Section 4: Mollusca. *Bernice P. Bishop Museum Special Publication*, 64 (4): i–xviii, 1–652.
- Matsumoto, Y., Komada, H. and Higashigawa, S. 1970. Shells of the Ogasawara (Bonin) Islands. In: Report on the Marine Biological Expedition to the Ogasawara (Bonin) Islands, pp. 41–74. Toba Aquarium and Asahi Shinbun Publishing Company.
- Ministry of Environment. 1991. *Red Data Book: Endangered Wild Life in Japan*. Invertebrate. 271 pp.
- Nishimura, K. 1999. Distribution of molluscan sea shells in the Izu-Ogasawara Islands and adjacent waters (the Tokyo Metropolitan sea area). *Tôkyo-to Suisanshikenjô Chôsa Kenkyû-hôkoku (Report on Tokyo Metropolitan Fisheries Experimental Station)*, 211: 1–124.
- Okutani, T. 1972. Molluscan fauna on the submarine banks, Zenisu, Hyotanse, and Takase, near the Izu-Shichito Islands. *Bulletin of Tokai Regional Research Laboratory*, (72): 63–142, 2 pls.
- Okutani, T. 1975. Glimpse of benthic molluscan fauna occupying the submarine bank, Kurose, near Hachijo Island, Japan. *Venus: Japanese Journal of Malacology*, 33 (4): 185–205.
- Rosewater, J. 1961. The family Pinnidae in the Indo-Pacific. *Indo-Pacific Mollusca*, 1 (4): 175–226.
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2008～2010年に調査船興洋及び淡青丸によって採集された小笠原諸島島棚の二枚貝類

奥谷喬司・齋藤 寛

国立科学博物館が主導する「相模灘における生物多様性の起源探求に関する研究—フォッサマグナ要素及び伊豆-小笠原弧」の研究プロジェクトの一環として、2008年から2010年に亘り、小笠原水産センター所属の興洋および海洋研究開発機構所属の淡青丸によって小笠原周辺の島棚上で行われたドレッジによる採集物のなかから、軟体動物のうち二枚貝類の同定を行った。

標本精査の結果、二枚貝（死殻は除く）は3年間で水深約40～250 mの範囲における合計44地点70種出現した。内訳は翼形類37種（52.7%）、異齒類30種（44.2%）、異韌帶類2種（2.8%）で、原鰓類の出現は皆無であった。

種構成は硬底に足糸やセメント質で固着する表棲性及び少数の穿孔性の内棲種が多く、軟底に埋棲自由生活種は半数にも満たない42.8%（30種）のはドレッジ採集した島棚の海底が粗く、硬底が優占していたことを反映している。

構成種は温帯から亜熱帯の浅海性種であるのは当然であるが、従来パラオから記載されたカゲロウハネガイが出現したことは興味深い。また、過去に調べられた伊豆七島の島棚及び礁の二枚貝相（Okutani, 1972, 1975）と極めて高い類似性を示し、オオタカノハ、ミノエガイ、アラヒメイガイ、ユキゾラホトギス、マメヒバリガイ、ヒリョウ、ハネタイラギ、オオナデシコ、ニクイロナデシコ、モグラノテ、ニクイロトマヤ、アサヒザルなど共通種が多い。いっぽう、伊豆諸島七島と礁で類出したシンクロセウチワ（＝シノノメウチワ）、ミノナデシコ、ツヅレナデシコ、ワタゾコナデシコ、ヒヨクガイ、ヒラヒヨク、ロウイロミノガイなどは出現しない。これは、小笠原のような大洋島に見られる動物相の多様性における縮小（faunal attenuation）現象の一端を示すのではないかと示唆される。