

XII. PRELIMINARY REPORT ON SHELL OCCURRENCES FROM SEA BOTTOMS IN THE AREA NORTHEAST OF HACHIJOJIMA ISLAND DURING GH 80-4 CRUISE

Eiji Inoue

Introduction

During the sampling of bottom sediments during a cruise of the R/V Hakurei-maru in July, 1980, a few shells were obtained from the sea floor at water depths of 200–500 m on the Kitakurose and Shinkurose Banks and the area east of Hachijojima Island. The banks are topographical elevations like small plateaus having broad and flat tops lying at depths of 200–300 m, and having rather steep flanks. The flat, top areas of the banks are covered by rather thick limestone or a calcareous sandstone layer exposed on the sea floor. In places, the sea floor has a veneer of coarse sediments and organisms such as corals and sponges.

The lower parts of the slopes of the banks and the broad depression between Shinkurose and Hachijojima are covered with sand and gravel layers composed mostly of volcanic materials. These sediments are well sorted in places.

The surface water current in the area is strongly affected by the Kuroshio Warm Current flowing eastward. However the current changes locally and temporarily in direction and intensity. Generally the current flows more strongly over the western parts of the tops of the banks than in other areas. Judging from the results of the sampling work and the sea bottom photographs (INOUCHI, Y. and KINOSHITA, Y. 1981, see Chapter IX), a somewhat strong bottom current exists on the sea floor of the surveyed area as shown by the considerable ripple marks in the coarse sediments.

This report is related to the occurrence of shells on sea floors where these unusual conditions prevail.

Species identification of the shells was roughly and preliminarily carried out by the author with reference to the shell catalogues (HABE, T., 1951–1953, 1961, HABE, T. and ITO, K., 1965, HABE, T. and KOSUGE, S., 1965, and KIRA, T., 1959). It seems that the discovery of some new species may be confirmed after further examination.

Shell occurrences

The shells were obtained from seven sites in the area surveyed (Fig. XII-1) by a chain-bag dredge and a Smith-McIntyre grab, this work being carried out primarily for sediment and rock sampling, not for sampling benthic organisms. Shell localities can be divided into three sub-areas, the Kitakurose Bank, the

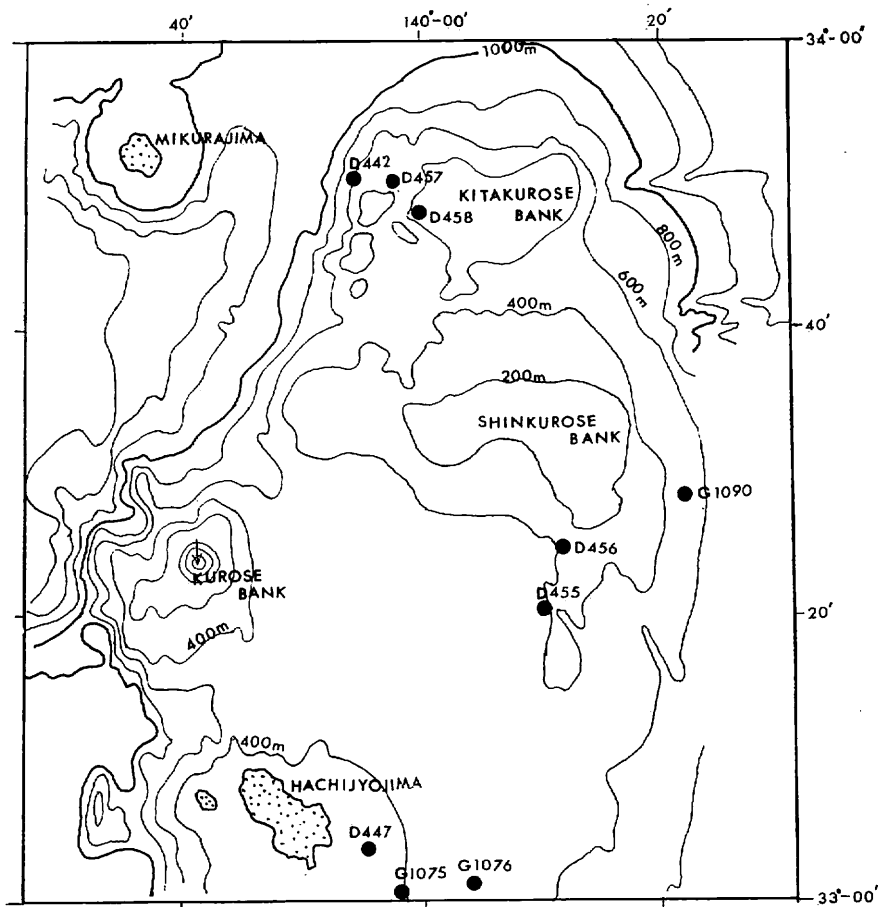


Fig. XII-1 Shell sampling sites.

Shinkurose Bank and the area east of Hachijojima Island. The locations, depths of water, sampling methods and the material recovered from each site are summarized in Table XII-1.

A total of 84 species of molluscs were distinguished, comprising 52 species of Gastropoda, 1 species of Scaphopoda, 27 species of Pelecypoda and 4 species of Brachiopoda. These are listed in Table XII-2.

It seems to be characteristic of all the sites that the individual number of the shells was remarkably small compared with the number of species, with the exception of Pteropoda, and that species common to all the sites are few, again with the exception of Pteropoda, and that most individual shells are small in size. A few live individuals were found.

The shell occurrence at each site is set out below.

Table XII-1 Sampling sites of shells in the surveyed area

Area	Sample No.	Station No.	Long. N.	Lat. E.	Water depth m	Dredge duration	Sample materials
Kitakurose Bank	D 458	St. 1958	<33-48.0 33-47.7	<140-00.0 140-00.1	302-293	15 min.	Coral & beach rock fragments
	D 457	St. 1956	<33-49.9 33-49.8	<139-57.9 139-57.8	485-425	22	Sand, coral & sponge
	D 442	St. 1830	<33-50.2 33-50.3	<139-54.4 139-55.2	608-425	48	Pumice, pebbles & coral fragments
Shinkurose Bank	D 455	St. 1932	<33-20.2 33-20.1	<140-10.2 140-10.2	290-285	14	Limestone pebbles and fragments
	D 456	St. 1934	<33-24.0 33-23.9	<140-11.5 140-11.6	307	9	Coral, sponge & pebbles
	G1090	St. 1917	33-28.0	140-21.9	495	—	Brown, medium sand
East of Hachijojima Island	D 447	St. 1892	<33-03.3 33-03.2	<139-54.9 139-54.9	190-181	5	Algal sandstone & limestone
	G1075	St. 1885	33-00.5	139-58.2	410	—	Sand & gravel
	G1076	St. 1886	33-00.2	140-04.6	545	—	Sand & gravel

Table XII-2 Occurrence of shells from the area northeast of Hachijojima Island

GASTROPODA	
Acmaeidae	G1075
<i>Ethaliopsis</i> af. <i>iridescens</i> HABE	D442*
<i>E.</i> cf. <i>katoi</i> KURODA & HABE	G1076
<i>Galeoastraea?</i> sp.	D442
<i>Tristichotrochus?</i> sp.	D458
<i>Akoya akoya</i> (HIRASE)	D442
<i>Homalopoma</i> spp.	D458
Rissoidae	D442
<i>Rhincolavis?</i> sp.	D447
Architectonicidae	D442
<i>Cinctiscala</i> sp.	D442
Janthinidae	G1076
<i>Polinices</i> sp.	D458
<i>Natica</i> af. <i>fasciata</i> (ROEDING)	D442
<i>Tectonatica</i> sp.	D447, D456, G1076
Eratoidea	D442
<i>Phenacovolva</i> sp.	D442
Ovulidae	D458
Cypraeidae	D447
Oocorythidae	D457
<i>Bufohariella</i> cf. <i>ranelloides</i> (REEVE)	D458*
Muricidae	D458
<i>Puteropurpura</i> sp.	D455
Rapidae	D458
<i>Manaria lirata</i> KURODA & HABE	D442, D458
<i>Siphonalia</i> sp.	D457, D458
<i>Hindsia</i> sp.	D442
<i>Siphonofusus</i> cf. <i>lubrica</i> (DALL)	D442
Nassariidae	D457

<i>Niota</i> sp.	D442
Fasciolariidae	D458
<i>Neadamete japonica</i> (SMITH)	D442
<i>Olivella</i> af. <i>aureobaeteata</i> KURODA	G1090, G1076
<i>Turrancilla</i> sp.	G1075
<i>Lyrta</i> sp.	D442
<i>Fulgoraria</i> sp.	D442
<i>Chrysame</i> sp.	D442
<i>Vexillum</i> sp.	D442
Mittridae	D458
<i>Chelyconus propundorum</i> KURODA	D442
<i>Parviconus</i> af. <i>tuberculosis</i> (TOMUN)	D458
<i>Asprella?</i> sp.	G1075
Turridae	D458
<i>Turris</i> sp.	D442, D447, D457
<i>Daphnella</i> sp.	D447
<i>Cavolinia gibbosa</i> (d'ORBIGNY)	D442, D457, G1076, G1090
<i>C. globulosa</i> (GRAY)	D442, G1090
<i>C. uncinata</i> (d'ORBIGNY)	D442, D458, G1090
<i>C. inflexa</i> (LESUEUR)	D442, D457, D458
<i>Diacria trispinosa</i> (BLAINVILLE)	D442, G1076, G1090
<i>Clio pyramidata</i> LINNE	D442, D457, D458, G1076, G1090
<i>Cuvierina columnella ulceolaria</i> (MURCH)	D442, G1076

SCAPHOPODA

<i>Dentalium</i> sp.	G1090
---------------------------	-------

PELECYPODA

<i>Arca</i> cf. <i>nvicularis</i> BRUGUIÈRE	D447
<i>Bathyarca</i> sp.	D442
<i>Limopsis</i> af. <i>cuminggi</i> A. ADAMS	G1075, G1090*
<i>Aspalima</i> (<i>Nipponolimopsis</i>) <i>decussata</i> (A. ADAMS)	D442, G1090
<i>Glycymeris</i> sp.	G1090
<i>Polymeamussium?</i> sp.	D458
<i>Palliolium</i> sp.	G1090*
<i>Chlamys</i> af. <i>nobilis</i> (REEVE)	D447
<i>Chlamys</i> sp.	G1076
<i>Spondylus</i> af. <i>nicolaricus</i> SCHREIBERS	D442
<i>S.</i> af. <i>sanguineus</i> DUNKER	D447
<i>Limatula</i> (<i>Stabilima</i>) <i>strangei</i> (SOWERBY)	D447
<i>Acesta</i> spp.	D458, D442
<i>Monia</i> sp.	D442
<i>Ostrea</i> spp.	G1075
<i>Neopycnodonte</i> sp.	G1075, G1090
<i>Crassatellites</i> sp.	G1075
<i>Cardita</i> sp.	G1075
<i>Glans</i> sp.	D447*
<i>Chama</i> spp.	D456, G1090
<i>Pholadomya</i> sp.	D442
<i>Lyonsiella?</i> sp.	D442
<i>Verticordia</i> (<i>Sspinospella</i>) af. <i>japonica</i> A. ADAMS	D458, G1090
<i>Cuspidaria</i> af. <i>nobilis</i> (A. ADAMS)	D442

BRACHIOPODA

<i>Dallina</i> sp.	D442, G1076
<i>Hemithyris</i> sp.	D442, G1090*
<i>Terebratulina</i> spp.	D442

Note: * is living.

1) Kitakurose Bank sub-area

D458: The dredge was pulled along the sea floor on the western margin of the top of the bank at depths of 302 to 293 m for 15 minutes. The recovered materials were mostly composed of coral fragments, a few fragments of the bed rock, and a few shells. Those shells which were present were small in size, but not fragmented. There were 22 species and gastropod shells dominated, but the only dominant species was Pteropoda. A live specimen of *Bufoasiella* was recovered.

D457: Sample materials were dredged from the western slope adjacent to the site of D458, at water depths of 485 to 425 m. A small quantity of sand, sponge and coral fragments with several individual shells were recovered. All the individuals were gastropods.

D442: The sample materials were taken with the dredge which was dragged for 48 minutes upwards from the base of the slope at water depth of 608 to 425 m, adjacent to the D457 site. A large quantity of coral and sponge remains were obtained in association with boulders of basaltic rock and pumice. A few shells were found in the sample. Most of the shells were fragmented, and the surface colour of the shells was altered to dark brown. A live individual of *Ethaliopsis* was found. The collection comprised 38 species of molluscs, including 27 species of Gastropoda, 8 species of Pelecypoda and 3 species of Brachiopoda. There were more species at this site than at any of the other sampling sites in the area surveyed. The abundance of shells at this site might be due to a mixture of shells having fallen from the shallower sites, such as D457 and D458, into the present site, and to the somewhat long duration of the haul. The most abundant individual numbers are 7 individuals each of *Ethaliopsis*, *Chelyconus* and *Gleoastraea*, and the next greatest abundance is 3 or 4 individuals each of *Natica*, *Aspalima* and *Spondylus*.

Although the bottom sediment temperature at the site could not be measured owing to the coarse sediments, the temperature at the adjacent site G104 at a depth of 595 m was 15.5°C, when the temperature of the sea surface water was 25.0°C.

2) Shinkurose Bank sub-area

D455: A small quantity of pebbles of algal limestone and sandstone was taken from a small hill on the southern slope of the Bank at water depths of 290 to 285 m. Only an individual of *Pteropurpura* was recovered.

D456: A small quantity of coral, sponge and rock fragments was dredged from the upper part of the southern slope adjacent to the top of the bank at a water

depth of 307 m. Only several individuals of *Tectonatica* and *Chama* were found, and the latter genus was represented by two or three species.

G1090: Brown coloured and medium-grained sand was obtained from the eastern slope of the bank by the grab at a depth of 495 m. 15 species of shells, comprising 7 species of Pelecypoda, 6 species of Gastropoda, 1 species of Scaphopoda and 1 species of Brachiopoda, were recovered by washing the sediments through a 4 mm sieve.

Compared with the assemblages from the Kitakurose Bank, this assemblage is characterized by the common occurrence of Limopsidae and few occurrence of Gastropoda. Pteropoda are abundant. Live individuals of *Limopsis*, *Pallio-rium* and *Hemithyris* were found.

3) Sub-area east of Hachijojima Island

D447: A large quantity of algal-limestone cobble and pebbles was obtained by dredging carried out in shallow water at depths of 190 to 181 m near the island. 5 species each of Gastropoda and Pelecypoda were recovered, and the individuals of each species were 1 to 3 in number.

G1075: The shells were taken from sand and gravel in the grab which was operated on the eastern slope at a depth of 410 m. The shells consisted of 3 and 4 species of Gastropoda and Pelecypoda respectively, and all of these were small in size and fragmented.

G1076: Pebbly coarse sand was obtained with the grab from the flat sea floor of the broad depression between the island and the Shinkurose Bank, at depth of 545 m. The bottom sediment temperature was measured as 14.5°C when the water temperature of the sea surface was 24.0°C. 8 species of Gastropoda, and 1 species each of Pelecypoda and Brachiopoda occurred. Dominant shells were *Clio*, *Diacria* and *Cavolinia* of Pteropoda; other species were only one or two in individual number. These shells were somewhat well preserved. No live individual was recovered.

Discussion

The shells were recovered from coarse sandy sediments and rocky bottoms at water depths greater than those of the continental shelf and from areas influenced by bottom currents in the ocean. The data of shell occurrence related to the bathymetry and the nature of the sea floor will be useful for the ecological study of shells, because there is little information related to shell occurrences on rough bottoms at such depths. Owing to the paucity of reports on shells occurring in such an environment, it is possible that a re-examination of the assemblage could reveal some new species amongst the shells recovered.

The occurrence of the shells in the area is reasonably consistent with previous information on the bathymetry of shells. Most of the identified species of the shells sampled have been described in the catalogues as archibenthic dwellers. Many of the shells were not well preserved and some were fragmented. This may indicate that some of the shells were derived from other places. However, there is evidence that some poorly preserved shells are commonly found on rocky

bottoms where strong currents prevail, such as on the sea floor off Abashiri in Hokkaido and west of the Tsugaru Straits (INOUE, E. ed. Cruise Report in preparation). Therefore, the author considers, at the present time, that most of the shells sampled are in situ.

The shell assemblages in the area are characterized by the small size of the individuals and a relatively small number of individuals compared to the large number of species. These factors will be due to the environment at the considerable water depths.

Assemblages from the sites on the Kitakurose Bank display a clearly recognizable difference in composition from that of assemblages from the other two sub-areas. In the assemblages from the Kitakurose Bank the number of species is larger than that in the other sub-areas, Gastropoda being dominant and Pelecypoda few, while in the assemblages from the other sub-areas the Pelecypoda content exceeds that of Gastropoda, with the exception of Pteropoda. There are few species common to the three sub-areas. The differences in composition of the assemblages probably reflect variations in the benthic environments.

Pteropoda are very common at almost all the sites owing to the planktonic content common to all sites. Brachiopoda seem to be common at the deeper sites such as D442, G1076 and G1090.

References

- HABE, T. (1951-53) *Outline of Classification of Shells of Japan, Pelecypoda and Scaphopoda*, vol. 1-4, p. 1-326. Association of Shell References, Tokyo.
- (1961) *Coloured Illustrations of the Shells of Japan, Vol. II*. Hoikusha Publishing Co., Ltd., Osaka. p. 1-194.
- and ITO, K. (1965) *Shells of the World in Colour, Vol. I. The Northern Pacific*. Hoikusha Publishing Co., Ltd., Osaka. p. 1-176.
- and KOSUGE, S. (1965) *Shells of the World in Colour, Vol. II, The Tropical Pacific*. Hoikusha, Publishing Co., Ltd. p. 1-194.
- KIRA, T. (1959) *Coloured Illustrations of the Shells of Japan, Vol. I*. Hoikusha Publishing Co., Ltd. p. 1-240.