

Marine Mollusca Dredged by the "S. S. Hokuho-maru" during 1959 in the Okhotsk Sea

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(With 3 plates, 2 tables)

INTRODUCTION AND ACKNOWLEDGEMENTS

The importance of a fundamental analysis of the marine invertebrate fauna living in the region adjacent to the northern part of the Japanese Islands is recognized to be of value by several Japanese paleontologists and malacologists for the purposes of the interpretation of the fossil faunal composition, paleoecology, evolution and the other features especially during Pliocene and Pleistocene Periods. However, very few data are known concerning the marine invertebrates of the regions just mentioned, that is, the northern Japan Sea, along the Kurile Islands and the Okhotsk Sea.

Taking this opportunity the writer presents the systematics of the marine shellbearing molluscs dredged from the continental shelf off the Kamchatka Peninsula in the northeastern Okhotsk Sea as basic fundamentals for further study. In this paper only the systematics of the fauna will be given and descriptions on the ecology and fisheries of the fauna will be reserved for another paper.

The materials upon which this study is based were collected by Mr. Isamu Takeuchi, biologist of the Hokkaido Regional Fisheries Research Laboratory, Fisheries Agency of Japan during his survey on the fishing ground of the king crab [*Paralithodes camtschatica* (Tilesius)] in the late spring and summer of 1959 on board the "S. S. Hokuho-maru" of that Agency.

Here, the writer expresses his deep appreciation to Mr. Isamu Takeuchi who kindly entrusted the interesting materials to his study, and to the officials of the cited Laboratory for their permission to study and make public the valuable materials deposited in the Laboratory.

The writer is deeply indebted to and thanks Professor Kotora Hatai of the Institute of Geology and Paleontology, Tohoku University, who has been a constant source of encouragement and help in many ways. He is also indebted to Dr. Nettie MacGinitie of the Kerckhoff Marine Laboratory, California Institute of Technology, who has kindly sent her copy on the monograph of the marine molluscs of Point Barrow, Alaska to the writer for comparison.

Thanks are also due to Dr. Shozo Hayasaka of the Institute of Geology and Paleontology, Tohoku University for his help in various ways during this study, and to Mr. Kimiji Kumagai for his photographic work.

DREDGE OPERATION

The materials studied were all dredged from the continental shelf of the east coast of the Kamchatka Peninsula in the region limited from 52°00' to 58°08' North Latitude and from 155°06' to 156°37' East Longitude, and the stations were in the depth ranges of

50 m to 129 m. The dredge operations were undertaken as a project to investigate the benthonic animals utilizable as king crab bait, and Niino's C type dredge was employed for the purpose. The positions and the depths of the stations are shown in Table 1, and the station numbers with the notation of "Gill Net" indicate the station where the gill net for the king crab was used jointly with dredge operation.

From the 28 stations cited in Table 1, 50 species and three subspecies distributed among 40 genera were discriminated and they are summarized in Table 2.

Among the molluscan fauna shown in Table 2, 30 species and one subspecies distributed among 25 genera of Gastropoda were discriminated. These include 12 species which are recorded for the first time from the Okhotsk Sea, three new species, one species hitherto known from the Okhotsk Sea, and four undetermined forms owing to their ill preservations. The Pelecypoda comprise 19 species and two subspecies in 15 genera, among which three species are new records in the region, two are only known from the Okhotsk Sea and Japan respectively, and three are indetermined.

Of the 50 species and three subspecies (including new species and undetermined forms) of the marine molluscs in the present region, the followings are more or less common;

Margarites costalis, *M. beringensis*, *Turritellopsis stimpsoni*, *Bulbus (Amaulopsis) islandicus*, *Natica (Tectonatica) clausa*, *Trophonopsis* n. sp.?, *Colus (Aulacofusus) capponius*, *C. (Limatofusus) timetus*, *Chlamys islandicus erythrocomata*, *Astarte (Tridonta) borealis*, *A. (T.) montagui striata*, *Venericardia (Cyclocardia) crassidens*, *V. (C.) crebricostata*, *Liocyma fluctuosa* and *Mya (Arenomya) arenaria*.

The following families or subfamilies include more than two species; Margaritinae of the family Trochidae, Naticidae, Buccinidae (11 species), Turridae, Astartidae, Carditidae, Cardiidae, Veneridae and Tellinidae.

Table 1. Stations of Dredge Operation

St. No.	Date	Depth (in m)	N Lat.	E Long.
3	V 28 '59	77	56 45	155 15
9	29	55	56 44	155 28
11	30	50	56 39	155 26
15	VI 1	70	56 51	155 40
17	4	53	55 46.5	155 10.5
19	4	63	55 40	155 10
20	7	52	55 30	155 08
21	7	55	55 30	155 07
22	9	65	54 30	155 18
28	16	70	57 00	155 47
30	16	69	56 59.5	155 51
C-1 :2	20	129	53 00	155 06
C-1 :9	21	94	52 00	155 34
C-1 :10	21	60	54 30	155 14
33	22	60	52 00	156 00.5
36	22	60	52 00.5	156 00
40	24	70	53 32	155 20
42	25	70	54 00	155 18
45	27	65	54 30	155 18
Gill Net 8	VII 31	92	58 08	156 50
Gill Net 9	VIII 2	98	57 42	156 26
Gill Net 11	11	60	52 32	155 37.5
52	6	65	56 22.5	155 10
53	11	57	52 34	155 37
59	18	65	56 15	155 09
61	23	60	52 58	156 37
63	23	70	52 51	155 37
64	23	66	52 49	155 37

Table 2. Faunal List

Species	St. No.
<i>Puncturella nobilis</i> (A. Adams)	15
* <i>Margarites costalis</i> (Gould)	22, 40
<i>Margarites beringensis</i> (E. A. Smith)	9, 36
* <i>Tachyrhynchus</i> cfr. <i>reticulatus</i> (Mighels)	40
<i>Turritellopsis stimpsoni</i> Dall	40
* <i>Trichotropis</i> (<i>Ariadna</i>) <i>borealis</i> Broderip and Sowerby	40
* <i>Velutina</i> (<i>Velutina</i>) <i>velutina</i> (O. F. Müller)	42
<i>Velutina</i> n. sp.	63
<i>Bulbus</i> (<i>Amauropsis</i>) <i>islandicus</i> (Gmelin)	19, 20
* <i>Natica</i> (<i>Tectonatica</i>) <i>clausa</i> (Broderip and Sowerby)	C-1:9, 61
<i>Natica</i> (<i>Tectonatica</i>) <i>rusa</i> (Gould)	Gill Net 9
* <i>Euspira pallida</i> (Broderip and Sowerby)	C-1:9
* <i>Trophonopsis</i> (<i>Boreotrophon</i>) <i>beringi</i> (Dall)	45
<i>Trophonopsis</i> n. sp. ?	Gill Net 8
<i>Nucella lima</i> (Martyn)	42
<i>Liomesus ooides</i> (Middendorff)	Gill Net 11, 53
<i>Volutopsius</i> sp.	Gill Net 8
<i>Volutopsius</i> n. sp.	Gill Net 9
* <i>Anomalosipho capponius</i> (Dall)	3, 40
<i>Colus</i> (<i>Limatofusus</i>) <i>timetus</i> Dall	22, 59
<i>Latisipho dalmasius</i> (Dall)	22
<i>Plicifusus</i> (<i>Plicifusus</i>) <i>kroeyeri</i> (Möller)	3
<i>Plicifusus</i> (<i>Helicofusus</i>) <i>laticordatus</i> Dall	C-1:9
<i>Ancistrolepis</i> (<i>Clinopegma</i>) <i>magnus</i> Dall	21
<i>Neptunea vinosa</i> (Dall)	22
* <i>Neptunea</i> cfr. <i>middendorffiana</i> N. MacGinitie	17
<i>Volutomitra groenlandica</i> Gray	Gill Net 8
<i>Antiplanes vinosa</i> Dall	C-1:9
<i>Oenopota tenuissima</i> (Dall)	45
<i>Granotoma</i> cft. <i>surana</i> (Dall)	40
<i>Cylichna alba corticata</i> Möller	42
<i>Ennucula</i> sp.	C-1:2
<i>Portlandia</i> (<i>Megayoldia</i>) <i>thraciaeformis</i> (Storer)	C-1:2
<i>Yoldia</i> (<i>Cnesterium</i>) <i>johanni</i> Dall	C-1:10
<i>Solamen tamurai</i> (Habe)	C-1:9
<i>Solamen</i> cfr. <i>grisea</i> (Dall)	C-1:2
* <i>Musculus nigra</i> (Gray)	Gill Net 8, 59
* <i>Musculus corrugata</i> (Stimpson)	33
<i>Chlamys islandicus erythrocomata</i> (Dall)	Gill Net 8
* <i>Astarte</i> (<i>Tridonta</i>) <i>borealis</i> (Schmacher)	C-1:9, 40, 45
* <i>Astarte</i> (<i>Tridonta</i>) <i>montagui striata</i> (Leach)	40
<i>Astarte</i> (<i>Tridonta</i>) <i>bennettii</i> Dall	53
* <i>Venericardia</i> (<i>Cyclocardia</i>) <i>crassidens</i> (Broderip and Sowerby)	Gill Net 8, 28
* <i>Venericardia</i> (<i>Cyclocardia</i>) <i>crebricostata</i> (Krause)	64
<i>Venericardia</i> (<i>Cyclocardia</i>) <i>incisa</i> Dall	36
<i>Phlyctiderma semiasperoides</i> (Nomura)	52, 59
* <i>Clinocardium ciliatum</i> (Fabricius)	36
<i>Serripes laperousi</i> (Deshayes)	C-1:2
* <i>Liocyma fluctuosa</i> (Gould)	C-1:9, 21
<i>Liocyma</i> sp.	3
* <i>Macoma moesta</i> (Deshayes)	Gill Net 11
* <i>Peronidia lutea</i> (Wood)	11
<i>Mya</i> (<i>Arenomya</i>) <i>arenaria</i> Linné	19, 36

* Species reported from Point Barrow, Alaska (MacGinitie, 1959).

SYSTEMATICS

Phylum MOLLUSCA
 Class GASTROPODA
 Family Fissurellidae
 Subfamily Emarginulinae

Genus *Puncturella* Lowe, 1827

Type species: *Patella noachina* Linné, 1771. Recent, Arctic Sea.

Puncturella nobilis (A. Adams), 1860

Pl. 33, figs. 1, 8.

Cemoria nobilis A. Adams, 1860, p. 422; A. Adams in Sowerby, 1863, p. 208, pl. 245, figs. 6-9; Sowerby, 1873, sp. 6.

Puncturella nobilis, Pilsbry, 1890, p. 231, pl. 63, figs. 34-37; Thiele, 1919, p. 163, pl. 19, fig. 12; Yokoyama, 1922, p. 116, pl. 6, fig. 4; Otuka, 1935, p. 846, pl. 53, figs. 23a-c; Kira and Habe, 1949, p. 85; Taki in Hirase, 1951, pl. 62, fig. 6; Kira, 1959, p. 8, pl. 4, fig. 8.

Dimensions (in mm): -

Height: 8.6 Aperture: 13.6×10.2

Remarks: - One almost perfect living specimen partly covered with bryozoan colonies was dredged from St. 15.

This Japonic species has been recorded from areas farther south of the present region from where it ranges northwards to Saghalin. The distribution of the present form should be therefore reconsidered.

Occurrence: - St. 15, 70 m.

Geographical distribution: - Both coasts of Northeast Honshu and Hokkaido, Japan (Kuroda and Habe, 1952). The present region is a new locality for the present species.

Family Trochidae
 Subfamily Margaritinae

Genus *Margarites* Gray, 1847

Type species: *Turbo helycinus* Fabricius, 1780. Recent, Arctic Sea.

Margarites costalis (Gould), 1841

Pl. 33, fig. 2.

Trochus costalis Gould (*ex* Loven MS), 1841, p. 252 (*non vidi, fide* Rehder, 1937).

Margarita striata Broderip and Sowerby, 1829, p. 371 (*non* Leach, 1819) (*non vidi, fide* MacGinitie, 1959).

Turbo cinereus Couthouy, 1838, p. 99, pl. 3, fig. 9 (*non* Born, 1778) (*non vidi, fide* MacGinitie, 1959).

Margarita cinerea, Pilsbry in Tryon, 1889, p. 291, pl. 44, fig. 20 (substitute for *Turbo cinereus* Kiener, 1847-48); Sars, 1878, p. 134, pl. 9, figs. 1a-c.

Margarites cinereus, Kuroda and Habe, 1952, p. 65.

Margarites (Pupillaria) sordida, Dall, 1921, p. 178, pl. 17, figs. 11, 12 (*non* Hancock, 1846).

Margarites sordida, Kuroda and Habe, 1952, p. 65 (*non* Hancock, 1846).

Margarites costalis, Rehder, 1937, p. 115; MacGinitie, 1959, p. 75, pl. 1, figs. 1-7.

non *Margarita cinerea*, Yokoyama, 1920, p. 91, pl. 5, fig. 30 [= *Minolia nyssona* (Dall), 1919b, *fide* Taki and Oyama, 1954].

Dimensions (in mm): -

Height	Breadth	Height of Aperture	St. No.
14.9	13.4	8.6	40
13.6	13.8	8.2	40
12.0	12.2	7.7	22

9.8	11.3	6.4	22
8.9	9.3	5.7	22

Remarks :— Several more or less well preserved specimens are at hand.

The present species was first quoted in the synonymy by Gould (1841) as a manuscript name. Couthouy's species name *cinerea* had been adopted by several authorities for the present form, but according to Rehder (1937, p. 115),

“*Margarites (Pupillaria) cinereus* Couthouy 1839. Originally described as *Turbo cinereus* Couthouy (Journal Boston Soc. Nat. Hist., vol. 2, p. 99), this name is preoccupied by *Turbo cinereus* Born (Index Mus. Caes. Vind., p. 356), which, by the way, will have to be the name for the shell known as *Turbo porphyrites* Martyn 1786 or *Turbo versicolor* Gmelin 1792, as the description and rather poor figure show it to be the smooth form of this protean species (I have not seen Born's first work, but have used his Testacea Mus. Caes. Vind., 1780, p. 349, pl. 12, figures 25, 26); Brauer, who examined Born's type, with the aid of von Martens, came to this same conclusion (Sitzb. k. Akad. Wissensch. Wien. I Abth. Febr.-Heft, 1878, p. 177). For Couthouy's species we may use the combination *Margarites costalis* “Loven” Gould 1841, since this name is quoted in the synonymy by Gould as a manuscript name (Invertebrata of Massachusetts, p. 252).”

Occurrence :— St. 22, 65 m; St. 40, 70 m.

Geographical distribution :— Arctic coast, Bering Strait and the Okhotsk Sea, ? North Japan (Dall, 1921 as *sordida*). From the south of the Bering Strait and from Greenland and Norway (MacGinitie, 1959).

This is a new name to the fauna of the Okhotsk Sea.

***Margarites beringensis* (E. A. Smith), 1899**

Pl. 33, figs. 3-6.

Valvatella beringensis E. A. Smith, 1899, p. 206, fig. 1.

Margarites beringensis, Dall, 1921, p. 180, pl. 16, figs. 5, 6; Dall, 1925, p. 19, pl. 19, figs. 4, 6; Oldroyd, 1927c, p. 211, pl. 99, figs. 7, 8.

Dimensions (in mm) :—

Height	Breadth	Height of Aperture	St. No.
5.0	7.0	5.2	9
5.6	6.4	4.4	36

Remarks :— Two young fresh shells characterized by their narrow and shallow umbilicus and low spire were examined.

Occurrence :— St. 9, 55 m; St. 36, 60 m.

Geographical distribution :— Arctic Ocean, Plover Bay, Commander Islands, and Petrel Bank, Bering Sea (Dall, 1921). This is new to the molluscan fauna of the Okhotsk Sea.

Family Turritellidae
Subfamily Pareorinae

Genus ***Tachyrhynchus*** Mörch, 1868

Type species: *Turritella reticulata* Mighels, 1841. Recent, North Atlantic.

Tachyrhynchus cfr. *reticulatus* (Mighels), 1841

Pl. 33, fig. 7.

Compare with:

Turritella reticulata, Tryon, 1886, p. 208, pl. 64, fig. 15, pl. 65, fig. 25.

Tachyrhynchus reticulatus, Habe, 1961, p. 24, pl. 11, fig. 2.

non *Tachyrhynchus reticulatus*, MacGinitie, 1959, p. 86, pl. 5, fig. 9 (non Mighels, 1841, =? *Turritellopsis*).

Dimensions (in mm) :—

Height : 22.5	Width : 7.0	Height of Aperture : 5.3
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Remarks : - A faded specimen is in the collection.

Occurrence : - St. 40, 70 m.

Subfamily Turritellopsinae

Genus *Turritellopsis* Sars, 1878

Type species : *Turritella acicula* Stimpson, 1851. Recent, North Atlantic.

Turritellopsis stimpsoni Dall, 1919

Pl. 33, fig. 9.

Turritellopsis acicula, Sars, 1878, p. 186, pl. 10, figs. 14a-b; Wenz, 1939, p. 660, fig. 1879; Bousfield, 1960, p. 21, pl. 4, fig. 40 (*non* Stimpson, 1851).

Turritellopsis acicula stimpsoni Dall, 1919b, p. 247; Oldroyd, 1927c, p. 59; Grant and Gale, 1931, p. 776; Habe, 1961, p. 24, pl. 11, fig. 3.

Dimensions (in mm) : -

Height	Breadth	Height of Aperture
23.4	8.0	5.2
22.4	7.5	4.8
21.5	7.7	5.8
17.6	7.2	5.6
14.0	5.5	4.1

Remarks : - Five specimens lacking their protoconch and outer lip of the aperture were examined.

The present species was first discriminated from Stimpson's *acicula* as a variety based upon the materials from the Pacific coast of the United States of America by Dall in 1919, because of the rather broad apical or pleural angle of the shell and large number of lines making the spiral sculpture. The specimens examined are all sculptured with five spirals instead of three as in Stimpson's *acicula*, and have broad spires. According to the writer's experience in the classification of the Japanese *Turritella* fauna, these differences seem to be of great importance in taxonomy and beyond the ranges of specific variation.

Occurrence : - St. 40, 70 m.

Geographical distribution : - Nunivak Island; Port Etches; Shoal Bay, British Columbia and San Diego, California (Dall, 1919b). Volcano Bay of Hokkaido, Japan farther northward (Habe, 1961). This is a new addition to the Okhotsk fauna.

Family Trichotropidae

Subfamily Trichotropinae

Genus *Trichotropis* Broderip and Sowerby, 1829

Type species : *Turbo bicarinata* Sowerby, 1825. Recent, Arctic Sea.

Subgenus *Ariadna* P. Fischer, 1864

Type species : *Trichotropis borealis* Broderip and Sowerby, 1829. Recent, North Atlantic Ocean.

Trichotropis (Ariadna) borealis Broderip and Sowerby, 1829

Pl. 33, fig. 10.

Trichotropis borealis Broderip and Sowerby, 1829, p. 395 (*non vidi, fide* MacGinitie, 1959); Sowerby, 1866, p. 321, pl. 285, figs. 1-3; Jeffreys, 1867, p. 245, pl. 4, fig. 2; Sars, 1878, p. 163; Tryon, 1887, p. 42, pl. 7, figs. 44-48, 52, 59.

Trichotropis (Ariadna) borealis, Wenz, 1940, p. 891, fig. 2619.

Dimensions (in mm) : -

Height : 21.0	Breadth : 13.0	Height of Aperture : 12.6
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Remarks :— A well preserved specimen is in the collection. The present species is known from the northern Atlantic and Arctic Seas and also from the Bering Sea, but is new to the fauna of the Okhotsk Sea.

Trichotropis insignis Middendorff (1849) which is known from near the area dealt with in the present work, has an intimate affinity with the present form in the general shape of the spire and the surface sculpture, but the smooth base of the body whorl serves to distinguish it from the latter.

Occurrence :— St. 40, 70 m.

Geographical distribution :— Arctic Ocean, Sitka Island, Iceland, Faroe Isles, Norway, United States and Canada (Jeffreys, 1867). North Atlantic Ocean (Wenz, 1940). New to the present region.

Family Lamellariidae
Subfamily Velutinae

Genus *Velutina* Fleming, 1821

Type species : *Bulla velutina* O. F. Müller, 1776. Recent. Northern Atlantic Region.

Subgenus *Velutina* s. str.

Velutina (Velutina) velutina (O. F. Müller), 1776

Pl. 33, figs. 11–13.

Bulla velutina O. F. Müller, 1776, p. 242, pl. 101, figs. 1–4 (*non vidi, fide* Forbes and Hanley, 1853 and MacGinitie, 1959).

Velutina laevigata, Forbes and Hanley, 1853, p. 347, pl. 99 figs. 4, 5; Sars, 1878, p. 146; Tryon (*part.*), 1886 p. 67, pl. 27, figs. 41–44, 48 (*non fig. 59*); Oldroyd, 1927c, p. 140, pl. 92, fig. 8.

Velutina velutina, MacGinitie (*part.*), 1959, p. 95, pl. 6, fig. 4 (*non fig. 5 = Velutina velutina schneideri* Friele, 1886).

Dimensions (in mm) :—

Height : 10 Aperture : 10.0×7.5

Remarks :— A thin shell characterized by several fine spiral striae crossing the growth lines is in the collection. The present form is apparently distinguishable from the other species in the genus by its spiral sculptures on the whorl surface.

Occurrence :— St. 42, 70 m.

Geographical distribution :— The Siberian, Russian and Norwegian coasts, Arctic coast of Norway south to Portugal (rare); eastern Canada and Newfoundland south to Cape Hatteras (Thorson, 1944). Point Barrow, south through the Bering Sea and south to Puget Sound; also Kamchatka (MacGinitie, 1959). It may be a new member to the Okhotsk Sea.

Velutina n. sp.

Pl. 33, figs. 14, 15.

Dimensions (in mm) :—

Height : 38 Aperture : 23.5×37.0

Remarks :— Two well preserved specimens, large and small, are in the collection. The rather round outline and extremely low spire of the shell of the present form are very characteristic and such have never been reported or illustrated to date. This is a species new to science. The description of the species will be given at another opportunity in cooperation with Mr. I. Takeuchi of the Hokkaido Branch of the Research Institute of Fisheries.

Occurrence :— St. 63, 70 m.

Family Naticidae
Subfamily Polinicinae

Genus *Bulbus* T. Brown (in J. Smith), 1839

Type species: *Globulus smithii* Brown, 1838. Recent, Northeastern Atlantic Ocean.

Subgenus *Amaulopsis* Mörch, 1857

Type species (by subsequent designation, Dall, 1909): *Natica helicoides* Johnston, 1835 = *Nerita islandica* Gmelin, 1783–93. Recent, Arctic Seas.

Bulbus (Amaulopsis) islandicus (Gmelin), 1788–93

Pl. 33, fig. 16.

Nerita islandica Gmelin, 1788–93 (*non vidi*).

Amaulopsis islandica, Sars, 1878, p. 156, pl. 21, fig. 17; Bousfield, 1960, p. 16, pl. 2, fig. 20.

Bulbus (Amaulopsis) islandicus, Wenz, 1941, p. 1035, fig. 2965.

Dimensions (in mm) : –

Height	Breadth	Height of Aperture	St. No.
21.7	17.2	16.0	19
21.8	16.5	16.2	20
12.0	9.5	8.6	20
10.6	9.0	8.2	20

Remarks : – One specimen from St. 19 and three from St. 20 are in the collection, all of them are well preserved and covered with thin whitish brown coloured epidermis and their operculum are retained.

The angle of the shoulder and the breadth of the body whorl of the present form are more or less weaker than those of the Atlantic form, but these differences may be included in the limits of variation of the species.

Occurrence : – St. 19, 63 m; St. 20, 52 m.

Geographical distribution : – Arctic Norwegian Coast (Sars, 1878), Canadian Atlantic Coast (Bousfield, 1960), North Atlantic (Wenz, 1941). This is an additional member to the fauna of the Okhotsk Sea.

Subfamily Naticinae

Genus *Natica* Scopoli, 1777

Type species (by subsequent designation, G. F. Harris, 1897): *Natica vitellus* Linné, 1758. Recent, Indo-Pacific.

Subgenus *Tectonatica* Sacco, 1890

Type species (monotype): *Natica tectula* Bonelli. Pliocene of Italy.

Natica (Tectonatica) clausa Broderip and Sowerby, 1829

Pl. 33, fig. 17.

Natica clausa Broderip and Sowerby, 1829, p. 372 (*non vidi, fide* MacGinitie, 1959); Tryon (*part.*), 1886, p. 30, pl. 97, fig. 65; MacGinitie, 1959, pl. 1, fig. 10, pl. 12, fig. 8.

Natica (Cryptonatica) clausa, Dall, 1921, p. 163, pl. 14, fig. 11; Oldroyd, 1927c, p. 122, pl. 97, fig. 2; Abbott, 1960, p. 191, text-fig. 43b.

Natica (Tectonatica) clausa, Grant and Gale, 1931, p. 797, text-fig. 11.

Dimensions (in mm) : –

Height	Breadth	Height of Aperture	St. No.
18.4	20.0	16.1	61
11.3	—	9.5	9
10.3	9.6	9.0	9
9.4	—	8.2	9

Remarks: — One adult specimen from St. 61 and three youngs from St. 9 are in the collection. The protoconch or the nucleus and the first one or two postnuclear whorls of them are almost all eroded even in the younger forms.

The present form is common in the circumpolar regions extending from the Arctic Seas to the Aleutians, Kamchatka, Saghalin Island, and Japan.

Occurrence: — St. 9, 55 m; St. 61, 60 m.

Geographical distribution: — Circumpolar (MacGinitie, 1959). Arctic Ocean to North Carolina, Arctic Ocean to Southern California (Abbott, 1960). Arctic Ocean south to Pacific side of Northeast Honshu and the Japan Sea side of Japan (Kuroda and Habe, 1952). Arctic and Bering Seas, south, in gradually deeper water, to Japan or the west and San Diego, California, on the east (Dall, 1921).

Natica (Tectonica) russa (Gould), 1859

Pl. 33, fig. 18.

Natica russa Gould, 1859, p. 43; Dall, 1874, p. 251 (both *non vidi*, *fide* Grant and Gale, 1931); Tryon (*part.*), 1886, p. 31.

Natica (Cryptonica) russa, Oldroyd, 1927a, p. 123.

Natica (Tectonica) russa, Grant and Gale, 1931, p. 798.

Cryptonica aleutica Dall, 1919b, p. 352.

Natica (Cryptonica) aleutica, Dall, 1921, p. 164, pl. 14, fig. 10; Oldroyd, 1927c, p. 124.

Dimensions (in mm): —

Height: 29.0 Breadth: 26.4 Height of Aperture: 22.7

Remarks: — A more or less faded specimen is in the collection. The present species is somewhat allied to *Natica (Tectonica) clausa* Broderip and Sowerby in the features of the aperture and the base of the body whorl, but the larger size of the shell and slender shoulder of the whorls distinguish the former from the latter.

Occurrence: — Gill Net St. 9, 98 m.

Geographical distribution: — Bering Sea south of Catalina Island, California; and also Kamchatka and Japan (Grant and Gale, 1931). Bering Strait south to the Sanriku coast of Northeast Honshu, Japan (Kuroda and Habe, 1952).

Genus ***Euspira*** L. Agassiz (in J. Sowerby), 1838

Type species (by subsequent designation, Dall, 1908): *Natica glaucinoides* Sowerby, 1829. Eocene of England.

Euspira pallida (Broderip and Sowerby), 1829

Pl. 33, figs. 19, 20.

Natica pallida Broderip and Sowerby, 1829, p. 372 (*non vidi*, *fide* MacGinitie, 1959); Tryon, 1886, p. 37, pl. 9, fig. 76–78, pl. 13, fig. 15, pl. 14, figs. 26–28.

Polinices (Euspira) pallida, Dall, 1921, p. 164, pl. 14, fig. 5.

Polinices pallidus, MacGinitie, 1959, p. 91, pl. 12, fig. 10.

Lunatia pallida, Abbott, 1960, p. 190, text-fig. 43c.

Euspira pallida, Kuroda and Habe, 1952, p. 57.

Dimensions (in mm): —

Height	Breadth	Height of Aperture
18.4	16.0	16.0
11.8	10.0	9.5

Remarks : - Two specimens were collected from St. 9, among which the larger one is almost complete and with dark brown coloured corneous (instead of shelly) operculum.

Occurrence : - St. C-1 ; 9, 94 m.

Geographical distribution : - Arctic Ocean at Point Barrow and southward to the east of Forrester Island, Alaska. The island of Kolgnief in the Polar Sea and in the Okhotsk Sea (Middendorff) (Dall, 1921). Arctic Seas to off North Carolina, Arctic Seas to California (Abbott, 1960). Bering Strait southward to Northeast Honshu, Japan (Kuroda and Habe, 1952).

Family Murcidae
Subfamily Murcinae

Genus *Trophonopsis* Buquoy, Dautzenberg and Dollfus, 1882

Type species : *Murex muricata* Montagu, 1803. Recent, Atlantic Coast of England.

Subgenus *Boreotrophon* P. Fischer, 1884

Type species (monotype) : *Murex clathratus* Linné, 1758. Recent, Arctic Region.

Trophonopsis (Boreotrophon) beringi (Dall), 1902

Pl. 33, fig. 21.

Boreotrophon beringi Dall, 1902c, p. 544; Habe, 1961, p. 53, pl. 27, fig. 13.

Trophon (Neptunea) beringi, Dall, 1921, p. 109, pl. 10, fig. 6.

Trophon beringi, Oldroyd, 1927a, pl. 18, fig. 8; 1927b, p. 33, pl. 30, fig. 6.

non Boreotrophon beringi, MacGinitie, 1959, p. 99, pl. 7, figs. 11, 12.

Dimensions (in mm) : -

Height : 22.6 Breadth : 10.0 Height of Aperture : 8.8

Remarks : - A somewhat water worn specimen was examined. The number of the varices and the long siphonal canal of the present form safely identifies it with *beringi* of Dall.

MacGinitie (1959) has reported *Boreotrophon beringi* from Point Barrow, Alaska, but the description and illustration of her species is considerably different from *beringi* in the rather large number of varices and shorter siphonal canal of the aperture.

Occurrence : - St. 45, 65 m.

Geographical distribution : - Icy Cape, Arctic Ocean to Puget Sound, and Japan (Dall, 1921). Southern Kurile Islands (?) (Kuroda and Habe, 1952).

Trophonopsis sp. (n. sp. ?)

Pl. 33, figs. 22, 23.

Dimensions (in mm) : -

Height	Breadth	Height of Aperture
21.1	13.7	11.0
21.1	11.4	9.5

Remarks : - A well preserved living shell and a faded dead one with the remain of a hermit crab were dredged from a depth of 92 m at St. 8. The form is characterized by its low but sharp varices on the whorl surface and spiral sculptures even on the base of the body whorl.

Occurrence : - Gill Net St. 8, 92 m.

Subfamily Drupinae

Genus *Nucella* [Bolten] Röding, 1798Type species (by subsequent designation, Dall, 1909): *Buccinum filosa* Gmelin = *Buccinum lapillus* Linné, 1758. Recent, Atlantic Ocean.*Nucella lima* (Martyn), 1784

Pl. 33, fig. 24.

Buccinum lima Martyn, 1784, figs. 46 (*non vidi, fide* Tryon, 1880).*Purpura (Polytropha) lima*, Tryon, 1880, p. 175, pl. 53, figs. 156-159, 161.*Purpura attenuata* Reeve, 1846, pl. 10, sp. 49.*Purpura lapillus*, Forbes and Hanley (*part.*), 1853, p. 380, pl. 102, fig. 3 (*non* figs. 1, 2).*Thais (Nucella) lima*, Dall, 1915, p. 566, pl. 75, figs. 4-6; Dall (*part.*), 1921, p. 112; Oldroyd, 1927b, p. 44, pl. 36, figs. 4-6; Grant and Gale, 1931, p. 717, pl. 32, fig. 15.*Thais (Polytropha) lima*, Abbott, 1960, p. 216, text-fig. 48d.*Dimensions* (in mm): -

Height: 41.5+

Breadth: 29.0

Height of Aperture: 30.0

Remarks: - A specimen which lacks its protoconch was examined. The body and penultimate whorls are covered with thin epidermis and the whorls younger than the penultimate one are more or less heavily eroded. The surface sculptures are rather weaker than those of the normal form of the present species.*Occurrence*: - St. 40, 70 m.*Geographical distribution*: - Kotzenbue Sound, Arctic Ocean, south on the west to Bering Island, the Kurile Islands and Northern Japan, on the east to the Aleutian Islands, Alaska, Monterey and San Diego, California and Cerros Island, Lower California (Dall, 1921). The specimens from Northern Japan should be allocated to the species *freycineti* (Deshayes), 1839.

Family Buccinidae

Genus *Liomesus* Stimpson, 1865Type species: *Buccinum dalei* J. Sowerby, 1825. Pliocene of England.*Liomesus ooides* (Middendorff), 1848

Pl. 33, figs. 25, 26.

Buccinum ooides Middendorff, 1848, p. 6 (*non vide, fide* Oldroyd, 1927a).*Liomesus ooides*, Oldroyd, 1927a, p. 198; Kuroda and Koba, 1933, p. 156, pl. 14, fig. 3.*Buccinum chishimanum*, Kinoshita, 1937, p. 14, pl. 4, fig. 24 (*non* Pilsbry, 1904).*Dimensions* (in mm): -

Height	Breadth	Height of Aperture	St. No.
36.7	22.8	18.5	Gill Net 11
24.5	22.0	18.6	Gill Net 11
23.0	17.0	14.5	53

Remarks: - Three specimens with hermit crabs are in the collection. Although the surface of the shells are partly covered with the membranous colonies of bryozoans and attached small barnacles, the characteristics of the shells can be examined.*Liomesus ooides canaliculatus* Dall is closely related to the present form, but its rather globose whorls distinguish it from the named species. *Liomesis bistriatus* Dall, 1907 (typographic error *Liomesus*) also resembles *ooides* in the shape of the whorls and the characters of the aperture, but *bistriatus* has more or less distinct sculpture of two spirals around the surface of the whorls, instead of very finely and spirally striated ones as in the

present one.

Occurrence : - St. 53, 57 m, Gill Net St. 11, 60 m.

Geographical distribution : - Hitherto only known from the Okhotsk Sea.

Genus *Volutopsius* Mörch in Rink, 1857

Type species : *Fusus largillierti* Petit de la Sausaye, 1851. Recent, Greenland.

Volutopsius sp.

Pl. 33, fig. 31.

Dimensions (in mm) : -

Height : 44.0 Breadth : 20.0 Height of Aperture : 24.5

Remarks : - One specimen was examined; the abapical part of the outer lip of the aperture is incomplete. The general shape of the present shell agrees well with that of *Volutopsius regularis* Dall, 1878, but the surface of the whorls in being densely covered with fine uniform spiral striae is very akin to *Volutopsius attenuatus* Dall, 1874. Although at a glance, the present shell seems to be a form intermediate between the above mentioned two species, it may be new to science. The proposal of a new species name is reserved until more specimens are obtained.

Occurrence : - Gill Net St. 8, 92 m.

Volutopsius n. sp.

Pl. 33, fig. 34.

Dimensions (in mm) : -

Height : 107 Breadth : 55 Height of Aperture : 70

Remarks : - A heavy and large specimen with a hermit crab was examined. Although the majority of the shell surface is covered with the membranous colonies of bryozoans, the characters of the shell are well preserved. The present form is somewhat allied to *Volutopsius norvegicus* (Chemnitz) (*vide* Tryon, 1881), but the former is distinguished from the latter in having slender shell and elongate aperture. *Volutopsius middendorffi* (Dall), 1891 is also akin to the present form, but the smooth shell surface of the latter apparently differs from the finely and spirally sculptured shell surface of the former.

Volutopsius middendorffi emphaticus Dall, illustrated by Habe (1961) also resembles the present form, but its rather globose shell outline is different from the present one. As mentioned above, the shell characters show that the present form can be distinguished from any allied species hitherto described, and the proposal of a new specific name will be given at another opportunity.

Occurrence : - Gill Net St. 9, 98 m.

Genus *Colus* [Bolten] Röding, 1798

Type species (by subsequent designation, Dall, 1906) : *Murex islandicus* Gmelin, 1790. Recent, Arctic Seas.

Subgenus *Limatofusus* Dall, 1918

Type species : *Colus tahwitanus* Dall, 1918. Recent, Washington Coast.

Colus (Limatofusus) timetus Dall, 1919

Pl. 33, fig. 27.

Aulacofusus (Limatofusus) timetus Dall, 1919b, p. 318.

Colus (Limatofusus) timetus, Dall, 1925, p. 14, pl. 1, fig. 2.

Colus timetus, Oldroyd, 1927a, p. 219, pl. 13, fig. 2.

Dimensions (in mm) : -

Height	Breadth	Height of Aperture	St. No.
37.6	18.6	20.8	22
25.0	12.9	15.5	59
24.0	11.0	12.7	59

Remarks : - Three fresh specimens were examined, among which one from St. 22, is an adult and the others from St. 59 are premature.

Although the younger whorls of all the specimens are eroded, the surface sculptures and the features of the aperture are identical with the named species.

Occurrence : - St. 22, 65 m; St. 59, 65 m.

Geographical distribution : - Unalaska, Aleutian Islands (Dall, 1925).

Genus *Anomalosipho* Dautzenberg and H. Fischer, 1912

Type species (by subsequent designation, Dall, 1916) : *Sipho verkurzensis* Dautzenberg and H. Fischer, 1897 = *Colus dautzenbergi* Dall, 1916. Recent, Atlantic Ocean.

Anomalosipho capponius (Dall), 1919

Pl. 33, fig. 36.

Colus (Aulacofusus) capponius Dall, 1919b, p. 317; Dall, 1925, p. 12, pl. 3, fig. 2.

Colus capponius, Oldroyd, 1927a, p. 217, pl. 9, fig. 2.

Dimensions (in mm) : -

Height	Breadth	Height of Aperture	St. No.
52	24	25	3
60	29	27	40

Remarks : - Two specimens are at hand. Both are fresh, but the whorls are considerably eroded even in the apertural part of the body whorls, and are characterized by the distinct inner lip of the aperture.

The present species has been placed under the subgenus *Aulacofusus* of the genus *Colus* by the original author, but the rather slender outline and the surface sculptures indicate its reference to the genus *Anomalosipho*.

Occurrence : - St. 3, 77 m : St. 40, 70 m.

Geographical distribution : - Bering Strait, near Port Clarence (Oldroyd, 1927a). This is the first occurrence in the Okhotsk Sea.

Genus *Latisipho* Dall, 1916

Type species : *Chrysodomus hypolipsus* Dall, 1891. Recent, Bering Sea.

Latisipho dalmasius Dall, 1919

Pl. 33, fig. 35.

Colus (Latisipho) dalmasius Dall, 1919b, p. 322; Dall, 1925, p. 12, pl. 1, fig. 9; Oldroyd, 1927a, p. 227, pl. 13, fig. 9.

Dimensions (in mm) : -

Height : 58.2 Breadth : 31.4 Height of Aperture : 31.0

Remarks : - A well preserved specimen is in the collection. The adapical part on the outer lip of the aperture is somewhat protruded and slightly retracted behind in com-

parison with the original form of the present species.

Occurrence :— St. 22, 65 m.

Geographical distribution :— Off British Columbia (Dall, 1925). This is new to the present region.

Genus *Plicifusus* Dall, 1902

Type species : *Fusus krøyeri* Möller, 1842. Recent, Circumboreal.

Subgenus *Plicifusus* s. str.

Plicifusus (Plicifusus) krøyeri (Möller), 1842

Pl. 33, fig. 30.

Fusus krøyeri Möller, 1842, p. 19 (*non vidi*, *fide* MacGinitie, 1959).

Sipho krøyeri, Tryon (*part.*), 1881, p. 130, pl. 53, figs. 333–336 only (*non* figs. 349–351).

Plicifusus krøyeri, Oldroyd, 1927a, p. 206; MacGinitie, 1959, p. 126, pl. 10, figs. 11–13.

Plicifusus verkruzeni, Oldroyd, 1927a, p. 208 (*fide* MacGinitie, 1959).

Dimensions (in mm) :—

Height : 41.4

Breadth : 17.0

Height of Aperture : 21.4

Remarks :— A single specimen was examined. The original description of the present species is not adequate and therefore, the specific identification is based upon the work of MacGinitie (1959). The present form well agrees with her remarks, discussion and the illustration.

Habe (1961) recorded and illustrated *Plicifusus (Retifusus) plicatus* (A. Adams), 1864 from Hokkaido and Saghalin, his species is also allied to the present one in the general features of the shell, but differs in the more or less sharply and finely incised spiral sculpture on the whole surface of the shell. This character is the most important characteristic of the subgenus *Retifusus* Dall, 1916.

Occurrence :— St. 3, 77 m.

Geographical distribution :— Point Barrow to Vladivostok, Gulf of Peter the Great, and Japan Sea, and the east coast of Siberia (Burch, 1945). Parry Island to Labrador, Newfoundland to Cape Cod, Greenland, Jan Mayen, and Spitzbergen (Thorson, 1944) (both *fide* MacGinitie, 1959).

Subgenus *Helicofusus* Dall, 1916

Type species : *Chrysodomus laticordatus* Dall, 1907. Recent, Bering Sea.

Plicifusus (Helicofusus) laticordatus (Dall), 1907

Pl. 33, fig. 29.

Tritonofusus (Plicifusus) aurantius laticordatus Dall, 1907, p. 160.

Plicifusus (Helicofusus) laticordatus, Dall, 1921, p. 92.

Plicifusus laticordatus, Dall, 1925, p. 25, pl. 1, fig. 4; Oldroyd, 1927a, p. 211, pl. 13, fig. 4.

Dimensions (in mm) :—

Height : 31.0

Breadth : 17.5

Height of Aperture : 17.0

Remarks :— A well preserved fresh specimen and a broken shell are in the collection. The present species is additional to the region dealt with.

Occurrence :— St. C-1 : 9, 94 m.

Geographical distribution :— Bering Sea south to Fuca Strait (Dall, 1921). Bristol Bay, Alaska (Dall, 1925). It is a new member of the Okhotsk fauna.

Genus *Ancistrolepis* Dall, 1894

Type species : *Chrysodomus eucosmius* Dall, 1891. Recent, Northern Pacific.

Subgenus *Clinopegma* Grant and Gale, 1931

Type species: *Buccinum unicum* Pilsbry, 1905 = *Chrysodomus (Ancistrolepis) magnus* Dall, 1895. Recent, Bering Sea.

Ancistrolepis (Clinopegma) magnus (Dall), 1895

Pl. 33, fig. 37.

Chrysodomus (Ancistrolepis) magnus Dall, 1895, p. 709, pl. 29, fig. 5.

Ancistrolepis magnus, Dall, 1921, p. 92; Kinoshita, 1937, p. 12, pl. 3, fig. 18.

Ancistrolepis (Clinopegma) magna, Wenz, 1941, p. 1161, fig. 3302.

Buccinum unicum Pilsbry, 1905, p. 102.

Neptunea (Sulcosipho) magna, Grant and Gale, 1931, p. 660.

Dimensions (in mm):—

Height: 36 Breadth: 25 Height of Aperture: 23

Remarks:— A specimen with a hermit crab is in the collection. The outer lip of the aperture is slightly broken and the protoconch is a little eroded. However, it shows the surface sculpture characteristic to the present species, especially the ridge forming the shoulder of the whorl and the rather distinct and broad spirals on the base of the body whorl.

Occurrence:— St. 21, 55 m.

Geographical distribution:— Okhotsk and Bering Seas (Dall, 1921). Japan (Pilsbry, 1905). Kezennuma, Rikuzen (= Kesennuma, Miyagi Prefecture) to Kuril (Wenz, 1941). Nemuro, Hokkaido (Kinoshita, 1937).

Genus *Neptunea* [Bolten] Röding, 1798

Type species (by subsequent designation, Cossmann, 1901): *Murex antiqua* Linné, 1758, Recent, Atlantic.

Neptunea vinoso (Dall), 1919

Pl. 34, fig. 6.

Chrysodomus vinosus Dall, 1919b, p. 323; Dall, 1925, p. 10, pl. 6, fig. 3; Oldroyd, 1927a, p. 232, pl. 22, fig. 3.

Neptunea vinoso, Habe, 1961, p. 59, pl. 30, fig. 7.

Dimensions (in mm):—

Height: 3.25 Breadth: 18.8 Height of Aperture: 21.6

Remarks:— A well preserved fresh young specimen was examined. The angle of the main spiral is rather stronger than that of the adult one.

Occurrence:— St. 22, 65 m.

Geographical distribution:— Avacha Bay, Kamchatka (Dall, 1925). Western Bering Sea and Avacha Bay, Kamchatka (Oldroyd, 1927a). Northeast Honshu, Japan and northward (Habe, 1961).

Neptunea cfr. *middendorffiana* MacGinitie, 1959

Pl. 34, fig. 5.

Compare with:

Neptunea middendorffiana MacGinitie, 1959, p. 124, pl. 14, figs. 7–10.

Dimensions (in mm):—

Height: 117 Breadth: 73 Height of Aperture: 75

Remarks : - A well preserved fresh large specimen is in the collection. On the base of the body whorl are attached several barnacles. The shell is very heavy and the lamellose sculpture is developed near the terminal part of the body whorl surface.

Occurrence : - St. 17, 53 m.

Family Volutidae
Subfamily Volutomitrinae

Genus *Volutomitra* H. and A. Adams, 1853

Type species (monotype) : *Mitra groenlandica* Möller, 1842. Recent, Arctic Atlantic Ocean.

Volutomitra groenlandica (Möller), 1842

Pl. 33, fig. 32.

Mitra grönländica Möller, 1842 (*non vidi, fide* Wenz, 1943).

Mitra groenlandica, Reeve, 1843, pl. 15, sp. 106; Sowerby, 1880, p. 25, pl. 22, figs. 5, 19; Tryon, 1882, p. 124, pl. 36, fig. 83.

Volutomitra groenlandica, H. and A. Adams, 1858, p. 172, pl. 19, fig. 2; Wenz, 1943, p. 1354, fig. 3831.

Volutomitra alaskana, Habe, 1961, p. 71, pl. 35, fig. 9 (*non* Dall, 1902a).

Dimensions (in mm) : -

Height : 17.2 Breadth : 8.1 Height of Aperture : 10

Remarks : - A well preserved specimen is at hand. Although the generic position of the present species has been discussed by several authors, the writer could not examine the animal of the present form, so here, he provisionally follows the arrangement of Wenz (1943), and separates the genus *Volutomitra* from *Mitra*.

Volutomitra alaskana Dall recorded from the Bering Sea and the Aleutians by Dall (1902a) is one of the most allied forms listed in the genus, but it apparently differs from the present species in having a rather large shell with minute spiral striations on the surface, and a larger proportion of the diameter to the total length of the shell.

Habe's form (1961) illustrated from Japan under the name of *alaskana* is also closely allied to the present form, and judging from his illustration and explanation, his form may better be included into the present species from its smooth surface and rather slender shell.

Occurrence : - Gill Net St. 8, 92 m.

Geographical distribution : - Hitherto known only from Greenland. Japan and the Okhotsk Sea are the new localities for the species.

Family Turridae
Subfamily Turrinae

Genus *Antiplanes* Dall, 1902

Type species : *Pleurotoma perversa* Gabb, 1865. Post-Pliocene of California.

Antiplanes vinosa (Dall), 1874

Pl. 33, fig. 33.

Pleurotoma vinosa Dall, 1874, p. 253 (*non vidi, fide* Dall, 1921).

Antiplanes vinosa, Dall, 1902b, pl. 34, fig. 1 (*non vidi, fide* Dall, 1921); Dall, 1921, p. 91; Oldroyd, 1927a, p. 82, pl. 28, fig. 4.

Dimensions (in mm) : -

Height : 38.8 Breadth : 14.7 Height of Aperture : 17.6

Remarks :— Three specimens among which one is full grown and the others still young are in the collection. Their shells have distinct sinus, and the trace of the deepest point of the sinus forms the selenizone like sculptures on the adult whorls, thus they can be included into *vinosa* of Dall.

Occurrence :— St. C-1 : 9, 94 m.

Geographical distribution :— Bering Sea to San Diego (Dall, 1921). This is new to the Okhotsk Sea.

Subfamily Brachytominae

Genus *Oenopota* Mörch, 1852

Type species (by subsequent designation, Dall, 1919) : *Fusus pleurotomarius* Cou-thouy, 1839. Recent, Massachusetts Bay.

Oenopota tenuissima Dall, 1919

Pl. 33, fig. 28.

Lora tenuissima Dall, 1919a, p. 49, pl. 15, fig. 5; Oldroyd, 1927a, p. 105.

Dimensions (in mm) :—

Height : 10.0 Breadth : 4.5 Height of Aperture : 4.7

Remarks :— A single small specimen was examined. The present species was, hitherto, only known from the type locality.

Occurrence :— St. 45, 65 m.

Geographical distribution :— Chernoffski Harbor, Unalaska Island, Alaska (Dall, 1919a). New to the Okhotsk Sea.

Genus *Granotoma* Bartsch, 1941

Type species :— *Bela krausei* Dall, 1865. Recent, Port Etches, Alaska.

Granotoma cfr. *surana* (Dall), 1919,

Pl. 34, fig. 4.

Compare with :

Lora surana Dall, 1919a, p. 45, pl. 14, fig. 6.

Lora surana, Oldroyd, 1927a, p. 114.

Dimensions (in mm) :—

Height	Breadth	Height of Aperture
10.4	5.1	5.5
9.6	5.3	6.4

Remarks :— Two small faded shells in which the remains of a hermit crab are preserved were examined. The present form closely resembles in the general features of the species here compared with, but the details of the surface sculptures can not be examined owing to being worn.

Occurrence :— St. 40, 70 m.

Family Scaphanderidae

Genus *Cylichna* Loven, 1846

Type species (by subsequent designation, Herrmannsen, 1852) : *Bulla cylindracea* Pennant, 1777. Recent, European Seas.

Cylichna alba corticata Möller, 1842

Pl. 34, figs. 1-3.

Bulla corticata Möller in Beck, 1842, p. 79 (*non vidi, fide* Pilsbry in Tryon, 1893); A. Adams in Sowerby, 1855, p. 592, pl. 125, fig. 138.

Cylichna alba corticata, Sars, 1878, p. 283, pl. 17, figs. 1a-c.

Dimensions (in mm) :-

Length : 8.8 Breadth : 4.0

Remarks :- A well preserved brown coloured specimen is in the collection. The subspecies is closely allied to the species in several characteristics especially in the slightly sunken apex covered with the callus except for rather narrow form of the shell. Since the species was established, it has been reported and illustrated from the circumboreal regions by many authors, that is, by Sars (1878) from the coast of Norway, by Dall (1921) from the Arctic and Northern Pacific Oceans and by Bousfield (1960) from the Canadian Atlantic, but they are all distinguished from the subspecies in the shape of the shell.

Occurrence :- St. 42, 70 m.

Geographical distribution :- Arctic Seas, Norway and Greenland. This is a new name to the Okhotsk Sea fauna.

Class PELECYPODA

Family Nuculidae

Genus *Ennucula* Iredale, 1931

Type species : *Nucula obliqua* Lamarck, 1816. Recent, type locality unknown to the present writer.

Ennucula sp.

Remarks :- A crushed specimen with a part of the animal still adhered was obtained from St. C-1 : 2, 129 m in depth.

Family Nuculanidae

Genus *Portlandia* Mörch, 1857

Type species (by subsequent designation, Dall, 1896) : *Arca arctica* Gray, 1847. Recent, Arctic Sea.

Subgenus *Megayoldia* Verrill and Bush, 1897

Type species : *Yoldia thraciaeformis* Storer, 1838. Recent, original locality unknown to the present writer.

Portlandia (Megayoldia) thraciaeformis (Storer), 1838

Pl. 34, figs. 8, 9.

Yoldia thraciaeformis Storer, 1838, p. 122 (*non vidi, fide* Uozumi, 1957); Sowerby in Reeve, 1873, *Yoldia* pl. 1, sp. 1; Grant and Gale, 1931, p. 128, pl. 1, fig. 12; Otuka, 1934, p. 609, pl. 47, figs. 5, 6; Kanehara, 1937, p. 20, pl. 5, fig. 4; Nomura, 1935b, p. 33, pl. 4, fig. 10; Minato and Uozumi, 1951, p. 11, figs. 102, 103.

Yoldia scapha Yokoyama, 1926a, p. 247, pl. 31, figs. 7-11 (*non* Yokoyama, 1926b); Yokoyama, 1929, p. 394, pl. 75, figs. 5, 6.

Portlandia (Megayoldia) thraciaeformis, Habe, 1951, p. 26, figs. 24, 25; Uozumi, 1955, p. 28, pl. 23, figs. 189a-b; Uozumi, 1957, p. 574, pl. 1, figs. 5, 5a, 7, 8, 8a, pl. 7, figs. 23, 24.

Dimensions (in mm) :-

Height : 16.4 Breadth : 26.3 (right valve)

Remarks :- A single right valve was examined. The features of the resilifer pit and the hinge teeth of the present form, and the outline of the shell refer it to *thraciaeformis*.

Occurrence :— St. C-1 : 2, 129 m.

Geographical distribution :— Arctic Norwegian coast (Sars, 1878). Fukushima Prefecture ?. Hokkaido northward to Arctic Ocean (Kuroda and Habe, 1952).

Genus *Yoldia* Möller, 1842

Type species (by subsequent designation, Gardner, 1916) : *Nuculana arctica* Möller, 1842 (*non* Gray, 1824). Recent, Arctic Sea.

Subgenus *Cnesterium* Dall, 1898

Type species : *Yoldia scissurata* Dall, 1897. Recent, Arctic Sea.

Yoldia (Cnesterium) johanni Dall, 1925

Pl. 34, fig. 7.

Yoldia (Cnesterium) johanni Dall, 1925, p. 32, pl. 29, fig. 7; Habe, 1951, p. 26, fig. 27; Uozumi, 1957, p. 582, pl. 6, figs. 1-2; Kira, 1959, p. 108, pl. 41, fig. 13.

Yoldia johanni, Kuroda, 1929, p. 12, fig. 16; Nomura, 1935, p. 104, pl. 5, fig. 3.

Yoldia *cf.* *johanni*, Yokoyama, 1932, p. 16, pl. 3, fig. 1.

Cnesterium johanni, Habe, 1955, p. 2, pl. 2, fig. 9; Habe, 1958, p. 251, pl. 12, fig. 4; Yamamoto and Habe, 1958, p. 3, pl. 2, fig. 5, pl. 4, fig. 1.

Dimensions (in mm) :—

Height : 9.0 Breadth : 16.6 Width : 4.5 (intact specimen)

Remarks :— An intact specimen of small size was examined. Although the area around its beak is eroded, one of the characteristics of *johanni*, is that, the middle part of the shell surface is covered by oblique striae to the concentric growth lines, the slightly rostrate and recurved posterior end and evenly arcuate basal margin of the shell. Their features assign the present form to *Yoldia (Cnesterium) johanni* Dall.

This is the northern limit in the known distribution of the present species.

Occurrence :— St. C-1 : 10, 60 m.

Geographical distribution :— Fukushima Prefecture and northward to Saghalin (Kuroda and Habe, 1952). This is a new form in the northern Okhotsk Sea.

Family Mytilidae

Genus *Solamen* Iredale, 1924

Type species : *Solamen rex* Iredale, 1924. Recent, type locality unknown to the present writer.

Solamen tamurai (Habe), 1955

Pl. 34, figs. 10, 11.

Crenella tamurai Habe, 1955, p. 26, pl. 7, figs. 1, 2; Habe, 1961, p. 113, pl. 50, fig. 10.

Dimensions (in mm) :—

Height	Breadth	Width
17.8	21.7	13.0 (intact specimen)
16.2	20.3	

Remarks :— A well preserved intact specimen and a left valve are in the collection. The present species was first proposed under the genus *Crenella* from Volcano Bay, Hokkaido by Habe (1955), but judging from his description and the illustration, the present writer is inclined to allocate the present species neither to *Crenella* nor to any other allied genera but to the genus *Solamen* because of the very finely striated surface and thin shell.

Occurrence :- St. C-1 : 9, 94 m.

Geographical distribution :- Only known from the original locality (Volcano Bay of Hokkaido). *Solamen tamurai* is a new name to the Okhotsk fauna.

***Solamen* cf. *grisea* (Dall), 1897**

Pl. 34, figs. 12-14.

Compare with :

Crenella grisea Dall, 1897, p. 171 (*non vidi, fide* Oldroyd, 1924) ; Oldroyd, 1924, p. 80, pl. 3, fig. 2.

Dimensions (in mm) :-

Height : 10.3 Breadth : 9.2 Width : 6.4 (intact specimen)

Remarks :- A well preserved intact specimen and a crushed young shell were examined.

The present form closely resembles Dall's species recorded from Attu Island of the Aleutian Islands. Dall did not illustrate his species and the illustration subsequently given by Oldroyd does not reveal the details of the species. Dall's species is somewhat elongate instead of short as the present one. Judging from the description and the illustration of Dall and Oldroyd, the present species can be safely placed in the genus *Solamen* from its thin and delicate shell and the surficial sculpture.

Occurrence :- St. C-1 : 2, 129 m.

Genus ***Musculus*** [Bolten] Röding, 1798

Type species (by subsequent designation, Iredale, 1915) : *Musculus discors* [Bolten] Röding, 1798. Recent, Atlantic Ocean.

***Musculus niger* (Gray), 1824**

Pl. 34, figs. 15, 16.

Modiolus nigra Gray, 1824, p. 244 (*non vidi, fide* MacGinitie, 1959).

Modiolaria nigra, Oldroyd, 1924, p. 74, pl. 13, fig. 21, pl. 39, fig. 9.

Musculus niger, MacGinitie, 1959, p. 157, pl. 18, fig. 6, pl. 21, fig. 6; Abbott, 1960, p. 355, pl. 28, fig. g; Bousfield, 1960, p. 27, pl. 6, fig. 67.

? *Modiola nigra*, Reeve, 1858, *Modiola* sp. 49.

Dimensions (in mm) :-

Height	Breadth	Width	St. No.
22.5	44.5	10.6	59
5.4	7.6	3.4	Gill Net 8

Remarks :- A full grown intact shell and a juvenile one are in the collection. The adult is somewhat small in ratio of height against length of the shell in comparison with the forms hitherto described and figured as *niger* by several authors except for the one illustrated by Oldroyd (1924) which is quite similar to the present specimen in the shape of the shell. The juvenile specimen closely resembles the specimen described and illustrated by MacGinitie from Point Barrow, Alaska (1959) in the shape and colour of the shell.

Occurrence :- Gill Net St. 8, 92 mm ; St. 59, 65 m.

Geographical distribution :- Throughout the Arctic ; in the Pacific south to Oregon ; in the Atlantic south to Cape Hatteras, N.C., and to Scotland (MacGinitie, 1959).

***Musculus corrugatus* (Stimpson), 1851**

Pl. 34, fig. 17.

Mytilus corrugatus Stimpson, 1851, p. 12 (*non vidi, fide* MacGinitie, 1959).

Modiolaria corrugata, Sars, 1878, p. 30, pl. 19, figs. 2a-b; Oldroyd, 1924, p. 77, pl. 14, figs. 8, 9.

Musculus corrugatus MacGinitie, 1959, p. 158, pl. 4, fig. 11, pl. 18, fig. 7, pl. 21, fig. 4; Bousfield, 1960, p. 27 pl. 6, figs. 66.

Dimensions (in mm) :—

Height : 10.7 Breadth : 18.2 Width : 9.8

Remarks :— A well preserved intact specimen is in the collection.

Occurrence :— St. 33, 60 m.

Geographical distribution :— Circumboreal; Arctic Ocean to Puget Sound (Dall, 1921); Jan Mayen (?), Western Greenland (few), Iceland (?), Spitzbergen, Finmarken, Polar Sea of Siberia (Jensen, 1912); Greenland to North Carolina (Johnson, 1934) (all quoted from MacGinitie, 1959).

Family Pectinidae

Genus *Chlamys* [Bolten] Röding, 1798

Type species (by subsequent designation, Herrmannsen, 1846): *Pecten islandicus* Müller, 1776. Recent, Iceland.

Subgenus *Chlamys* s. str.

Chlamys (Chlamys) islandica erythrocomata (Dall), 1907

Pl. 34, figs. 18–23.

Pecten (Chlamys) erythrocomata Dall, 1907, p. 170.

? *Pecten islandicus*, Yoshiwara, 1902, p. 144, pl. 2, figs. 5a-c (non Müller, 1776).

Chlamys erythrocomata, Kinoshita and Isahaya, 1934, p. 14, pl. 11, fig. 75.

Chlamys islandica, Kubota, 1950, p. 14, pl. 8, fig. 53, pl. 9, fig. 65 (non Müller, 1776).

Chlamys islandica pilikaensis Kubota, 1950, p. 15, pl. 9, fig. 56, 69–71.

Chlamys (Chlamys) islandica erythrocomata, Habe, 1951, p. 73, figs. 140, 141.

Chlamys islandica erythrocomata, Kira, 1959, p. 124, pl. 49, fig. 13; Oyama, 1958, *Chlamys* (5), figs. 4, 5.

Dimensions (in mm) :—

Height	Breadth	Width
46.2	42.0	14.6
27.4	22.7	8.0
26.8	22.7	7.6

Remarks :— Three well preserved intact specimens are at hand.

Since the proposal of the present species by Dall in 1907 from the Okhotsk Sea, it has long been confused and misidentified with other forms of fossil and Recent scallops owing to the wide range of variation in the surface sculptures of the species group of *Chlamys islandica*.

The present form is very closely allied to Müller's *islandica* in general characteristics. And although Dall (1907, p. 170) described the differences between the two forms now dealt with in the following way ;

“..... from *islandica* it is somewhat more rounded in the disk and more convex; the anterior ears are smaller and more vertically truncate distally, the hinge line is shorter and the posterior ears smaller and the byssal fasciole narrower; the radii are smaller, keeled and minutely spinose instead of smooth and flat top and laterally rounded; the minor reticular sculpture is more oblique and rough, the channels between the radii relatively wider; the radii themselves are gathered obscurely into fascicular bundles, which as a whole are raised like wide obsolete ribs; the colors are obscurely radial, rose-red and white instead of mainly concentrically distributed”.

It seems to the present writer, that these differences cited above are insufficient for specific separation, and the name *erythrocomata* might be placed in the subspecies of *islandica*.

Occurrence :- Gill Net St. 8, 92 m.

Geographical distribution :- Okhotsk Sea.

Family Astartidae

Genus *Astarte* Sowerby, 1816

Type species (by subsequent designation, Stoliczka, 1871) : *Astarte lurida* Sowerby, 1816. Jurassic of England.

Subgenus *Tridonta* Schumacher, 1817

Type species : *Tridonta borealis* Schumacher, 1817. Recent, Circumboreal.

Astarte (Tridonta) borealis (Schumacher), 1817

Pl. 34, figs. 24, 25, 28, 29.

Tridonta borealis Schumacher, 1817, p. 47, pl. 17, fig. 1 (*non vidi, fide* Grant and Gale, 1931 and MacGinitie, 1959).

Astarte borealis, Dall, 1903a, pp. 941, 944.

Astarte borealis, Yokoyama, 1922, p. 163, pl. 10, fig. 11.

Astarte borealis, Oldroyd, 1924, p. 106; Yokoyama, 1926b, p. 298, pl. 37, fig. 2, 3; Grant and Gale, 1931, p. 267; Kinoshita and Isahaya, 1934, p. 15, pl. 11, fig. 79; Nomura and Hatai, 1935, p. 114, pl. 10, figs. 1, 2, 7; Iwai, 1959, p. 57, pl. 2, figs. 3a-b; MacGinitie, 1959, p. 165, pl. 22, figs. 1-6; Abbott, 1960, p. 375, pl. 28, fig. q.

Astarte (Tridonta) borealis, Hatai and Nisiyama, 1952, p. 31; Habe in Kuroda, 1952, p. 162 pl. 23, figs. 18, 19; Kira, 1959, P. 131, pl. 52, fig. 22; Habe, 1951, p. 104, figs. 204, 205.

Dimensions (in mm) :-

Height	Breadth	Width	St. No.
34.4	44.0	15.3	9
26.7	32.5	10.6	45
23.7	28.5	9.9	45
11.2	13.1	5.1	40
8.8	10.5	4.3	40

Remarks :- Three adult and two young specimens are in the collection, they are all with intact valves and well preserved. The shells in the collection vary in outline from subtrigonal to more or less elongate, but is characterized by the broadly spaced distinct concentric sculpture in the young stage of the shell.

Occurrence :- St. C-1 : 9, 94 m; St. 40, 70 m; St. 45, 65 m.

Geographical distribution :- MacFarlane Bay near the mouth of the Mackenzie River, Point Barrow, south to the Aleutians and Prince William Sound, the Sea of Okhotsk, also northern Japan; in the Atlantic area south to Massachusetts and Rhode Island; Greenland and Iceland; Franz Josef Land, Novaya Zemlya, and northern Europe south to Bergen, Norway (MacGinitie, 1959). Both Pacific and Japan Sea sides of Honshu (35° long. N. farther northward) and Hokkaido, Japan (Kuroda and Habe, 1952).

Astarte (Tridonta) montagui striata (Leach), 1819

Pl. 34, figs. 26, 27.

Venus compressa Montagu (*part.*), 1808, p. 43, pl. 26, fig. 1 (*non vidi, fide* MacGinitie, 1959).

Venus montagui Dillwyn (*part.*), 1817, p. 167 (*non vidi, fide* MacGinitie, 1959).

Nicania striata Leach in Ross, 1819, p. 62 (*non vidi, fide* MacGinitie, 1959).

Astarte montagui, MacGinitie (*part.*), 1959, p. 106, pl. 22, figs. 14-16 (*non figs.* 11-13).

Dimensions (in mm) :-

Height	Breadth	Width
11.0	12.2	6.6

10.9	12.2	6.7
9.8	11.1	6.7
8.9	9.7	5.3
8.8	9.8	5.2
6.9	7.7	4.1
5.0	5.5	2.7

Remarks :— Seven intact specimens were examined, among which two are juvenile and the others are all small in size. The more or less globose curvature of the shells, and distinct but fine concentric sculptures on the shell surface are characteristic of the present form.

The present species and subspecies was first recorded from the Pacific region by MacGinitie in 1959, and this is a new addition to the fauna of the present region.

Occurrence :— St. 40, 70 m.

Geographical distribution :— Circumboreal.

***Astarte (Tridonta) bennettii* Dall, 1903**

Pl. 34, fig. 30.

Astarte bennettii Dall, 1903a, p. 946, pl. 63, fig. 61; Oldroyd, 1924, p. 107.

? *Astarte aomoriensis* Nomura and Hatai, 1935, p. 115, pl. 9, fig. 5.

Astarte (Tridonta) bennettii, Habe, 1952, p. 163, pl. 23, fig. 1.

Dimensions (in mm) :—

Height : 13.7 Breadth : 14.9 Width : 7.6

Remarks :— A well preserved intact specimen is in the collection. The present form resembles *Astarte (Tridonta) montagui striata* cited above in its swollen valves and the outline of the shell, but it is distinguishable from the latter in the glossy and smooth shell surface except for numerous growth-line traces.

Occurrence :— St. 53, 57 m.

Geographical distribution :— Polar Sea at Bennett Island, and south in Bering Sea to Nunivak Island (Oldroyd, 1924).

Family Carditidae

Genus ***Venericardia*** Lamarck, 1801

Type species (by subsequent designation, Schmidt, 1818) : *Venus imbricata* Gmelin, 1790. Eocene of the Paris Basin, France.

Subgenus ***Cyclocardia*** Conrad, 1867

Type species (monotype) : *Cardita borealis* Conrad, 1867. Recent, Arctic Seas.

Venericardia (Cyclocardia) crassidens (Broderip and Sowerby), 1829

Pl. 35, figs. 1–4.

Astarte crassidens Broderips and Sowerby, 1829, p. 365 (*non vidi, fide* Dall, 1903a).

Cardita borealis paucicostata Krause, 1885, p. 30, pl. 3, fig. 5 (*non vidi, fide* Habe, 1955).

Venericardia crassidens, Dall, 1903a, p. 949, pl. 63, fig. 9.

Venericardia paucicostata, Oldroyd, 1924, p. 112, pl. 13, fig. 13.

Venericardia (Cyclocardia) crebricostata, Habe (*part.*) 1951, p. 106, figs. 210–212 (cited figures only) (*non* Krause, 1855).

Venericardia (Cyclocardia) paucicostata, Habe, 1951, p. 106; Habe, 1953, p. 9, pl. 2, figs. 22, 23; Kira, 1959, p. 1313, pl. 52, fig. 21.

Cyclocardia paucicostata, Yamamoto and Habe, 1959, figs. 22, 23.

Cardita crassidens, MacGinitie, 1959, p. 170, pl. 22, figs. 7-10.

Dimensions (in mm) :-

Height	Breadth	Width	St. No.
33.0	32.0	23.0	28
22.2	24.8	12.1	28
31.0	30.0	19.0	Gill Net 8
28.8	27.0	20.9	Gill Net 8

Remarks :- Four specimens with intact valves are in the collection. Among them the youngest one closely resembles *Venericardia paucicostata* which has been described and illustrated by several authors as already pointed out by MacGinitie, and the other adults agree well with *crassidens* in the shape of the shell.

Occurrence :- St. 28, 70 m ; Gill Net 8, 92 m .

Geographical distribution :- Point Barrow to Puget Sound (MacGinitie, 1959). Northeast Hokkaido and farther northward, 5-10 fathoms (Habe, 1961, as *paucicostata*). Atlantic Seas to Juan de Fuca Strait (Oldroyd, 1924, as *paucicostata*).

***Venericarida (Cyclocardia) crebricostata* (Krause), 1885**

Pl. 35, figs. 5-7.

Cardita borealis crebricostata Krause, 1885, p. 30, pl. 3, fig. 4 (*non vidi, fide* MacGinitie, 1959).

Venericardia alaskana Dall, 1903a, pl. 63, fig. 7.

Venericardia alaskana, Dall, 1903b, (for 1902), p. 710.

Venericardia crebricostata, Oldroyd, 1924, p. 114, pl. 13, fig. 12.

Venericardia (Cyclocardia) crebricostata, Otuka, 1939, p. 28, pl. 2, figs. 3, 4; Habe, 1951, p. 108 (*non* figs. 210-212=*crassidens*); Taki in Okada *et al*, 1960, p. 70, pl. 35, fig. 15.

Cardita crebricostata, MacGinitie, 1959, p. 169.

Dimensions (in mm) :-

Height	Breadth	Width	St. No.
24.3	27.9	14.6	64
28.0	32.2	15.1	Gill Net 11
26.9	30.0	13.4	Gill Net 11
24.3	27.8	12.8	Gill Net 11
23.9	26.3	12.6	Gill Net 11
15.2	18.0	8.7	Gill Net 11
15.1	17.2	7.9	Gill Net 11

Remarks :- Seven well preserved specimens with intact valves were examined. The general shape of the shell of the present form agrees well with that of the young *paucicostata* cited above, but are characterized by rather large number of radial ribs and several fine striations.

Occurrence :- St. 64, 66 m ; Gill Net St. 11, 60 m.

Geographical distribution :- Point Barrow south and east of the Aleutians, British Columbia, Puget Sound, and the coast of Oregon (MacGinitie, 1959). Pacific Area, Sanriku, Northeast Honshu, Japan and farther northward to the Arctic Sea, Japan Sea Area, Southwest Honshu to Hokkaido (Kuroda and Habe, 1952).

***Venericardia (Cyclocardia) incisa* Dall, 1902**

Pl. 35, fig. 8.

Venericardia incisa Dall, 1903b, 54, p. 714 (*non vidi, fide* Dall, 1903a); 1903a, 26, pl. 63, fig. 4; Oldroyd, 1924, p. 115; Kuroda and Habe, 1952, p. 34.

Dimensions (in mm) :-

Height : 7.0 Breadth : 7.7 Width : 4.4

Remarks :- A small specimen with severely water worn umbonal area is now at hand. The present form somewhat resembles *Venericardia* (*Cyclocardia*) *ferruginea* Clessin commonly known from the Japanese waters, but the large number of radial ribs of the present form distinguishes it from the latter. The present form is characterized with slightly and finely rugose 19 radial ribs.

Occurrence :- St. 36, 60 m.

Geographical distribution :- Unalaska to Semidi Island, Alaska (Oldroyd, 1924). Japan Sea coast of Hokkaido, Japan and farther northward to the Okhotsk Sea (Kuroda and Habe, 1952).

Family Ungulinidae

Genus *Phlyctiderma* Dall, 1899

Type species : *Diplodonta semiaspera* Philippi, 1836, Recent, original locality unknown to the present writer.

Phlyctiderma semiasperoides (Nomura), 1932

Pl. 35, figs. 9, 10.

Diplodonta semiaspera, Dunker, 1882, p. 48; Yokoyama, 1920, p. 131, pl. 10, figs. 2, 3; Yokoyama, 1922, p. 160, pl. 14, fig. 2.

Diplodonta semiasperoides Nomura, 1932, p. 78 (*nom. nov.* for *semiaspera* Yokoyama, 1920, *non* Philippi, 1836); Habe, 1961, p. 124, pl. 56, fig. 10.

Joanisiella cumingi, Kuroda and Habe (? *part.*), 1952, pp. 19, 21.

Dimensions (in mm) :-

Height	Breadth	Width	St. No.
21.0	24.3	12.9	52
23.8	37.1	16.0	59

Remarks :- Two intact specimens with the animals enclosed were examined. The more or less prominent nymph of the present form is closely allied to the type species of the genus *Phlyctiderma*, but the concentric sculpture on the surface of the shell is broken up into reticulations in the latter in comparison with the smooth shell surface except for fine concentric striae in the present form.

Phlyctiderma japonica (Pilsbry) known from the Japanese waters is also allied to the present species, but it is characterized by having cancellate sculpture on the surface.

Occurrence :- St. 52, 66 m ; St. 59, 65 m.

Geographical distribution :- Japan and the Okhotsk Sea, also found in the Pleistocene deposits of the Kanto Region, Honshu, Japan.

Family Cardiidae

Subfamily Laevicardiinae

Genus *Clinocardium* Keen, 1936

Type species : *Cardium nuttallii* Conrad, 1873. Recent, Pacific Coast of Oregon and Washington.

Clinocardium ciliatum (Fabricius), 1780

Pl. 35, fig. 11.

Cardium ciliatum Fabricius, 1780, p. 410 (*non vidi, fide* Keen, 1954); Sars, 1878, p. 46, pl. 5, figs. 4a-b;

Oldroyd, 1924, p. 142, pl. 19, figs. 8, 8a.

Laevicardium (Cerastoderma) ciliatum, Grant and Gale, 1931, p. 310, pl. 19, fig. 11.

Clinocardium ciliatum, Keen, 1936, p. 120; Kira, 1959, p. 138, pl. 55, fig. 2; MacGinitie, 1959, p. 176, pl. 26, fig. 4; Bousfield, 1960, p. 28, pl. 6, fig. 70; Abbott, 1960, p. 403, pl. 32, fig. e.

Dimensions (in mm) :-

Height	Breadth	Width
41.0	43.6	26.6
17.9	19.3	12.3

Remarks :- An adult and a young well preserved intact specimens are in the collection. The present form is characterized by the sharp edged radial ribs numbering 38 in the adult and 34 in the young.

Occurrence :- St. 36, 60 m.

Geographical distribution :- Arctic Ocean to Puget Sound and Japan, also Circumboreal (Oldroyd, 1924). From northern Northeast Honshu (Pacific side) and from central Honshu (Japan Sea side) to farther northward (Kuroda and Habe, 1952).

Genus *Serripes* Gould, 1841

Type species: *Cardium groenlandicum* Bruguière, 1792. Recent, Greenland.

Serripes laperousii (Deshayes), 1839

Pl. 35, figs. 12, 13.

Cardium laperousii Deshayes, 1839, p. 360 (*non vidi, fide* Dall, 1925).

Serripes laperousii, Dall, 1921, p. 40; Oldroyd, 1924, p. 145; Dall, 1925, p. 26, pl. 20, fig. 3; Grant and Gale, 1931, p. 314; Kuroda, 1931, p. 61, text-fig. 44; Kuroda and Koba, 1933, pp. 164-170; Habe, 1951, p. 151, text-figs. 339-340; Kuroda and Habe, 1952, p. 31.

Dimensions (in mm) :-

Height: 38.5 Breadth: 45.0 (left valve)

Remarks :- A more or less well preserved adult left valve and a crushed younger left valve are in the collection. The present form is somewhat allied to *Serripes notabilis* (Sowerby) known from the boreal regions, but the latter attains rather rounder shell outline and more or less laterally elongate shape in the present species.

Occurrence :- St. C-1 : 2, 129 n.

Geographical distribution :- Bering Strait to Hakodate, Japan and Sitka, Alaska (Dall, 1921). Bering Strait to Sitka, Alaska. Also Japan (Oldroyd, 1924).

Family Veneridae

Genus *Liocyra* Dall, 1870

Type species: *Venus fluctuosa* Gould, 1841. Recent, North Atlantic and Arctic Oceans.

Liocyra fluctuosa (Gould), 1841

Pl. 35, figs. 14-17.

Venus fluctuosa Gould, 1841, p. 87, fig. 5 (*non vidi, fide* Grant and Gale, 1931); Dall, 1870, p. 256 (*non vidi, fide* Grant and Gale, 1931); Grant and Gale, 1931, p. 336; MacGinitie (*part.*), 1959, p. 177, pl. 25, figs. 1, 7, 8 (*non* figs. 2-6).

Dimensions (in mm) :-

Height	Breadth	Width	St. No.
22.0	29.0	11.5	9
14.8	18.8	7.5	9

15.3	19.2	8.4	21
10.6	13.4	5.1	21
10.5	13.3	5.6	21
10.4	13.6	5.5	21
9.5	11.8	5.0	21

Remarks :— Several intact specimens were dredged from three localities. In 1959, MacGinitie allocated several forms of the genus known from the circumboreal regions under the species level of *Liocyma fluctuosa* as the result of the measurements of the type specimens, but the present writer, so far as the available materials now in our institute are concerned is inclined to the view that until sufficient biological evidence is gained, for instance the biological significance of the variations in the shape of the pallial sinus, it is best to reserve those forms dealt with by MacGinitie as of species level.

Occurrence :— St. C-1 : 9, 94 m ; St. 21, 55 m.

Geographical distribution :— Nemuro, Hokkaido and northward (Kuroda and Habe, 1952). North Atlantic and Arctic Oceans (Grant and Gale, 1931).

***Liocyma* sp.**

Pl. 35, figs. 18, 19.

Dimensions (in mm) :—

Height : 14.3 Breadth : 30.8 Width : 14.0

Remarks :— A well preserved intact specimen was examined. The present form is somewhat similar to the specimens illustrated by MacGinitie (1959, pl. 23, fig. 2) under the name *Liocyma fluctuosa* and she thought it to be intermediate between the fairly typical *fluctuosa* close to “*viridis*” Dall and “*becki*” Dall in shape, but the present one is characterized by somewhat truncated posterior margin of the shell.

Occurrence :— St. 3, 77 m.

Family Tellinidae

Genus ***Macoma*** Leach, 1819

Type species : *Macoma tenera* Leach, 1819 = *Tellina calcarea* Gmelin, 1791. Recent, type locality unknown to the present writer.

Macoma moesta (Deshayes), 1854

Pl. 35, figs. 20, 21.

Tellina moesta Deshayes, 1845, p. 351 (*non vidi, fide* MacGinitie, 1959).

Macoma krausei Dall, 1900, p. 322, pl. 4, fig. 8.

Macoma oneilli Dall, 1919b, p. 20, pl. 2, fig. 1; Oldroyd, 1924, p. 173, pl. 40, fig. 7.

Macoma moesta, MacGinitie, 1959, p. 182, pl. 21, figs. 1-3 pl. 23, fig. 10, pl. 24, figs. 1-3.

Dimensions (in mm) :—

Height : 16.7 Breadth : 24.4 (left valve)

Remarks :— A dead intact shell lacking the larger posterior part of the right valve was examined.

The specimen dealt with here is slightly more elongate than the typical form but in other aspects it agrees well with Deshayes' species.

Occurrence :— Gill Net St. 11, 60 m.

Geographical distribution :— Point Barrow, Alaska, Nunivak Island, the Aleutians, coasts of Washington, Oregon and Monterey Bay, California, also Kamchatka, ; (MacGinitie, 1959).

Genus *Peronidia* Dall, 1900

Type species : *Tellina albicans* Gmelin, 1788-1793. Recent, original locality unknown to the present writer.

Peronidia lutea (Wood), 1828

Pl. 35, figs. 26, 27.

Tellina lutea Wood (ex Gray MS), 1828, *Tellina* pl. 1, fig. 3c (*non vidi, fide* MacGinitie, 1959); Oldroyd, 1924, p. 169, pl. 1, fig. 9; Grant and Gale, 1931, p. 363; MacGinitie (*part.*), 1959, p. 180; Abbott (*part.*), 1960, p. 425, figs. 87c-d.

Tellina (*Peronidia*) *lutea*, Dall, 1900, p. 322, pl. 4, figs. 15, 16.

Peronidia lutea, Habe, 1955, p. 19, pl. 3, fig. 14; Habe, 1961, p. 138, pl. 62, fig. 18.

Dimensions (in mm) :-

Height : 42 Breadth : 66 (left valve)

Remarks :- An intact dead shell was dredged from a depth of 50 m.

Although both valves are more or less eroded along the margins of the valves, and the right valve lacks its posterior and ventral margins of the shell, the rather rounded posterior end of the valve and the pinky colour of the interior surface of the shell can be recognized as the specific characteristics of the present form. The subspecies, *Peronidia lutea venulosa* (Schrenck) well known from northern Japan, Hokkaido and a part of the Okhotsk Sea is closely related to the species, but the above cited characters serve to distinguish one from the other.

Occurrence :- St. 11, 50 m .

Geographical distribution :- Arctic Ocean, Bering Sea, North Japan, the Aleutian Islands and east to Cooks Inlet, Alaska (Dall, 1921).

Family Myacidae

Genus *Mya* Linné, 1758

Type species (by subsequent designation, Gray, 1847) : *Mya truncata* Linné, 1758. Recent, European Seas.

Subgenus *Arenomya* Winckworth, 1930

Type species : *Mya arenaria* Linné, 1758. Recent, Northeastern Europe.

Mya (*Arenomya*) *arenaria* Linné, 1748

Pl. 35, figs. 22-25.

Mya arenaria Linné, 1758, p. 670 (*non vidi, fide* Grant and Gale, 1931); Sowerby in Reeve, 1870, *Mya* pl. 1, sp. 1; Oldroyd, 1924, p. 198, pl. 32, figs. 1a-b; Abbott, 1960, p. 455, pl. 32, fig. x.

Dimensions (in mm) :-

Height	Breadth	Width	St. No.
5.6	9.3	3.3	19
5.6	9.0	3.4	19
5.5	9.1	2.7	19
9.1	15.2	5.3	36

Remarks :- Four specimens with intact valves, well preserved and small in size, were examined. Although the examined specimens are all young and small in size, they are characterized by the deep pallial sinus and shell tapering posteriorly.

Occurrence :- St. 19, 63 m ; St. 36, 60 m.

Geographical distribution :- Britain, Scandinavia, Greenland, Atlantic Coast of North

America south to Carolina, Alaska south to Japan and to Vancouver Island, British Columbia (found in Indian mounds on Vancouver Island. *vide* Oldroyd), artificially introduced about 1865 from the Atlantic Coast with seed oyster to San Francisco Bay whence it has spread along the California and Oregon coasts (Grant and Gale, 1931). The Japanese form has now been allocated to another species *Mya* (*Arenomya*) *japonica* Jay, 1839.

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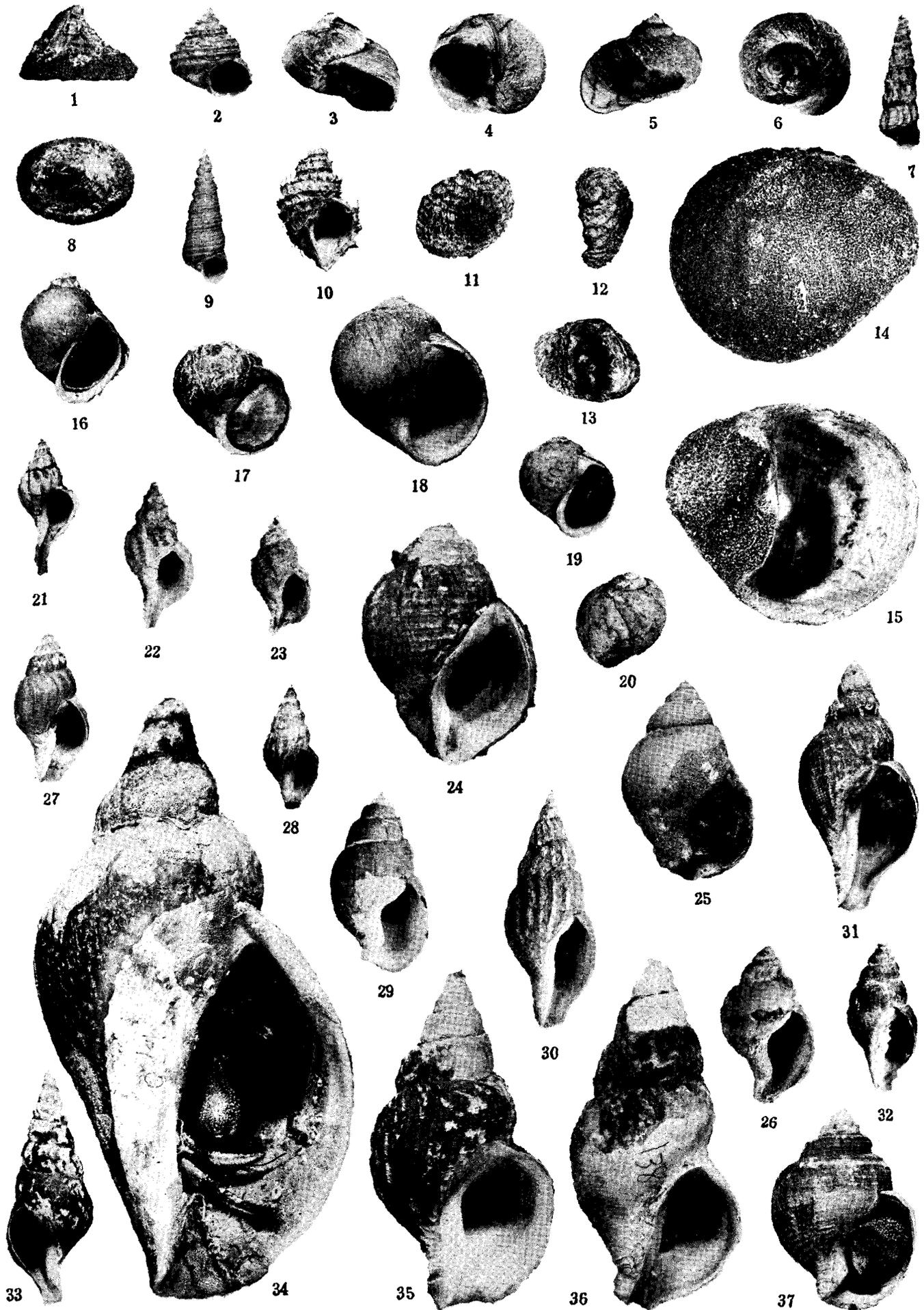
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PLATE 33

- Figs. 1, 8. *Puncturella nobilis* (A. Adams) ×1.5, St. 15, 70 m.
- Fig. 2. *Margarites costalis* (Gould) St. 40, 70 m.
- Figs. 3-6. *Margarites beringensis* (E. A. Smith) ×3, St. 36, 60 m.
- Fig. 7. *Tachyrhynchus* cfr. *reticulatus* (Mighels) St. 40, 70 m.
- Fig. 9. *Turritellopsis stimpsoni* Dall St. 40, 70 m.
- Fig. 10. *Trichotropis (Ariadna) borealis* Broderip and Sowerby ×1.5, St. 40, 70 m.
- Figs. 11-13. *Velutina (Velutina) velutina* (O. F. Müller) ×1.5, St. 42, 70 m.
- Figs. 14, 15. *Velutina* n. sp. St. 63, 70 m.
- Fig. 16. *Bulbus (Amaulopsis) islandicus* (Gmelin) St. 20, 52 m.
- Fig. 17. *Natica (Tectonatica) clausa* Broderip and Sowerby St. C-1 : 9, 94 m.
- Fig. 18. *Natica (Tectonatica) russa* (Gould) Gill Net St. 9, 98 m.
- Figs. 19, 20. *Euspira pallida* (Broderip and Sowerby) St. C-1 : 9, 94 m.
- Fig. 21. *Trophonopsis (Boreotrophon) beringi* (Dall) St. 45, 65 m.
- Figs. 22, 23. *Trophonopsis* sp. (n. sp. ?) Gill Net St. 8, 92 m.
- Fig. 24. *Nucella lima* (Martyn) St. 42, 70 m.
- Fig. 25. *Liomesus ooides* (Middendorff) Gill Nill Net St. 11, 60 m.
- Fig. 26. *Liomesus ooides* (Middendorff) St. 53, 57 m.
- Fig. 27. *Colus (Limatofusus) timetus* Dall St. 59, 65 m.
- Fig. 28. *Oenopota tenuissima* (Dall) ×3, St. 45, 65 m.
- Fig. 29. *Plicifusus (Helicofusus) laticordatus* (Dall) St. C-1 : 9, 94 m.
- Fig. 30. *Plicifusus (Plicifusus) kroeyeri* (Möller) St. 3, 77 m.
- Fig. 31. *Volutopsius* sp. Gill Net St. 8, 92 m.
- Fig. 32. *Volutomitra groenlandica* Gray ×1.5, Gill Net St. 8, 92 m.
- Fig. 33. *Antiplanes vinosa* Dall St. C-1 : 9, 94 m.
- Fig. 34. *Volutopsius* n. sp. Gill Net St. 9, 98 m.
- Fig. 35. *Latisipho dalmasius* (Dall) St. 22, 65 m.
- Fig. 36. *Anomalosipho capponius* (Dall) St. 40, 70 m.
- Fig. 37. *Ancistrolepis (Clinopegma) magnus* Dall St. 21, 55 m.
- (All figures in natural size otherwise stated.)



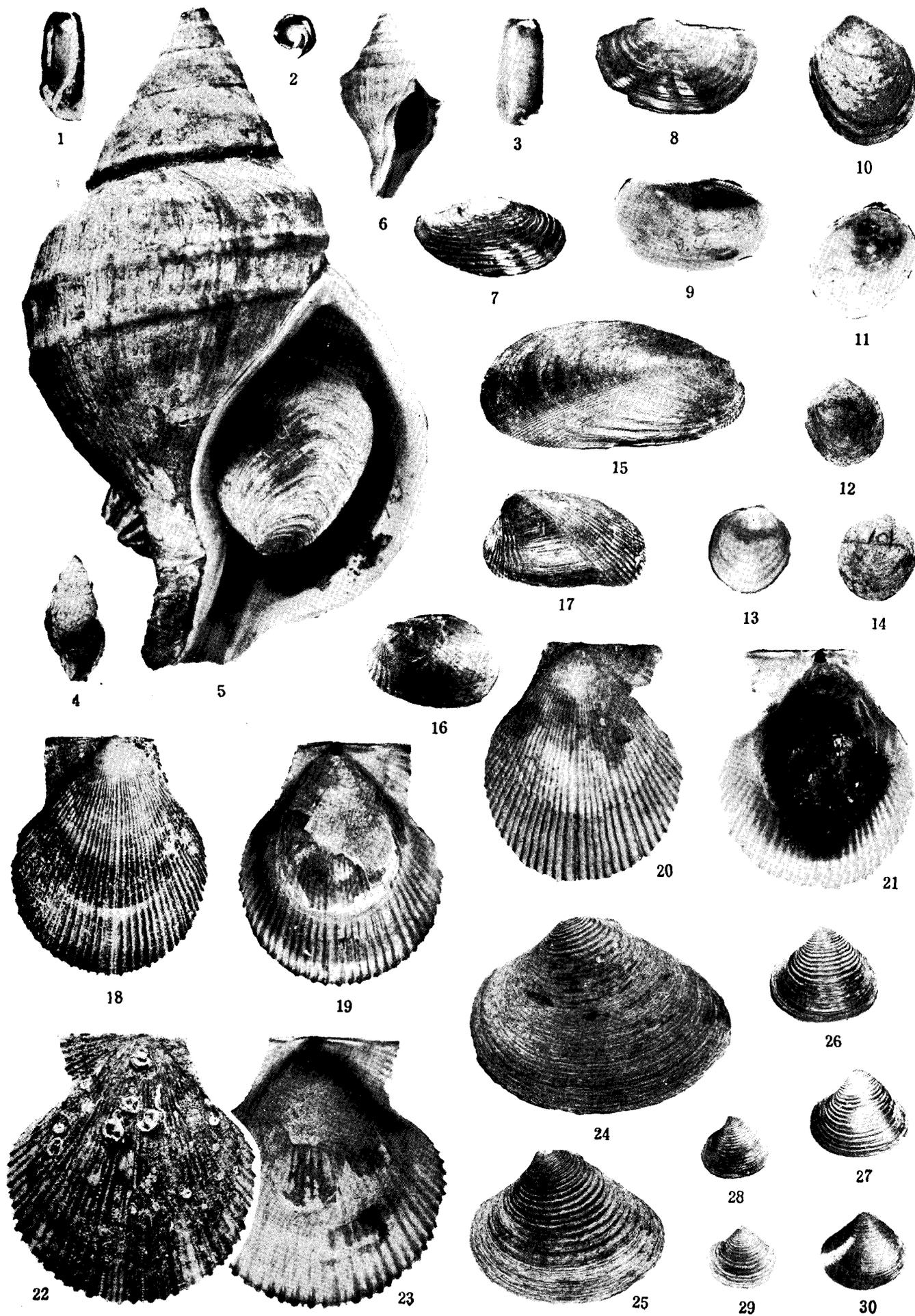


PLATE 34

- Figs. 1-3. *Cylichna alba corticata* Möller ×3, St. 42, 70 m.
Fig. 4. *Granotoma* cfr. *surana* (Dall) ×3, St. 40, 70 m.
Fig. 5. *Neptunea* cfr. *middendorffiana* MacGinitie St. 17, 53 m.
Fig. 6. *Neptunea vinosa* (Dall) Young form, St. 22, 65 m.
Fig. 7. *Yoldia* (*Cnesterium*) *johanni* Dall ×1.5, St. C-1 : 10, 60 m.
Figs. 8, 9. *Portlandia* (*Megayoldia*) *thraciaeformis* (Storer) St. C-1 : 2, 129 m.
Figs. 10, 11. *Solamen tamurai* (Habe) St. C-1 : 9, 94 m.
Figs. 12-14. *Solamen* cfr. *grisea* (Dall) ×1.5, St. C-1 : 2, 129 m.
Fig. 15. *Musculus niger* (Gray) St. 59, 65 m.
Fig. 16. *Musculus niger* (Gray) ×3, juvenile form, Gill Net St. 8, 92 m.
Fig. 17. *Musculus corrugata* (Stimpson) ×1.5, St. 33, 60 m.
Figs. 18-21. *Chlamys islandica erythrocomata* (Dall) ×1.5, Gill Net St. 8, 92 m.
Figs. 22, 23. *Chlamys islandica erythrocomata* (Dall) Gill Net St. 8, 92 m.
Fig. 24. *Astarte* (*Tridonta*) *borealis* (Schumacher) St. C-1 : 9, 94 m.
Fig. 25. *Astarte* (*Tridonta*) *borealis* (Schumacher) St. 45, 65 m.
Figs. 26, 27. *Astarte* (*Tridonta*) *montagui striata* (Leach) ×1.5, St. 40, 70 m.
Figs. 28, 29. *Astarte* (*Tridonta*) *borealis* (Schumacher) Young form, St. 40, 70 m.
Fig. 30. *Astarte* (*Tridonta*) *bennettii* Dall St. 53, 57 m.

(All figures in natural size unless otherwise stated.)

PLATE 35

- Figs. 1, 2. *Venericardia (Cyclocardia) crassidens* (Broderip and Sowerby) St. 28, 70 m.
Figs. 3, 4. *Venericardia (Cyclocardia) crassidens* (Broderip and Sowerby) Gill Net St. 8, 92 m.
Fig. 5. *Venericardia (Cyclocardia) crebricostata* (Krause) Gill Net St. 11, 60 m.
Figs. 6, 7. *Venericardia (Cyclocardia) crebricostata* (Krause) St. 64, 66 m.
Fig. 8. *Venericardia (Cyclocardia) incisa* Dall ×3, St. 36, 60 m.
Figs. 9, 10. *Phlyctiderma semiasperoides* (Nomura) St. 52, 65 m.
Fig. 11. *Clinocardium ciliatum* (Fabricius) St. 36, 60 m.
Figs. 12, 13. *Serripes laperousii* (Deshayes) St. C-1 : 2, 129 m.
Figs. 14-17. *Liocyma fluctuosa* (Gould) St. C-1 : 9, 94 m.
Figs. 18, 19. *Liocyma* sp. St. 3, 77 m.
Figs. 20, 21. *Macoma moesta* (Deshayes) Gill Net St. 11, 60 m.
Figs. 22-25. *Mya (Arenomya) arenaria* Linné St. 36, 60 m.
Figs. 26, 27. *Peronidia lutea* (Wood) St. 11, 50 m.

(All figures in natural size unless otherwise stated.)

