

A RECORD OF GASTROPODS AND BIVALVES COLLECTED FROM  
EAST ANTARCTICA BY THE JAPANESE ANTARCTIC RESEARCH  
EXPEDITIONS IN 1992-94

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**Abstract:** Benthic Mollusca were collected with baited traps and by SCUBA diving near Syowa Station, and with the beam-trawl at nine stations in the areas of Lützow-Holm Bay, Casey Bay and Prydz Bay, East Antarctica. Around Syowa Station, 7 gastropods and 3 bivalves were collected. Large size specimens collected with the beam-trawl include 8 gastropods and 3 bivalves from Lützow-Holm Bay, 7 gastropods from Casey Bay and 2 gastropods and 4 bivalves from Prydz Bay. Almost all species have circum-Antarctic distribution. Among them *Aforia multispirallis* (Turridae), which had hitherto been reported from the South Orkney Islands, the South Shetland Islands and the Antarctic Peninsula, was collected from Prydz Bay for the first time. This indicates that the distribution of the species is extended further eastward than previous records. The species composition of the present collections represents a typical shelf fauna in Antarctica.

## 1. Introduction

The winter party of the 33rd Japanese Antarctic Research Expedition (JARE) collected many benthic animals from the fast ice area around Syowa Station with baited traps and by SCUBA diving. The summer party of JARE-34 undertook beam-trawl samplings at nine stations in the areas offshore of Lützow-Holm, Casey and Prydz Bays. The sampling stations in Lützow-Holm Bay and Casey Bay were located in the pack ice area. Baited trap samplings on board the icebreaker SHIRASE were carried out off Syowa Station by the summer party of JARE-35. The relatively large sized prosobranch gastropods and bivalves contained in the benthic materials were investigated to increase the basic knowledge of molluscan fauna in this region.

## 2. Materials and Methods

A beam-trawl was towed by the icebreaker SHIRASE at three stations offshore of Lützow-Holm Bay in December 1992 and February 1993 (Fig. 1), in Casey Bay (Fig.

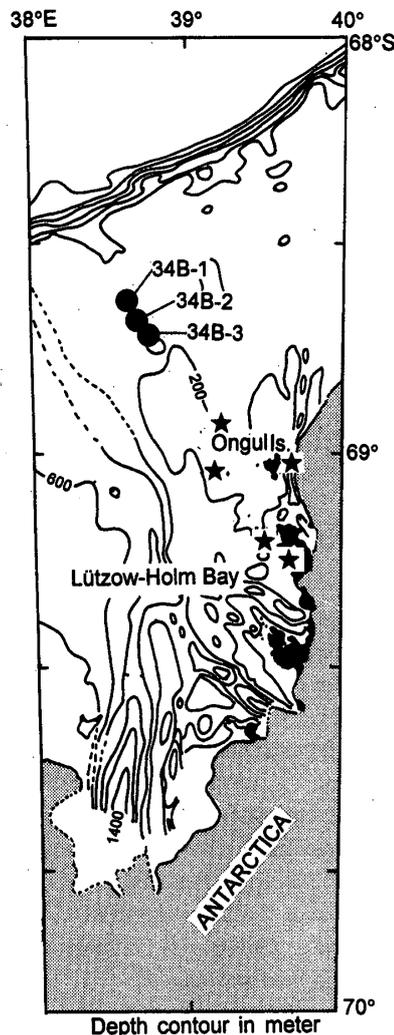


Fig. 1. Trawling sites (dots) and baited trap sites (stars) of Lützow-Holm Bay.

2) and Prydz Bay (Fig. 3) in February 1993. The sampling data are given in Table 1. In these collections of beam-trawls with two kind of nets (2.0 m in width, 0.7 m in depth and 7.0 m in length; 3.0 m in width, 1.0 m in depth and 9.2 m in length) were used. The sea floor was swapt for 10 to 20 min with the speed of 1 to 2 knots.

The relatively large benthos were sorted out from beam-trawl samples, immediately after the net retrieval. Specimens were fixed by 70% ethanol on board SHIRASE. The residue and bottom sediment which contained many minute organisms were frozen at about  $-20^{\circ}\text{C}$  for future examinations.

Baited trap samplings were carried out around Syowa Station ( $69^{\circ}00'S$ ,  $39^{\circ}35'E$ ), within the area  $68^{\circ}59.5'S$  to  $69^{\circ}15.3'S$  and  $39^{\circ}06.0'E$  to  $39^{\circ}40.1'E$ , depth range of 10 to 679 m, from January 1992 to January 1993 (Fig. 1). Another baited trap sampling was also performed off Syowa Station ( $68^{\circ}57.4'S$ ,  $39^{\circ}08.1'E$ , 160 m in depth) on board SHIRASE in January 1994 (Fig. 1).

Five of SCUBA diving samplings were taken at Nisi-no-ura Cove near Syowa Station in March 1992 and January 1993. The bottom texture of the survey area was

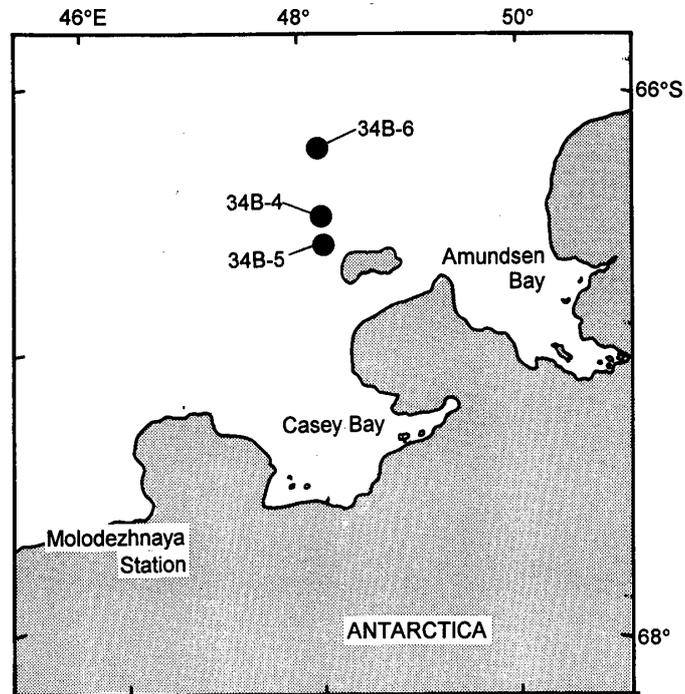


Fig. 2. Trawling sites (dots) in Casey Bay of the icebraker *SHIRASE*.

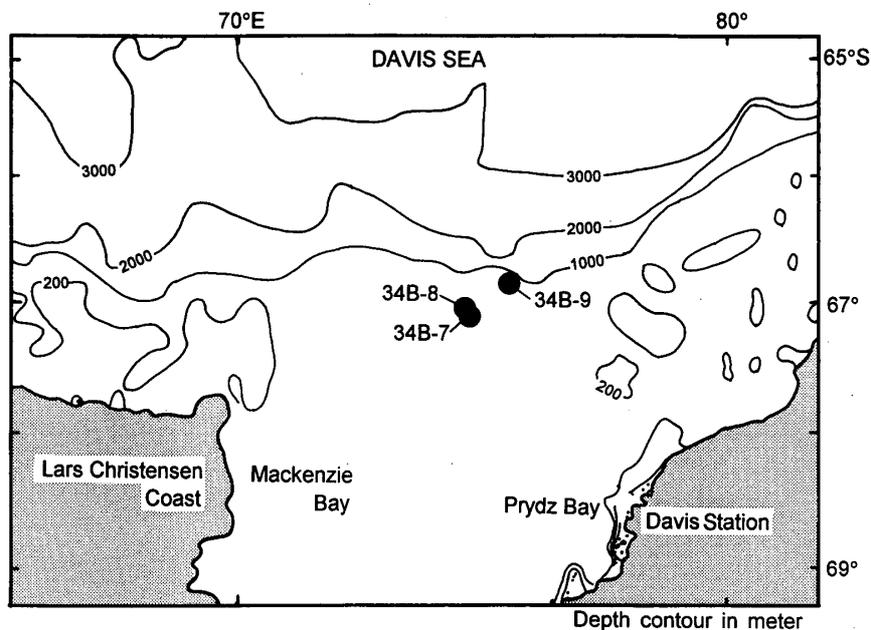


Fig. 3. Trawling sites (dots) in Prydz Bay of the icebraker *SHIRASE*.

mainly mud with scattered rock outcrops. The depth range of this survey was 0–17 m.

Almost all specimens collected by baited traps and SCUBA diving were also fixed in 70% ethanol immediately after capture. But some individuals of *Neobuccinum eatoni* were reared for the physiological observation in the laboratory of Syowa Station.

Table 1. Beam trawl stations of the 34th Japanese Antarctic Research Expedition.

Station	Date	Latitude	Longitude	Depth (m)
Off Lützow-Holm Bay				
34B-1 (2 m)	16/XII/92	68° 39.0' S	38° 41.8' E	242-237
34B-2 (3 m)	10/II/93	68° 41.7' S	38° 43.6' E	246-280
34B-3 (2 m)	10/II/93	68° 42.7' S	38° 47.0' E	291-231
Casey Bay				
34B-4 (3 m)	20/II/93	66° 42.6' S	48° 17.6' E	203-195
34B-5 (2 m)	20/II/93	66° 41.1' S	49° 20.0' E	196-199
34B-6 (3 m)	20/II/93	66° 28.7' S	48° 23.1' E	842-737
Prydz Bay				
34B-7 (3 m)	3/III/93	67° 06.6' S	75° 15.9' E	398-400
34B-8 (2 m)	3/III/93	67° 06.0' S	75° 15.6' E	396-398
34B-9 (3 m)	3/III/93	66° 53.5' S	75° 58.8' E	776-391

( ): Width of beam trawl.

### 3. Results

In total 149 specimens were taken alive, and 12 specimens were empty shells. 17 species of 16 genera of 11 families of gastropods and 8 species of 8 genera of 8 families of bivalves were identified. The species are listed in Tables 2 and 3. Only *Harpovoluta charcoti* was common to the four sampling areas.

The total number of species in beam-trawl collection was 19. *Chlanificula thielei* was common to both Lützow-Holm Bay and Casey Bay, and *Cyclocardia astaroides* was common to Lützow-Holm Bay and Prydz Bay.

A total of 113 specimens of 10 species were collected from around Syowa Station. *Iothia coppingeri*, *Marseniopsis mollis* and *Laternula elliptica* were collected from Nisi-no-ura Cove by SCUBA diving. There were many dead shells of *Adamussium colbecki*. A small specimen of *A. colbecki* was found in the stomach contents of the nototheniid fish, *Trematomus bernacchii*, from Nisi-no-ura Cove. A specimen of *Cyclopecten gaussianus* which byssated on a small stone, was collected with the baited trap together with other carnivorous benthic animals. *Neobuccinum eatoni* kept for several months in the laboratory, and laid three egg capsules in July 1992. The capsules were hemispherical in shape and creamy in color. The diameter and height of the capsules were approximately 8.2 mm and 5.1 mm, respectively. The capsules strongly adhered to the inner surface of the glass aquarium. The egg capsules of which shape was identical with the above ones were collected from the sea floor of about 15 m depth in Nisi-no-ura Cove by SCUBA diving (Plate 2, Fig. 12). They strongly attached to a tube of sedentary polychaeta.

### 4. Discussion

#### 4.1. Faunistic remarks

##### 4.1.1. Trap and SCUBA samplings

Usually the sea around Syowa Station area is covered with fast sea ice 1 to 4 m thick throughout the year. Accordingly, benthic animals have been sampled mainly with the

Table 2. *Gastropoda and Bivalvia collected by the beam trawl.*

	Lützow-Holm Bay		Casey Bay			Prydz Bay		Remarks on geographical distribution		
	34B-1	34B-2	34B-3	34B-4	34B-5	34B-6	34B-7		34B-8	34B-9
<b>GASTROPODA</b>										
Fissurellidae										
<i>Puncturella spirigera</i> THIELE, 1912	1									C
Trochidae										
<i>Calliotropis (C.) pelseeneeri rossiana</i> DELL, 1990	1				1					E
<i>Falsimargarita</i> sp.	2(1)									P
Turbinidae										
<i>Leptocollonia innocens</i> (THIELE, 1912)	1(1)									C
Trichotropidae										
<i>Torellia mirabilis</i> (SMITH, 1907)					2					C
Buccinidae										
<i>Neobuccinum eatoni</i> (SMITH, 1875)				2(2)						A+S
<i>Chlanidota elongata</i> (LAMY, 1910)				2(1)						C
<i>Chlanificula thielei</i> POWELL, 1958		1(1)		1						C
Cancellaridae										
<i>Nothoadmete consobria</i> (POWELL, 1951)				1						C
Volutidae										
<i>Harpovoluta charcoti</i> (LAMY, 1910)		1		7	1	2			4	C
Turridae										
<i>Aforia magnifica</i> (STREBEL, 1908)		1								C
<i>Aforia multispiralis</i> DELL, 1990								1(1)		C
<i>Pontiothauma elgata</i> HEDLEY, 1916		1(1)								E
<b>BIVALVIA</b>										
Limopsidae										
<i>Limopsis marionensis</i> SMITH, 1885									2(1)	A+S
Philobryidae										
<i>Philobrya sublaevis</i> (PELSENEER, 1903)	5									A+S
Mytilidae										
<i>Dacrydium albidum</i> PELSENEER, 1903	1									C
Limidae										
<i>Limatula (Antarctolima) hodgsoni</i> (SMITH, 1907)								1		A+S
Carditidae										
<i>Cyclocardia astartoides</i> (MARTENS, 1878)	2(1)								1(1)	A+S
Cuspidariidae										
<i>Cuspidaria tenella</i> SMITH, 1907									1(1)	C

A+S: Antarctic and Subantarctic distribution; C: Circum-Antarctic distribution; E: East Antarctic distribution; P: Collected only from the present area; ( ): Number of empty shells.

Table 3. *Gastropoda* and *Bivalvia* collected by baited trap and with SCUBA diving survey near Syowa Station.

	No. ind.	Sampling method	Remarks on geographical distribution
<b>GASTROPODA</b>			
Lepetidae			
<i>Iothia coppingeri</i> (SMITH, 1881)	1	S	A+S
Lamellariidae			
<i>Marseniopsis mollis</i> (SMITH, 1902)	10	B, S	C
Muricidae			
<i>Trophon shackletoni shackletoni</i> HEDLEY, 1911	5	B	C
Buccinidae			
<i>Neobuccinum eatoni</i> (SMITH, 1875)	55	B, S	A+S
<i>Probuccinum tenuistriatum</i> HEDLEY, 1916	30	B	C
<i>Chlanidota elongata</i> (LAMY, 1910)	6	B	C
Volutidae			
<i>Harpovoluta charcoti</i> (LAMY, 1910)	3	B	C
<b>BIVALVIA</b>			
Pectinidae			
<i>Adamussium colbecki</i> (SMITH, 1902)	1	B	C
Propeamussiidae			
<i>Cyclopecten gaussianus</i> (THIELE, 1912)	1	B	E
Laternulidae			
<i>Laternula elliptica</i> (KING and BRODERIP, 1831)	1	S	A+S

A+S: Antarctic and Subantarctic distribution; B: Baited trap; C: Circum-Antarctic distribution; E: East Antarctic distribution; S: SCUBA diving.

baited trap. Ten gastropod species, *Laevilitorina antarctica*, *Marseniopsis mollis*, *M. syowaensis*, *Trophon longstaffi*, *T. shackletoni shackletoni*, *Chlanidota elongata*, *Neobuccinum eatoni*, *Probuccinum tenuistriatum*, *Antarctoneputunea aurora* and *Harpovoluta charcoti*, and in addition three bivalve species, *Adamussium colbecki*, *Cyamiocardium rotundatum* and *Laternula elliptica* have been reported (HORIKOSHI *et al.*, 1979; NAKAJIMA *et al.*, 1982; OKUTANI, 1986; NUMANAMI and OKUTANI, 1991; NUMANAMI, 1993). *Iothia coppingeri* and *Cyclopecten gaussianus* were first recorded in this area. *C. gaussianus* has hitherto been known from the area offshore of the Davis Sea and the eastern part of the Weddell Sea, 385–481 m in depth (THIELE, 1912; EGOROVA, 1982; HAIN, 1990). In this study, *C. gaussianus* was collected from off Syowa Station at 159 m depth. OKUTANI (1986) reported a single living specimen of *L. elliptica* from a subtidal flat near Syowa Station. YOSHIDA (1986) reported fossil specimens of *L. elliptica* from the elevated beaches in the northeastern part of Lützw-Holm Bay. NUMANAMI and TSUCHIYA (unpublished) observed many siphons of *L. elliptica* on the fine mud bottom in Nisi-no-ura Cove by SCUBA diving. According to ARNAUD (1985a), the biomass of this bivalve reached 5 kg/m<sup>2</sup> in Haswell Island (Queen Mary Coast) or 140 individuals/m<sup>2</sup> in the Kerguelen Islands. AHN (1994) reported that the density of this species was 87 individuals/m<sup>2</sup> and 9 kg/m<sup>2</sup> in Collins Harbor, King George Island. It seems that dense populations of *L. elliptica* may distribute ubiquitously in the shallow coastal areas of Lützw-Holm Bay. NAKAJIMA *et al.* (1982) reported a zonal distribution of *A. colbecki* at a depth of about 3 m in Nisi-no-ura Cove, with

biomass being about 2 kg/m<sup>2</sup>, and the density, 112 individuals/m<sup>2</sup>. In the present study, a large colony of dead *A. colbecki* shell was recognized at the same point as reported by NAKAJIMA *et al.* (1982). The living specimen of *A. colbecki* could not be found from Nisi-no-ura Cove during the present SCUBA diving observation. It is presumed that the high mortality of *A. colbecki* was caused by the occurrence of hyposaline water as observed on the west coast of McMurdo Sound by STOCKTON (1984).

#### 4.1.2. Beam-trawl samples

The benthic fauna of the area offshore of Lützow-Holm Bay has been insufficiently worked out up to this date, because of the difficulty of ship operation in the pack ice. *Leptocollonia innocens*, *Harpovoluta charcoti*, *Pontiothauma elgata* and *Cyclocardia astartoides* were common to Breid Bay and Günnerus Bank (NUMANAMI, 1993). The beam-trawl caught many large sponges and spicules with mud from St. 34B-1, and a large mass of bryozoans and crinoids in St. 34B-2 and St. 34B-3. The constituents of the catch from St. 34B-2 included some soft bottom dwellers, such as *Aforia magnifica* and *P. elgata*. The faunal difference between these areas may be attributed to the bottom texture.

The benthic molluscan fauna of Enderby Land was observed by POWELL (1958), and 79 gastropods and 31 bivalves have hitherto been known. The present occurrences of *Torellia mirabilis*, *Chlanidota elongata*, *Chlanificula thielei* and *Notoadmete consobrina* are the first records of these species from Enderby Land.

The molluscan fauna of the Davis Sea was well worked out by THIELE (1912) based on the Deutschen Südpolar Expedition materials, and by EGOROVA (1982) on the Soviet Antarctic Expedition. TUCKER and BURTON (1987) also reported the shallow coastal marine fauna of the Vestfold Hills area in the Prydz Bay. Up to this date 106 gastropods and 43 bivalves are known from the Davis Sea. *A. multispiralis* was newly collected from the Davis Sea by the present survey. The constituents of the present catch from the Davis Sea contain soft bottom dwellers, except *Limatula (Antarctolima) hodgsoni* which is a hard bottom dweller (NICOL, 1966). According to NICOL (1966), *Cyclocardia astartoides* has been most frequently reported from a sandy bottom, and *Cuspidaria tenella* has been reported from ooze bottom and clay bottom. The knowledge of habitat and living mode of *Limopsis marionensis* is still insufficient. *L. marionensis* collected from such various bottom textures as hard rocky bottom, gravelly bottom, mud bottom with sponge spicules and sandy bottom (NICOL, 1966). This species has no byssus (NICOL, 1966). A Japanese allied species *L. tajimae* which does not byssate on small stones, was observed to lie on one valve just beneath the sediment surface (KONDO, 1989). These three species, *L. marionensis*, *Cyclocardia astartoides* and *Cuspidaria tenella*, seem to be endobiotic species. Therefore, the beam-trawl may have swept a hard bottom at St. 34B-8, and a soft bottom at St. 34B-9.

*A. multispiralis*, which had been reported from the Antarctic Peninsula, Bransfield Strait, the South Shetland Islands and South Orkney Islands, was first collected from Prydz Bay. The distribution area of this species is thus extended further to the east than in previous records, and new to the East Antarctic fauna. *Calliotropis (Calliotropis) pelseneeri rossiana* has hitherto been known from Ross Sea to Enderby Land (DELL, 1990), and its distribution range is slightly extended to the west.

The Ross Sea has been the best studied area in respect to the molluscan fauna, and

193 shell-bearing mollusca have been hitherto recorded (DELL, 1990). Among them, circum-Antarctic species are predominant, followed by East Antarctic species. Almost all species which were collected in this study have circum-Antarctic or Antarctic and Subantarctic distributions. Thus, it is suggested that the molluscan faunulae of these four areas are common to the East Antarctic molluscan fauna so far studied.

#### 4.2. Examination of presence of *N. eatoni* and *H. charcoti* in the catch

Comparing the molluscan fauna around Syowa Station with the other three areas under study, *Neobuccinum eatoni*, which is one of the most abundant whelks around Syowa Station (HOSHIAI, 1982; NUMANAMI *et al.*, 1984; NUMANAMI, 1993), was not found in the beam-trawl collections from off Lützow-Holm Bay and Prydz Bay. Although the present trawl samplings (195–776 m) were carried out within the known bathymetrical range of *N. eatoni*, only two empty shells of this species were collected from Casey Bay. POWELL (1958) reported two empty shells of *N. eatoni* from off Enderby Land, 603 m in depth. This species was collected by TUCKER and BURTON (1987) from the nearshore area of Davis Station, Prydz Bay, in 9 m depth. *N. eatoni* has wide geographic and vertical distribution ranges, such as Kerguelen Island to the Antarctic coastal waters, from 5.4 to 2350 m (DELL, 1990). According to HOSHIAI (1982), *N. eatoni* was collected in depths from 18 to 500 m around Syowa Station. In the present study, this species was also collected in depths from 10 to 680 m. This species adapts to a wide range of bottom textures, such as sand and pebbles, mud, sandy mud and rocky floor with pebbles (HOSHIAI, 1982). *N. eatoni* kept for several months in the laboratory, usually buried in the bottom sediment of gravel. When the beam-trawl sweeps the surface of the bottom or fish only a part of infaunal organisms that live near the surface of the sea floor, it may miss buried animals like *N. eatoni*.

*Harporoluta charcoti* was common to all four surveyed areas. According to ARNAUD (1985b), a large commensal sea-anemone, *Isosicyonis alba*, permanently adheres onto the shell of *H. charcoti*. In this collection, eight specimens (44% of total catch of this species) carry large sea-anemones. *H. charcoti* kept for several days in an aquarium on board SHIRASE, and did not become buried in the sediment. Therefore *H. charcoti* is seemingly an epibenthic species and it was easily collected with the beam-trawl.

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**Plate 1**

- Figs. 1, 2. *Puncturella spirigera* THIELE, 1912 (length 9.3 mm) St. 34B-1.  
Figs. 3, 4. *Iothia coppingeri* (SMITH, 1881) (length 15.1 mm) Nisi-no-ura Cove, about 10 m in depth.  
Figs. 5, 6. *Falsimargarita* sp. (length 3.8 mm) St. 34B-1.  
Figs. 7, 8. *Calliotropis (Calliotropis) pelseneeri rossiana* DELL, 1990 (length 13.4 mm) St. 34B-1.  
Fig. 9. *Leptocollonia innocens* (THIELE, 1912) St. 34B-1 (length 4.8 mm).  
Fig. 10. Small specimen of *Torellia mirabilis* (SMITH, 1907) (length 4.7 mm) St. 34B-6.  
Fig. 11. *Torellia mirabilis* (SMITH, 1907) (length 15.1 mm) St. 34B-5.

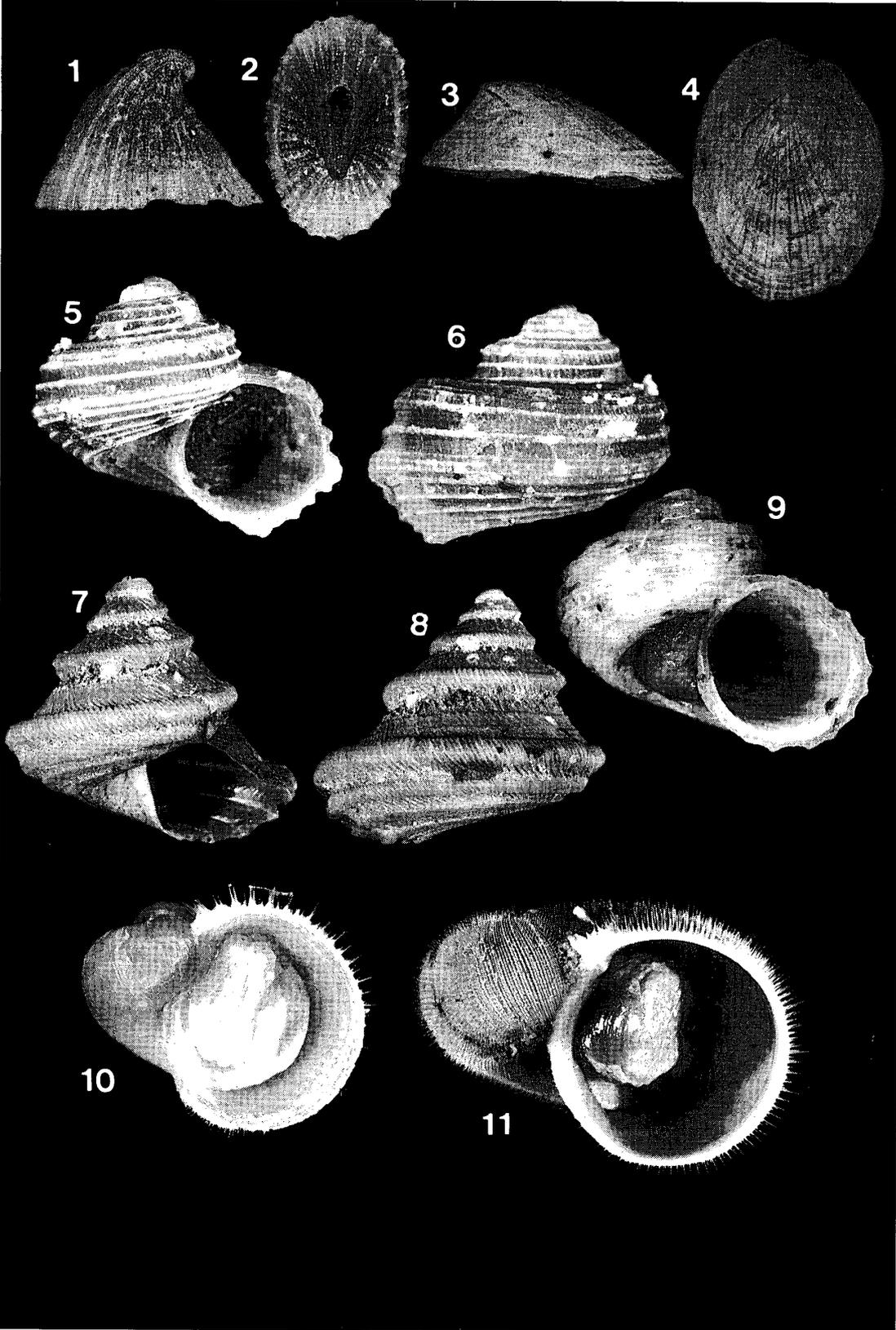
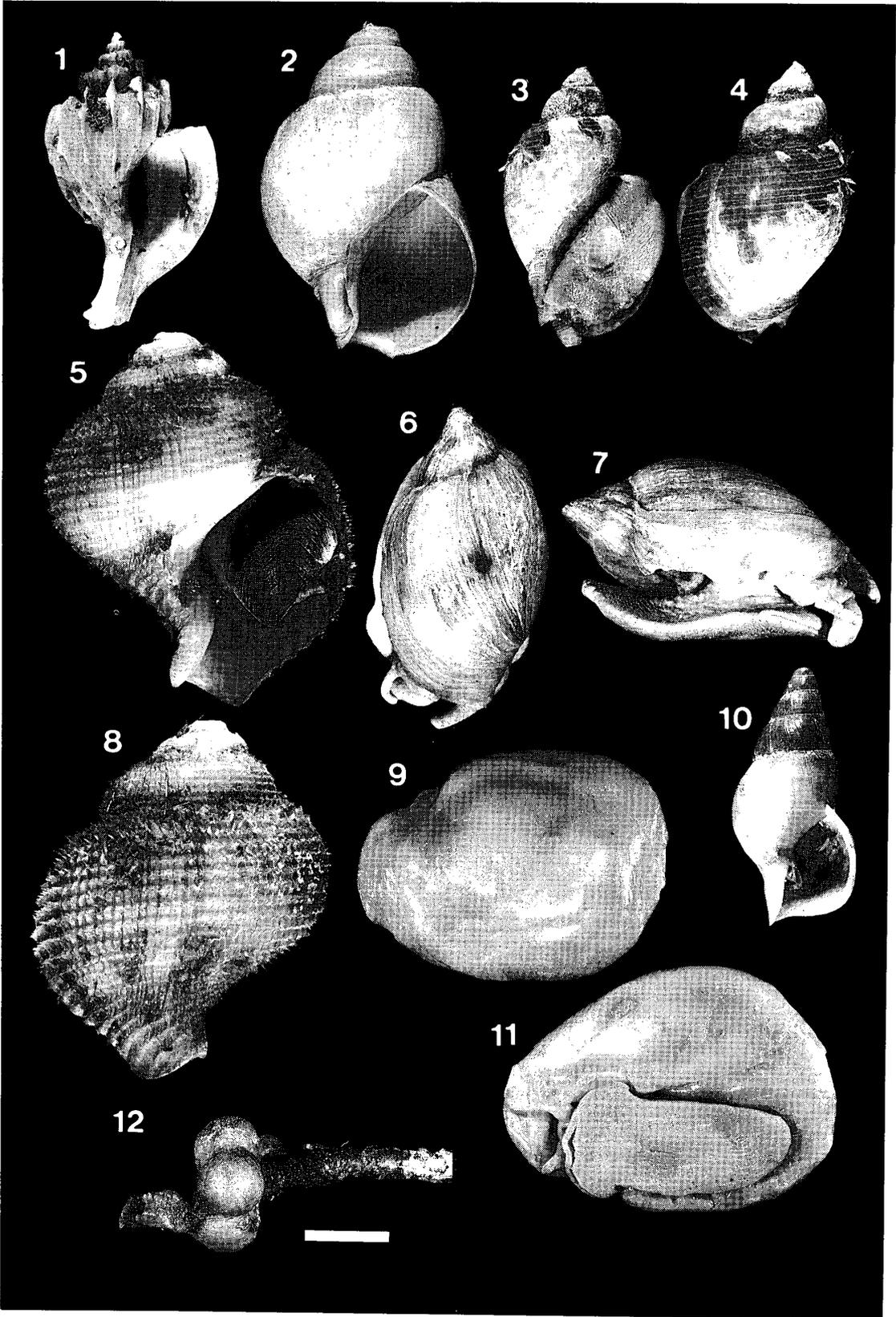


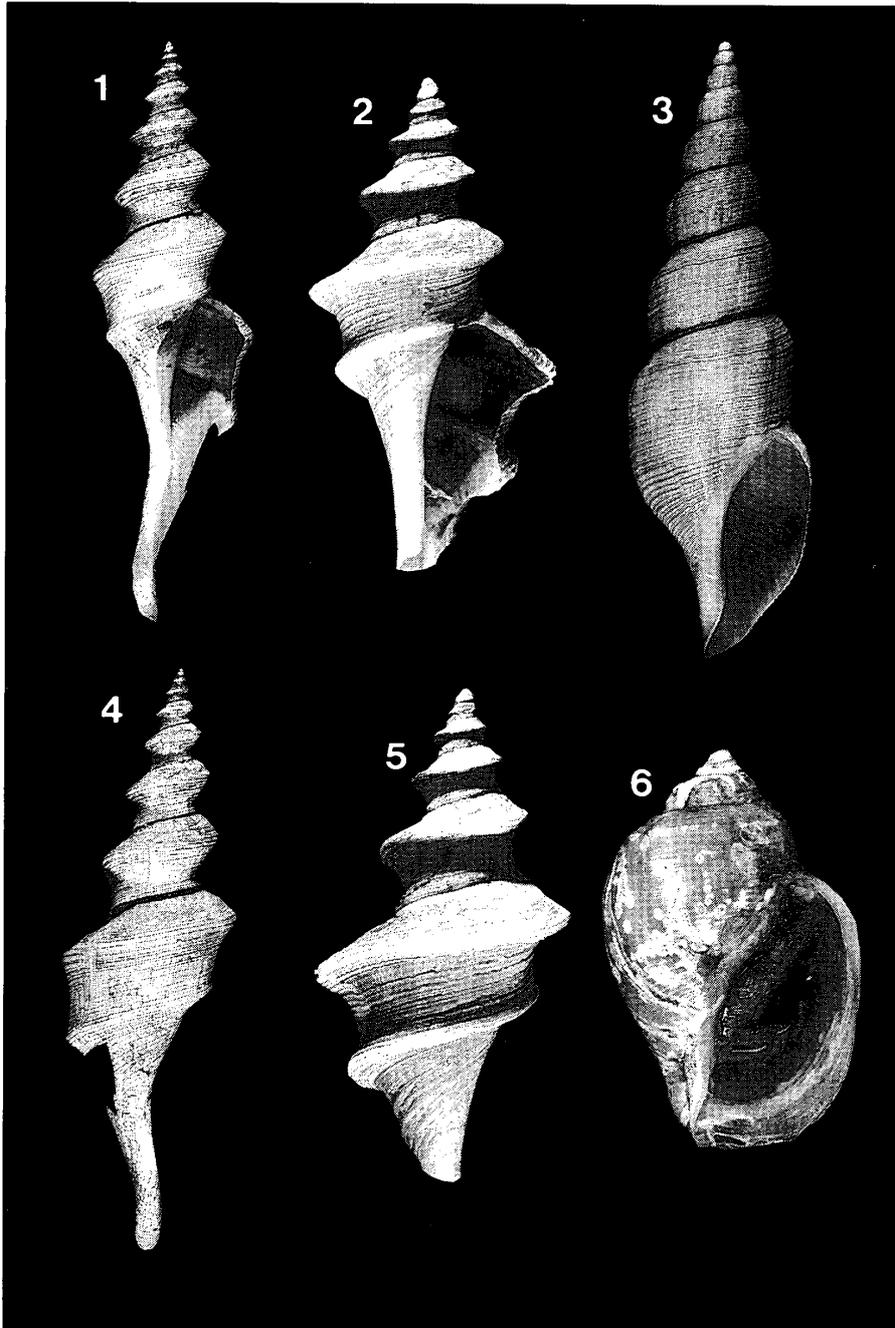
Plate 2

- Fig. 1. *Trophon shackletoni shackletoni* HEDLEY, 1911 (length 33.0 mm) Kita-no-ura Cove, 30 m in depth.
- Fig. 2. *Neobuccinum eatoni* (SMITH, 1875) (length 45.8 mm) St. 34B-6.
- Figs. 3, 4. *Chlanidota elongata* (LAMY, 1910) (length 29.3 mm) Kita-no-ura Cove, 30 m in depth.
- Figs. 5, 8. *Chlanificula thielei* POWELL, 1958 (length 24.9 mm) St. 34B-5.
- Figs. 6, 7. *Harpovoluta charcoti* (LAMY, 1910) (length 49.1 mm) St. 34B-2.
- Figs. 9, 11. *Marseniopsis mollis* (SMITH, 1902) (Body length 57.0 mm) Nisi-no-ura Cove, about 15 m in depth.
- Fig. 10. *Probuccinum tenuistriatum* HEDLEY, 1991 (length 20.6 mm) Kita-no-ura Cove, 30 m in depth.
- Fig. 12. Egg capsules of *Neobuccinum eatoni* (SMITH, 1875) Nisi-no-ura Cove, about 15 m in depth (white bar 10 mm).



**Plate 3**

- Figs. 1, 4. *Aforia magnifica* (STREBEL, 1908) (length 132.0 mm) St. 34B-2.  
Figs. 2, 5. *Aforia multispiralis* DELL, 1990 (length 40.8 mm; neck is broken) St. 34B-7.  
Fig. 3. *Pontiothauma elgata* HEDLEY, 1916 (length 85.9 mm) St. 34B-2.  
Fig. 6. *Nothoadmete consobria* (POWELL, 1951) (length 13.2 mm) St. 34B-5.



**Plate 4**

- Fig. 1. *Philobrya sublaevis* (PELSENEER, 1903) (length 12.4 mm) St. 34B-1.  
Fig. 2. *Dacrydium albidum* PELSENEER, 1903 (length 6.2 mm) St. 34B-1.  
Fig. 3. *Limatula (Antarctolima) hodgsoni* (SMITH, 1907) (length 25.3 mm) St. 34B-7.  
Figs. 4, 7. *Cyclopecten gaussianus* (THIELE, 1912) (length 5.9 mm) Ongul Strait, 159 m in depth.  
Fig. 5. *Cyclocardia astartoides* (MARTENS, 1878) (length 31.4 mm) St. 34B-8.  
Fig. 6. *Adamussium colbecki* (SMITH, 1902) from Nisi-no-ura Cove (shell is broken).  
Fig. 8. *Cuspidaria tenella* SMITH, 1907 (length 35.6 mm) St. 34B-8.  
Fig. 9. *Laternula elliptica* (KING and BRODERIP, 1831) (length 53.8 mm) Nisi-no-ura Cove, about 10 m in depth.  
Fig. 10. *Limopsis marionensis* SMITH, 1885 (length 50.1 mm) St. 34B-8.

