SMITHSONIAN INSTITUTION.

UNITED STATES NATIONAL MUSEUM.

PROCEEDINGS

OF THE

UNITED STATES NATIONAL MUSEUM.

Volume XXIV.

PUBLISHED UNDER THE DIRECTION OF THE SMITHSONIAN INSTITUTION.

WASHINGTON:

GOVERNMENT PRINTING OFFICE.

1902.

ADVERTISEMENT.

The publications of the National Museum consist of two series: Proceedings and Bulletins.

The Proceedings, the first volume of which was issued in 1878, are intended primarily as a medium of publication for newly-acquired facts in biology, anthropology, and geology, descriptions of new forms of animals and plants acquired by the National Museum, discussions of nomenclature, etc. A volume is issued annually for distribution to libraries, while in view of the importance to science of the prompt publication of descriptions of new species, a limited edition of each paper is printed in pamphlet form in advance.

The present volume is the twenty-fourth of the series.

The Bulletin, publication of which was begun in 1875, is a series of elaborate papers, issued separately and based for the most part upon collections in the National Museum. They are monographic in scope, and are devoted principally to the discussion of large zoological groups, bibliographies of eminent naturalists, reports of expeditions, etc.

A quarto form of the Bulletin, known as the "Special Bulletin," has been adopted in a few instances in which a larger page was deemed indispensable.

The Annual Report of the National Museum (being the second volume of the Smithsonian Report) contains papers chiefly of an ethnological character, describing collections in the National Museum.

Papers intended for publication by the National Museum are usually referred to an advisory committee, composed as follows: Frederick W. True (chairman), William H. Holmes, George P. Merrill, James E. Benedict, Otis T. Mason, Leonhard Stejneger, Lester F. Ward, and Marcus Benjamin (editor).

S. P. LANGLEY,
Secretary of the Smithsonian Institution.

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ILLUSTRATIONS AND DESCRIPTIONS OF NEW, UNFIGURED, OR IMPERFECTLY KNOWN SHELLS, CHIEFLY AMERICAN, IN THE U. S. NATIONAL MUSEUM.

By William Healey Dall,
Honorary Curator, Division of Mollusks.

During the last thirty years a large number of species have been described by me in various publications which it was, at the time of publication, impracticable to figure. There are also a number of species described by others which have either been inadequately illustrated, figured in almost inaccessible publications, or not figured at all. Of the many undescribed species in the national collection some few have been distributed with manuscript names, for reasons which seemed sufficient at the time. With the view of suitably illustrating these species and eventually preparing an illustrated list or manual for American collectors and students, I have been accumulating a store of drawings of which the present paper includes a selection. Many more, especially species obtained by Mr. and Mrs. Oldroyd in the vicinity of San Pedro, California, are reserved for a future occasion.

With the exception of the first species, a remarkable Malayan *Nanina*, the forms figured are all American, and for convenience are divided into three series, including, respectively, the species of land shells, the East American marine forms, and the marine species from the Pacific coast.

Some systematic and nomenclatorial notes on the species and genera illustrated, and especially on the *Buccininæ* and *Chrysodominæ* so richly developed on our northwest coast, are included, together with some descriptions of new forms and a review of the northern species of the genus *Boreotrophon*, and it is hoped as a whole that the paper will furnish welcome information to many students of American mollusks.

LANDSHELLS.

NANINA (MACROCHLAMYS?) DIADEMA Dall.

Plate XXVII, figs. 1, 2, 3.

Nanina (*Macrochlamys?*) *diadema* Dall, Nautilus, XI, No. 4, Aug., 1897, p. 37.

Collected in the vicinity of Prang, Malay Peninsula, by Dr. W. L. Abbott. U.S.N.M., 150277. The color is an olivaceous yellow-brown.

VITREA RADERI Dall.

Plate XXVII, figs. 4, 5, 6.

Vitrea raderi DALL, Nautilus, XI, No. 9, Jan., 1898, p. 100.—PILSBRY, Class. Cat., p. 26, 1898.

Collected at Cumberland, Maryland, by Rader, and forwarded to the National Museum by Prof. Howard Shriver. U.S.N.M., 107758. Shell of a waxen whitish color. The edge of the aperture in the specimen figured is slightly defective.

PUNCTUM RANDOLPHII Dall.

Plate XXVII, figs. 7, 8, 9.

Pyramidula? randolphii DALL, Nautilus, VIII, No. 11, Mar., 1895, p. 130.
Punctum randolphii PILSBRY, Nautilus, IX, No. 2, June, 1895, p. 18; Class. Cat., p. 33, 1898.

Collected near Seattle, Washington, under leaves, by P. B. Randolph. The color is a dark reddish brown with silky luster. U.S.N.M., No. 107542.

ZONITOIDES (PSEUDOHYALINA) PUGETENSIS Dall.

Plate XXVII, figs. 10, 12.

Patulastra? (Punctum?) pugetensis DALL, Nautilus, VIII, No. 11, Mar., 1895, p. 130.
Pseudohyalina pugetensis PILSBRY, Nautilus, IX, No. 2, June, 1895, p. 18.
Zonitoides milium pugetensis PILSBRY, Class. Cat., p. 28, 1898.

Collected near Seattle, Washington, by P. B. Randolph, under leaves. Shell with fine silky sculpture and of a pale greenish yellow color. The Pacific coast analogue of the eastern *Z. milium*. U.S.N.M., 107541.

ASHMUNELLA RHYSSA Dall.

Plate XXVII, figs. 11, 14.

Polygyra rhyssa DALL, Nautilus, XI, No. 1, May, 1897, p. 2.—PILSBRY, Class. Cat., p. 10, 1898.
Ashmunella rhyssa PILSBRY, Proc. Acad. Nat. Sci. Phila. for 1899, p. 188.

Collected in the White Mountains of New Mexico by Rev. E. H. Ashmun. It is of a dark yellowish brown color with a rather raggedly rough surface, harsher to the touch than any of the other species of this group. U.S.N.M., 107633.

ASHMUNELLA PSEUDODONTA Dall.

Plate XXVII, figs. 13, 15; Plate XXVIII, fig. 7.

Polygyra pseudodonta DALL, Proc. U. S. Nat. Mus., XIX, Jan., 1897, p. 343.
Ashmunella pseudodonta PILSBRY, Proc. Acad. Nat. Sci. Phila. for 1899, p. 188.

Collected at White Oaks, New Mexico, at an altitude of 7,000 feet, by Rev. E. H. Ashmun. The types are of a yellowish straw color. U.S.N.M., 107611.

ASHMUNELLA ASHMUNI Dall.

Plate XXVIII, figs. 4, 6, 9.

Polygyra ashmuni DALL, Proc. U. S. Nat. Mus., XIX, Jan., 1897, p. 342.

Collected at Bland, New Mexico, at a height of 8,000 feet above the sea, by the Rev. E. H. Ashmun. U.S.N.M., 107610.

HOLOSPIRA (HAPLOSTEMMA) HAMILTONI Dall.

Plate XXVIII, figs. 2, 11.

Holospira (Haplostemma) hamiltoni DALL, Nautilus, XI, No. 4, Aug., 1897, p. 38.

Collected in the Rio Grande Mountains, Brewster County, Texas, at a height of 3,500 feet, feeding on *Selaginella lepidophylla* Spring, by James M. Hamilton. The shell is pinkish white with a darker livid apex. U.S.N.M., 107759.

CERES NELSONI Dall.

Plate XXVIII, figs. 1, 3, 5, 8.

Ceres nelsoni DALL, Nautilus, XII, No. 3, July, 1898, p. 271.

Collected by E. W. Nelson at Pilitla, San Luis Potosi, Mexico. The umbilical region is pale lemon yellow. The rest varies from lemon yellow to deep orange, with a minute sculpture of small fine elevated threads which tend to break up into granules. U.S.N.M., 107823.

SIPHONARIA LINEOLATA Orbigny.

Plate XXVIII, figs. 10, 13.

Siphonaria lineolata ORBIGNY, Moll. Cubana, I, 1842, p. 232, pl. XVII, figs. 13, 15.
Siphonaria naufragum STEARNS, Proc. Boston Soc. Nat. Hist., XV, 1872, p. 23.

Cuba, Orbigny; St. Augustine, Hemphill; Amelia Island, East Florida, Stearns; Jupiter Inlet, etc., Dall. U.S.N.M., 97267.

Whitish or brownish, with radiating blackish lines conspicuous internally, the radial sculpture always fine and close and the form very regular for a limpet. The name has been misprinted *lineata* by Beau and Krebs.

SIPHONARIA ALTERNATA Say.

Plate XXVIII, figs. 12, 14.

Patella alternata SAY, Journ. Acad. Nat. Sci. Phila., V, 1826, p. 215.
Siphonaria alternata SAY, Am. Concb., IV, 1826, pl. XXXVIII.—BINNEY's Say, p. 192.
Siphonaria brunnea (Hanley) JONES, Moll. Bermuda, Trans. Nova Scotian Inst., II, 1864, Pt. 2, p. 21.
? Siphonaria picta ORBIGNY (part), Moll. Cubana, I, 1842, p. 231.

East Florida, Bermuda, south to Cuba and west to Yucatan. U.S.N.M., 94431.

The figured specimen is from Bermuda, collected by Goode, and is what Jones referred to *S. brunnea* Hanley. It appears to be merely a better-nourished, slightly darker-colored geographical race of the *alternata* of Say. If the *S. picta* Orbigny (1842) comprises only a single species, which is not yet certain, this species extends southward to Rio Janeiro, Brazil. It is somewhat singular that no good figure of Say's shell is to be found in the whole conchological literature of America, though the shell has been known (chiefly by bleached, worn specimens) for three-quarters of a century.

EAST AMERICAN MARINE SPECIES.

CYLICHNA VERRILLII Dall.

Plate XXIX, fig. 1.

Cylichna verrillii DALL, Rep. Blake Gastr., Bull. Mus. Comp. Zool., XVIII, Jan. 1889, p. 54.

Collected off the coast of North Carolina at various stations in from 50 to 124 fathoms, sand, with the bottom temperatures from 58° to 75° F., by the U. S. Fish Commission steamer *Albatross*. Bluish white with a nearly translucent periostracum and finely spirally striated. U.S.N.M., 94477.

RETUSA MAYOI Dall.

Plate XXIX, fig. 2.

Utriculus mayoi DALL, Rep. Blake Gastr., Bull. Mus. Comp. Zool., XVIII, Jan., 1889, p. 46.

Collected from the stomach of a haddock at Portland, Maine, by Mr. John Mayo. U.S.N.M., 95269.

Shell solid, yellowish white, with little or no spiral striation.

UMBRACULUM (HYALOPATINA) RUSHII Dall.

Plate XXX, fig. 5.

Umbraculum (*Hyalopatina*) *rushii* DALL, Rep. Blake Gastr., Bull Mus. Comp. Zool., XVIII, 1889, p. 61.—PILSBRY, Man. Conch., XVI, 1896, p. 185, pl. LI, fig. 58.

Dredged off Great Isaac Light, Bahamas, in 30 fathoms, sand, by Dr. W. H. Rush, U. S. N. U.S.N.M., 61222.

The shell is almost perfectly flat and very thin; bluish translucent white, dextral with a sinistral nucleus.

TEREBRA TEXANA Dall.

Plate XXIX, fig. 8.

Terebra texana DALL, Nautilus, XII, No. 4, Aug., 1898, p. 45.

From the Gulf coast of Matagorda Island, Texas, J. D. Mitchell. U.S.N.M., 107373.

Color pale yellowish, with darker yellow or brown flammules. Only two imperfect specimens of this fine species are known, both from the above locality.

TEREBRA (SUBULA) FLORIDANA Dall.

Plate XXIX, fig. 9.

Subula floridana DALL, Rep. Blake Gastr., Bull. Mus. Comp. Zool., XVIII, 1889, p. 63.

Terebra (Subula) floridana DALL, Bull. 37, U. S. Nat. Mus., 1889, p. 94.

Key West and Florida Strait, dredged by the U. S. Fish Commission steamer *Albatross* in 45 to 56 fathoms, sand. U.S.N.M., 87222. It is of a pale straw color.

TEREBRA (ACUS) RUSHII Dall.

Plate XXIX, fig. 6.

Terebra (Acus) rushii DALL, Rep. Blake Gastr., Bull. Mus. Comp. Zool., XVIII, 1889, p. 64.

Dredged 5 miles off Cape Florida, in 8 fathoms, by Dr. W. H. Rush, U. S. N. U.S.N.M., 82952.

It is a small, brilliantly white shell, remarkable for its exclusively spiral sculpture.

CONUS STIMPSONI, new species.

Plate XXIX, fig. 7.

Conus stimpsoni DALL, MS., in Coll. U. S. Nat. Mus.

Dredged by the U. S. Fish Commission steamer *Albatross*, in 60 fathoms, off Key West. U.S.N.M., 107371.

Shell of about twelve whorls, as figured, slopes of the spire somewhat concave, turreted, the nuclear whorl rounded, smooth; the following four furnished with a beaded keel at the shoulder; this keel becomes entire on the subsequent whorls; above the shoulder the whorls are slightly concave, the suture appressed, and there are about three faint spiral grooves on the concave surface; last whorl with shallow squarish channels, as figured. The periostracum is thin, pale straw color, finely axially striated. The color of the shell is pinkish white, suffused with salmon pink near the shoulder and on the spire and base, with a very faint, cloudy band of the same about midway between base and shoulder. Altitude of shell, 37 mm.

The species is named in honor of the late Dr. William Stimpson, whose last field work was done in the vicinity of the Florida Strait.

DAPHNELLA EUGRAMMATA, new species.

Plate XXIX, fig. 3.

Dredged at station 2328, off Habana, in 203 fathoms, bottom temperature 78° F., by the U. S. Fish Commission. U.S.N.M., 107448.

Shell small, yellowish white, with rather coarse spiral channels, separated by narrow, rounded threads crossed by narrow riblets, strong on the upper whorls, on the last fainter, extending axially from the broad concave fasciole to about the middle of the whorl, where they become obsolete, substantially as figured. Outer lip not lirate within, and no callus on the pillar. Altitude of figured type, 9 mm.; maximum diameter, 4 mm.

ADMETE MICROSCOPICA Dall.

Plate XXIX, fig. 4.

Cancellaria microscopica DALL, Rep. Blake Gastr., Bull. Mus. Comp. Zool., XVIII, 1889, p. 131.

Admete? microscopica DALL, Bull. 37, U. S. Nat. Mus., 1889, p. 106.

Campeche Bank, off Yucatan; Florida Strait, and off Fernandina, Florida, in 200 to 780 fathoms, U. S. Fish Commission steamer *Albatross* and Dr. W. H. Rush. U.S.N.M., 82977.

The plaits on the pillar are either not fully developed, or, as seems more probable, are almost obsolete, as are the inner lirations of the outer lip. For this reason it seemed more appropriately placed in *Admete*, though the general appearance is more like that of *Trigonostoma* in miniature. The largest specimen observed measures only 4.3 mm. in length.

AURINIA DUBIA Broderip.

Plate XXIX, fig. 11.

Voluta dubia BRODERIP, Zool. Journ., III, 1828, p. 81, pl. III, fig. 1.

Aurinia dubia DALL, Rep. Blake Gastr., Bull. Mus. Comp. Zool., XVIII, 1889, p. 151.

North Carolina to the Gulf of Mexico, in 34 to 168 fathoms. U.S.N.M., 54544.

Full synonymy and details of the gross anatomy will be found in the Blake report. The shell is so thin and fragile that it is probably always destroyed before reaching the beaches when cast up by the sea. The color is salmon pink with squarish dark brown spots, very much as in the case of *Scaphella junonia*. The figures of this species being hardly accessible to American students, it was thought desirable to provide one here.

MURICIDEA PHILIPPIANA Dall.

Plate XXIX, fig. 5.

Muricidea philippiana DALL, Rep. Blake Gastr., Bull. Mus. Comp. Zool., XVIII, Mar., 1889, p. 213.

Among coral at low water, at Key West, Hemphill, and off Cape Catoche, Yucatan, in 20 to 25 fathoms, coral sand, U. S. Fish Commission steamer *Albatross*. U.S.N.M., 93337.

This curious shell is of a bluish milky white suffused with pale violet or rose on the pillar or in the throat.

MURICIDEA (PSEUDONEPTUNEA) MULTANGULA Philippi.

Plate XXX, fig. 1.

Fusus multangulus PHILIPPI, Zeitschr. für Malak., V, 1849, p. 25.
Muricidea hemphilli DALL, Hemphill's Shells, 1883, p. 327.
Fusus (Pseudoneptunea) multangulus KOBELT, Jahrb. Malak. Ges., IX, 1882, p. 17.

From Cape Fear, North Carolina, to Florida; Yucatan, and the northern Antilles, in shallow water. U.S.N.M., 36030.

A very elegant shell when in fine condition, whitish with pale brown flecks, and often with rosy or purplish suffusion about the aperture. It has a fusoid operculum, and when perfect the very thin periostracum is slightly hispid.

MURICIDEA OSTREARUM Conrad.

Plate XXX, fig. 2.

Murex ostrearum CONRAD, Proc. Acad. Nat. Sci. Phila., III, 1846, p. 25.
Urosalpinx floridanus CONRAD, Am. Journ. Conch., V, 1869, p. 106, pl. XII, fig. 4.
Muricidea floridana DALL, Hemphill's Shells, 1883, p. 326; Rep. Blake Gastr., Bull. Mus. Comp. Zool., XVIII, 1889, p. 213.

Florida coast south from St. Augustine and west to Yucatan, low water to 13 fathoms, on rocky shores. U.S.N.M., 54491.

This species is of a grayish color with a livid purplish brown throat. It is rather similar to the *Urosalpinx perrugatus* Conrad, which is stouter, with two brown spiral bands usually visible in the throat, and has a quite different operculum.

LATIRUS CAYOHUESONICUS Sowerby and Melvill.

Plate XXX, fig. 6.

Latirus cayohuesonicus SOWERBY and MELVILL, Proc. Zool. Soc., 1878, p. 796, pl. XLVIII, fig. 4.

Key West and southward among the northern Antilles. U.S.N.M., 83635.

This small dark brown species appears to be rather rare.

SCALA NITIDELLA Dall.

Plate XXX, fig. 8.

Scala nitidella DALL, Rep. Blake Gastr., Bull. Mus. Comp. Zool., XVIII, Apr., 1889, p. 314.

Fifteen to 30 miles off the coast of North Carolina in about 50 fathoms, sandy bottom, U. S. Fish Commission steamer *Albatross*, and south to the Straits of Florida. U.S.N.M., 83716.

Brilliantly polished white, liberally blotched with cloudy spots of light brown disposed in an irregularly spiral manner along the whorl.

SCALA SCIPIO Dall.

Plate XXIX, fig. 10.

Scala scipio DALL, Rep. Blake Gastr., Bull. Mus. Comp. Zool., XVIII, Apr., 1889, p. 310.

Cape Hatteras, North Carolina, to Vera Cruz, Mexico, in 10 to 16 fathoms. U.S.N.M., 10694.

The species is characterized by its livid pink color, glistening surface, and white varices.

SCALA (AMÆA) MITCHELLI Dall.

Plate XXX, figs. 3, 4.

Scala mitchelli DALL, Nautilus, IX, No. 10, Feb., 1896, p. 112.

Matagorda Island, Texas, by J. D. Mitchell. U.S.N.M., 132788.

The shell is yellowish white, with the basal area and a band above the periphery dark reddish brown; the sculpture recalls *S. magnifica*.

SCALA (CIRSOTREMA) COCHLEA Sowerby.

Plate XXX, fig. 7.

Scalaria cochlea SOWERBY, Thes. Conch., *Scalaria*, 1847, p. 103, pl. XXXV, fig. 142 (only).

Scala (*Cirsotrema*) *cochlea* MÖRCH, Journ. Acad. Nat. Sci. Phila., VIII, 1876, p. 205.

Off Hatteras, North Carolina, in 124 fathoms, sand, and Gulf of Mexico, near Cedar Keys, in 25 fathoms; U. S. Fish Commission. In the West Indies, at St. Thomas, St. Croix, Santo Domingo, and Tortola (in mud, 1 to 2 feet of water, Swift). U.S.N.M., 93710.

This fine shell is of a whitish or slightly ferruginous color, with a black operculum. It reaches a length of over 40 mm. The specimen figured is from the northern part of the Gulf of Mexico. Sowerby's reference to Loanda, west coast of Africa, in connection with this species in the Thesaurus, is regarded by Mörch as an error, though it is included by Dunker in his catalogue of the Loanda collection of Tams.

SCALA (ACRILLA) RETIFERA Dall.

Plate XXX, fig. 9.

Scala (*Acrilla*) *retifera* DALL, Rep. Blake Gastr., Bull. Mus. Comp. Zool., XVIII, 1889, p. 312.

Off the coast of North Carolina, in 49 to 63 fathoms, bottom temperature 75° F. U.S.N.M., 83733.

The color of the shell is pale olive, grayish, or whitish, with a white callus on the inner lip.

PECTEN (PLAGIOCTENIUM) GIBBUS var. AMPLICOSTATUS Dall.

Plate XXXII, fig. 9.

Pecten gibbus var. *amplicostatus* DALL, Trans. Wagner Inst., III, Pt. 4, 1898, p. 747.

Coast of Texas and south to Cartagena. U.S.N.M., 106990.

One valve is usually white, the other of a slaty gray, more or less variegated with white and brown.

LIMA (CTENOIDES) ALBICOMA Dall.

Plate XXXII, fig. 2.

Lima albicoma DALL, Rep. Blake Pelec., Bull. Mus. Comp. Zool., XII, No. 6, 1886, p. 225.

Off Habana in 115 fathoms, and at Barbados in 100 fathoms. U.S.N.M., 62250.

The color of the shell is grayish white, or with a slight tinge of yellow.

PHILOBRYA ATLANTICA Dall.

Plate XXXII, figs. 4, 5.

Philobrya atlantica DALL, Proc. U. S. Nat. Mus., XVIII, 1895, p. 16.—BERNARD, Journ. de Conchyl., XLV, 1897, p. 10, pl. 1, fig. 2.

Spiring Bay, Argentine coast, attached to algæ in 58 fathoms. U. S. Fish Commission steamer *Albatross*. U.S.N.M., 97057.

Bernard, in discussing this species, has not quite clearly understood my meaning, when, in my original paper, I compared the nepionic valves of this species to a Naiad glochidium. I did not mean that the *Philobrya* passed through an encysted stage in its early development necessarily, or that the development of the soft parts before the post-nepionic development of the shell was necessarily equivalent to that of the naiades, but merely that the nepionic stages of the valves were comparable, which is undoubtedly the case, though the resemblance may be less close than I was at first disposed to believe. The shell is of a purplish color, with an olivaceous periostracum, fimbriated on the radial lines, and the young are retained within the maternal shell until of a considerable size, this period, perhaps, corresponding to the period of encystment in the naiades.

CRENELLA PECTINULA Gould.

Plate XXXI, fig. 11.

Modiola pectinula GOULD, Inv. Mass., 1841, p. 127, fig. 85.

Modiolaria pectinula GOULD, Otia, 1862, p. 182.

Crenella pectinula STIMPSON, Checkl. East Am. Shells, p. 2, Smithsonian Misc. Coll., 1860.

In codfish stomachs taken on Georges Banks, Gould; Gulf of St. Lawrence, Whiteaves. U.S.N.M., 64097.

Shell of a bright yellow brown with about forty not very close set, rounded ribs, sometimes with a fine intercalary thread, the interior nacre white or slightly bluish.

CRENELLA FABA Müller.

Plate XXXI, fig. 12.

Mytilus faba MÜLLER, Prodr. Zool. Danica, 1776, p. 250, No. 3015.—FABRICIUS, Fauna Grönl., 1780, p. 419.

Greenland and adjacent Arctic seas, Fabricius and others; Labrador, Turner; Straits of Belle Isle, Packard; and Mingan, Whiteaves. U.S.N.M., 107638.

Shell of a dark livid purple-brown externally, with about seventy low, flat radial riblets without intercalary threads; the interior nacre deep purple. I regard this as distinct from *C. pectinula* on account of the differences in color and sculpture; it is also rather less inflated than the latter.

ARCA (FOSSULARCA) ADAMSI Smith, var. CONRADIANA Dall.

Plate XXXI, fig. 1.

Arca adamsi var. *conradiana* DALL, Rep. Blake Pelec., Bull. Mus. Comp. Zool., XII, 1886, No. 6, p. 243.

Off Cape Hatteras, North Carolina, and southward to the Gulf of Mexico and Curaçao. U.S.N.M., 92553.

The shell is of a yellowish white color.

ARCA (CUCULLARIA) SAGRINATA Dall.

Plate XXXI, fig. 2.

Macrodon sagrinata DALL, Rep. Blake Pelec., Bull. Mus. Comp. Zool., XII, 1886, No. 6, p. 245.

Arca (*Cucullaria*) *sagrinata* DALL, Trans. Wagner Inst., III, 1898; Pt. 4, p. 659.

Gulf of Mexico, in 80 fathoms. U.S.N.M., 63175.

ASTARTE GLOBULA Dall.

Plate XXXII, fig. 6.

Astarte smithii var. *globula* DALL, Rep. Blake Pelec., Bull. Mus. Comp. Zool., XII, 1886, No. 6, p. 260.

Off Fernandina, Florida, in 294 fathoms, and in the Antillean region from Barbados westward to Campeche Bank, in 50 to 539 fathoms. U.S.N.M., 87722.

The shell is smooth, not vernicose, and of a pale brown or straw color.

CHAMA LACTUCA Dall.

Plate XXXI, figs. 8, 10.

Chama lactuca DALL, Rep. Blake Pelec., Bull. Mus. Comp. Zool., XII, 1886, No. 6, p. 260.

Dredged by the U. S. Coast Survey Steamer *Hassler* at Barbados in 80 to 100 fathoms. U.S.N.M., 64305.

The shell is of a whitish color with concentric bands of ruddy brown, capuliform and thin; the nepionic shell is claret colored and polished.

This species has the same capuloid form as the *C. nicolloni* Dautzenberg, from the Atlantic coast of France in about 65 fathoms; but the latter, which was described in 1893, has broad concentric frills on both valves whereas the present species has fluted sculpture on the upper, and concentric laminæ only on the lower valve.

AGRIOPOMA new section.

MERETRIX (AGRIOPOMA) TEXASIANA Dall.

Plate XXXII, fig. 1.

Cytherea texasiana DALL, Nautilus, V, 1892, No. 12, p. 134.

Coast of Texas at Galveston and elsewhere. U.S.N.M., 6056.

Shell white or creamy with a dull surface, rather rudely striated in harmony with the incremental lines.

This resembles *M. sayana* Conrad (=*convexa* Say) in a general way, but is more elongated and grows to a far larger size. They belong in the same section of the genus characterized by the colorless shell and the rude external sculpture for which (as it does not seem to have been differentiated hitherto and is perfectly distinguished from the original *Callista* by its superficial characteristics) I propose the sectional name of *Agriopoma*.

MERETRIX (TRANSENNELLA) CONRADINA Dall.

Plate XXXI, figs. 5, 7.

Cytherea (*Transennella*) *conradina* DALL, Proc. U. S. Nat. Mus., VI, Dec., 1883, p. 340.

In mud between tides at Cedar Keys on the west coast of Florida, Hemphill; south to Key West and north along the Atlantic coast to Cape Hatteras. U.S.N.M., 91993.

The shell is white with fine zigzag markings of pale yellow in some specimens and occasionally a pink suffusion internally. It belongs to a little group of *Veneridæ* which appears to be restricted to tropical and subtropical east American waters and recalls *Psephis* of the Pacific coast. They are all of small size but do not appear to be viviparous like *Psephis*, and are especially characterized by the singular system

of grooves on the internal margins of the valves. These grooves are subconcentric but cut the margins more or less obliquely, not in harmony with the lines of growth. The same type occurs in our southern tertiaries, and an attempt is made in fig. 7 to illustrate this system of marginal grooving.

MERETRIX SIMPSONI Dall.

Plate XXXII, fig. 3.

Cytherea simpsoni DALL, Bull. 37, U. S. Nat. Mus., 1889, p. 56 (name only); Nautilus, IX, 1895, No. 1, p. 10.

Tampa, Florida, Charles T. Simpson; Sarasota Bay, Hemphill. U.S.N.M., 53792.

Shell with narrow, slightly irregular and feeble concentric ridges, surface not polished except over the large ovate lunule which is smooth. Colors white or more or less suffused with purple which may be very dark internally, a zigzag pattern of yellowish brown frequently present; pallial sinus ascending, rather large and rounded in front; margins entire; escutcheon not delimited. Lon. 16.5; alt. 15.0; diam. 8.5 mm. The shell is rather solid and the periostracum thin and translucent.

MACTRA RICHMONDI Dall.

Plate XXXI, fig. 6.

Mactra richmondi DALL, Nautilus, VIII, 1894, No. 3, pp. 26, 28.

Grey Town, Nicaragua, C. W. Richmond. U.S.N.M., 124774.

The single valve obtained is white but may be somewhat bleached.

MACTRELLA IHERINGI Dall.

Plate XXXII, fig. 8.

Mactrella iheringi DALL, Nautilus, X, 1897, No. 11, p. 123.

San Paulo, Brazil, Ihering. U.S.N.M., 107632.

The shell is white with a yellowish silky periostracum and may reach nearly 3 inches in length.

ASTHENOTHÆRUS HEMPHILLI Dall.

Plate XXXI, fig. 9.

Asthenothærus hemphilli DALL, Rep. Blake Pelec., Bull. Mus. Comp. Zool., XII, 1886, No. 6, p. 308.

West of Florida in 17 fathoms; Marco, Florida, in 2 fathoms, Hemphill. U.S.N.M., 53691.

Small, yellowish white, with the aspect of a very young *Periploma*.

PANDORA (KENNERLEYIA) BUSHIANA Dall.

Plate XXXI, fig. 3.

Pandora (*Kennerleyia*) *bushiana* DALL, Rep. Blake Pelec., Bull. Mus. Comp. Zool., XII, 1886, No. 6, p. 312.

Tampa, Florida, in 6 fathoms, Charles T. Simpson. U.S.N.M., 61029.

The shell is white externally and very perlaceous within.

PANDORA (CLIDIOPHORA) TRILINEATA Say.

Plate XXXI, fig. 4.

Pandora trilineata SAY, Journ. Acad. Nat. Sci. Phila., II, p. 261; Am. Conch. 1830, Pt. 1, pl. 11.

Great Egg Harbor, New Jersey, and south to the Gulf of Mexico, Say; Cape Hatteras to West Florida, Dall. U.S.N.M., 61028.

The figured specimen is from Tampa Bay, Florida, in 6 fathoms. The species has been generally confounded by the northern collectors with the following one. The shell is white, often with a ferruginous deposit near the hinge line, and, like the other species of the genus, brilliantly nacreous internally.

PANDORA (CLIDIOPHORA) GOULDIANA Dall.

Plate XXXII, fig. 7.

Pandora (*Clidiophora*) *gouldiana* DALL, Rep. Blake Pelec., Bull. Mus. Comp. Zool., XII, 1886, No. 6, p. 312 (footnote).

Nova Scotia south to Virginia, in shoal water to 30 fathoms. U.S.N.M., 95490, from Woods Hole, Massachusetts, Dall.

This large and rude species has generally been confounded by New England collectors with the more delicate and elegant Southern shell.

WEST AMERICA MARINE SPECIES.

CEPHALOPODA.

ARGONAUTA EXPANSA Dall.

Plate XXXIII, figs. 1, 2, 3.

Argonauta expansa DALL, Proc. Cal. Acad. Sci., IV, Dec., 1872, p. 303.

Gulf of California, various collectors. U.S.N.M., 61369.

This fine and very distinct species of argonaut has a finely granular surface, with a generally yellowish white coloration, dark burnt brown color on the spines and part of the spire, and a livid brown-purple suffusion on the two long axial expansions. It appears to be abundant in the Gulf, and I have never seen a specimen from any other region. It has never been figured hitherto, and while a colored plate is required to fully exhibit its distinctive characters, I have thought that the figures now provided might aid in its recognition.

GASTROPODA.

Genus ACTÆON Montfort.

Subgenus MICROGLYPHIS Dall, 1902.

ACTÆON (MICROGLYPHIS) BREVICULUS, new species.

Shell small, short, plump, yellowish white, with four and a half polished whorls; nucleus sinistral but wholly immersed, so that the apex seems as if dextral, smooth; whorls convex, rapidly increasing, separated by a deep, almost channeled, very narrow suture; sculpture of extremely faint, fine spiral striæ almost absent in front of the suture and growing more distinct anteriorly, not visibly punctate; aperture ample, outer lip simple, body with a well-marked callus, continued on to the pillar and spreading a little over the base behind the pillar, which is concavely arcuate, its anterior edge thickened and expanded into a strong spiral plait or lamina behind which on the pillar is a second less marked plait; in front of the pillar is a small but distinct notch; lon. 3.6; max. diam., 2.25 mm.

Dredged off Santa Rosa Island, California, in 53 fathoms, sandy mud, at station 2902, by the U. S. Fish Commission steamer *Albatross;* bottom temperature, 45° F. U.S.N.M., 109042.

This little species belongs to a group of chiefly deep water Actæons, characterized by a very short spire and globose shell in which the end of the pillar is not only truncate as in *Rictaxis*, but has a marked sulcus behind it and is produced laterally into a rather wide spiral flange at maturity, and is concave with a single feeble plait behind the terminal lamina. Of these, *A. perconicus* and *A. curtulus* Dall may be mentioned, the latter, from the western part of Magellan Strait, may serve as type for the group which may be regarded as a subgenus of *Actæon* and take the name of *Microglyphis*. The present species is distinguished from *A. curtulus* by its somewhat more elongate form and much less obvious sculpture, beside being somewhat larger and less delicate.

TOLEDONIA, new genus.

Shell small, smooth, thin, imperforate, succineæform; pillar continuous with the basal margin of the aperture, straight, but with an elevated thin plait near the base of the pillar, which appears to be continued into the coil of the shell; nucleus smooth, dextral; soft parts unknown. Type, *T. perplexa* Dall.

This little shell has a combination of characters which prevent its being assigned to any known genus. It differs from any of the *Pyramidellidæ* in its form and dextral nucleus; from the *Actæonidæ* by its peculiar pillar and dextral nucleus; from immature *Ringicula* by its single plait and general aspect. It is not certain even to what

family of gastropods it should be assigned. As it was dredged at a considerable depth there seems no reason to doubt it is normally marine.

TOLEDONIA PERPLEXA, new species.

Shell small, whitish, smooth, except for faint incremental lines; suture distinct, whorls plump and rounded, the last comprising nearly the whole shell; nucleus smooth, polished, plump, dextral, of a single whorl; subsequent whorls three, smooth, inflated, slightly shouldered, with a distinct but not channeled suture; last whorl much the largest, surface slightly marked by incremental lines, not polished; periostracum, if any, lost; aperture ample, outer lip thin, simple, rounded in front and passing insensibly into the slightly oblique but not twisted pillar, with a thin callus on the body and over the imperforate umbilical region; plait thin, prominent, but not sharp, situated near the base of the pillar and apparently continued into the coil of the shell; alt. of shell 3.2; of aperture 2.2; max. diam. of shell 2.3 mm.

Dredged in the Straits of Magellan, east of Punta Arenas, by the U. S. Fish Commission steamer *Albatross* at station 2778, in 61 fathoms; bottom temperature 48° F. U.S.N.M., 109022.

The most striking features of this puzzling shell are its *Succinea*-like form and its untruncate straight pillar with a single prominent plait.

Genus PLEUROTOMA Lamarck.

Section ANTIPLANES Dall.

Among the deeper water and abyssal forms of this genus are some which do not seem to fit into any of the hitherto proposed sections. These forms are smooth except for incremental lines and sometimes fine spiral striæ, the periostracum is conspicuous and the shell disposed to be chalky, the anal sulcus shallow and more or less rounded, usually situated some distance from the suture, but not quite on the periphery of the whorl, the canal rather wide and long and often a little recurved, the aperture unarmed. There are both dextral and sinistral species, and I propose for them the sectional name of *Antiplanes*. The typical species will be *Surcula perversa* Gabb, of the California Tertiary and recent faunas.

PLEUROTOMA (ANTIPLANES) PERVERSA Gabb.

Plate XXXIV, fig. 8.

Pleurotoma perversa GABB, Proc. Cal. Acad. Sci., III, 1865, p. 183.
Drillia perversa GABB, Paleont. Cala., II, 1866, p. 6, pl. 1, fig. 10.

Off San Pedro in 60 fathoms, Cooper; off Lower California in 48 fathoms, mud, U. S. Fish Commission steamer *Albatross*, at station 2934. The latter is figured here. Also in Pliocene and Pleistocene shell beds of San Pedro and San Diego, California. U.S.N.M., 122561.

The original figure of Gabb is very poor. I have figured a specimen, which has been compared with the original type of Gabb and found identical, for comparison with the following species.

PLEUROTOMA (ANTIPLANES) VINOSA Dall.

Plate XXXIV, fig. 4.

Pleurotoma vinosa DALL, Proc. Cal. Acad. Sci., V, 1874, p. 253.

Kyska Harbor, Great Kyska Island, Aleutian chain, and in 17 fathoms, Bristol Bay, Bering Sea, at station 3246, by the U. S. Fish Commission steamer *Albatross*. The latter figured. U.S.N.M., 122575.

PLEUROTOMA (ANTIPLANES) PIONA, new species.

Shell solid, heavy, with a rapidly tapering spire of seven or more rotund whorls separated by a distinct suture; nucleus eroded; surface covered with a brown periostracum, smooth except for fine obscure feeble spiral lines and the lines of increment; aperture short, rounded ovate with a short wide slightly recurved canal; pillar solid, white, twisted, obliquely truncate in front; outer lip with a shallow anal sinus a little in front of the suture; margin thin, simple. Lon. of shell 41, of aperture 19; max. diam. 18 mm. Operculum normal, brown.

Type specimen dredged by U. S. Fish Commission at station 3644, in 96 fathoms, sand; bottom temperature 33° F. U.S.N.M., 109179.

Range from 41 to 81 fathoms in the southern part of Bering Sea, and in from 41 to 110 fathoms south of Aliaska peninsula, in the Pacific.

A fine solid dextral species, not particularly attractive, but with a certain symmetry of form. The two following are also dextral.

PLEUROTOMA (ANTIPLANES) THALÆA, new species.

Shell solid, heavy, with an elongate spire constricted at the sutures, and eight or more whorls; nucleus eroded; surface covered with a pale apple green periostracum, which fades in time to a greenish gray; surface sculptured only by incremental lines, faint spiral lines, a slight depression of the anal fasciole, and irregular, feeble, broken, short elevated lines which are scattered over the surface and usually directed at right angles to the incremental lines; aperture short and narrow, with a short and wide canal; outer lip with a deep anal sinuosity, leaving a slightly depressed fasciole behind it; anterior part of the outer lip much produced and rounded, thin and simple; pillar stout, white, short, obliquely truncate in front; canal wide, short, slightly flaring; base somewhat constricted, with the spiral striæ stronger than on the rest of the surface. Lon. of shell 40, of aperture 15; max. diam. 12 mm. Operculum normal.

Type specimen dredged off San Luis Obispo, California, by the U. S. Fish Commission steamer *Albatross* at station 3195, in 252 fathoms, mud; bottom temperature 43°.2 F. U.S.N.M., 122568.

Range, from the above locality northward to Bering Sea, being obtained off the Oregon coast in 277 fathoms, and at Unalaska in 68 to 85 fathoms.

This elegant species belongs to the same group as the preceding, and is notable for its numerous rounded whorls and deeply constricted suture, and when fresh for its peculiar pale green color, which fades in a few years, in the cabinet, to a greenish gray.

PLEUROTOMA (ANTIPLANES) SANTAROSANA, new species.

Shell elongated, slender, acute, with twelve whorls, of an olivaceous or pinkish brown; the interior of the aperture of a pale rufescent hue; whorls rounded, suture very distinct, sculpture chiefly of incremental lines and a faint spiral striation mostly below the periphery: anal fasciole limited by slightly raised lines; nucleus small, inflated, smooth; aperture narrow, with a short wide canal; pillar solid, short, obliquely truncate; outer lip thin, produced, with a deep anal sulcus a little in advance of the sutural margin of the whorl. Operculum normal. Lon. of shell 36, of aperture and canal 11.5; max. diam. 9 mm.

Dredged off Santa Rosa Island, California, in 53 fathoms, sand, at station 2902, by the U. S. Fish Commission steamer *Albatross* in 1889; bottom temperature 45° F. U.S.N.M., 109198.

This elegant species is the most slender and elongated of the group, so far as yet known, and is easily distinguished by that character and by the number of its whorls from any of the others.

PLEUROTOMA CIRCINATA Dall.

Plate XXXVI, fig. 1.

Pleurotoma circinata DALL, Proc. Cal. Acad. Sci., V, April 1873, p. 62, pl. II, fig. 5—AURIVILLIUS, Vega exp. vet. arb., IV, 1885, p. 353, pl. XIII, figs. 1, 2.

Mangilia (*Aforia*) *circinata* DALL, Rep. Blake Gastr., Bull. Mus. Comp. Zool., XVIII, Feb. 1889, p. 99.

Pleurotoma insignis JEFFREYS, Ann. Mag. Nat. Hist. for Aug., 1883, p. 120.

Captains Bay, Unalaska, in 60 fathoms, Dall; northwestern part of Bering Sea in 55 fathoms, Vega expedition. U.S.N.M., 108995.

This fine species was first figured from a more or less defective specimen, but has since been obtained in considerable numbers, living. It is not known from north of Bering Strait, though Jeffreys referred it to the Icy Sea of Siberia. The Vega specimens were dredged southwest of St. Lawrence Island, Bering Sea, in latitude 62° 39′ and west longitude 177° 05′. Jeffreys was mistaken in supposing it to be inoperculate.

PLEUROTOMA CALLICESTA, new species.

Shell small, subelongate, with the aperture shorter than the spire, and six or more whorls; white, covered with a pale olive green

periostracum; nucleus, and possibly a whorl or two more, eroded; subsequent whorls somewhat irregular, moderately convex, with a well-marked suture bordered in front by a narrow turgid band, in front of which again is a shallow rounded anal sulcus which does not leave a well-marked fasciole, and is a good deal nearer to the suture than to the periphery; in front of the fasciolar region are a series of 12 or 13 short ill-defined ribs with equal or wider interspaces, becoming obsolete at the periphery, and which are proportionately sharper on the earlier whorls; incremental lines rather prominent and irregular, the surface also sculptured with a singular oblique arrangement of small loops and furrows obliquely irregularly disposed, recalling the pattern familiar on bookbinders' "combed" marble paper, but less regular, which covers the whole shell; pillar a little twisted, straight, obliquely attenuated in front, without any marked callus; canal short, wide, somewhat recurved; outer lip convexly arcuate, thin, sharp; there is a slight thickening on the middle of the pillar, which in the interior of the shell may develop into something more prominent. Lon. of shell (eroded) 19.3, of aperture 9.0; max. diam. 7.6 mm.

Dredged off Acapulco, Mexico, in 660 fathoms, ooze, by the U. S. Fish Commission steamer *Albatross* at station 3418; bottom temperature 39° F. U.S.N.M., 109030.

This elegant little shell has a sculpture quite unique, as far as I know. The animal has retracted so far that I can not tell whether it is operculate or not, but believe it may be so. As there is only one specimen and the surface is eroded in spots, I am unable to settle the question by having a section made, and the same difficulty prevents an investigation into the armature of the pillar, if any exists.

DRILLIA EMPYROSIA Dall.

Plate XXXIX, fig. 5.

Drillia empyrosia DALL, Nautilus, XII, No. 11, Mar., 1899, p. 127.

Off San Pedro, California, in 20 to 50 fathoms; Oldroyd.

The shell is yellowish with a burnt sienna brown tint on the later whorls; a paler peripheral band develops white patches where it crosses the ribs. Numerous fine specimens have since been dredged by the party belonging to the summer laboratory of the University of California, at San Pedro.

CANCELLARIA MIDDENDORFFIANA Dall.

Plate XXXVIII, fig. 6.

Admete middendorffiana DALL, Proc. U. S. Nat. Mus., 1884, p. 524; 1886, p. 297.

North end of Nunivak Island, Bering Sea, Dall. U.S.N.M., 108972.

This fine and rare species has hitherto been unfigured.

SCAPHELLA STEARNSII Dall.

Plate XXXV, fig. 4.

Voluta (Scaphella) stearnsii DALL, Proc. Cal. Acad. Sci., IV, Oct., 1872, p. 270, pl. 1, fig. 1.

Shumagin Islands, Alaska, and westward to Captains Bay, Unalaska, in 40 to 100 fathoms. U.S.N.M., 91352.

The original figure of this species is not very accessible and was made from a rather imperfect specimen, hence I have figured a characteristic individual.

This fine species is separated by several thousands of miles from its nearest congener, and is perfectly distinct from any other. The purplish inner layer covered by a porcellanous bluish-white outer stratum is not paralleled among the volutes. Yet with astonishing absurdity it has been united with *Scaphella ancilla* of the opposite end of the world by a conchologist of some note, who, it is charitable to suppose, has never seen a specimen.

FUSUS ? (ROPERIA) ROPERI Dall.

Plate XXXIV, fig. 3.

Fusus (Roperia) roperi DALL, Nautilus, XII, May, 1898, p. 4.

San Pedro, California, in rather deep water. E. W. Roper. Also fossil in the Pleistocene of San Pedro, Arnold. U.S.N.M., 151735.

This singular species is of a ferruginous brown, with the pillar and throat whitish, and with narrow brown spiral lines showing on the interior margin of the outer lip.

Family BUCCINIDÆ.

Subfamily BUCCININÆ.

BUCCINUM ANGULOSUM Gray.

Plate XXXVII, figs. 1, 2, 3, 6.

Buccinum angulosum GRAY, Zool. Beechey's Voy., 1839, p. 127, pl. XXXVI, fig. 6.—DALL, Rep. Int. Polar Exp. to Point Barrow, Alaska, 1885, p. 179, figs. 1–4.
Buccinum stimpsoni GOULD, Proc. Bost. Soc. Nat. Hist., VII, 1860, p. 325.

Shores of the Polar Sea near Bering Strait, Beechey; Point Barrow and Cape Smythe, low water to 5 fathoms, Murdoch. U.S.N.M., 40966, 40967, 122555.

The Point Barrow report is not generally accessible, and, though it contains excellent figures of several of these arctic Buccinums, with magnified drawings of the minute sculpture of their surfaces, so important for identification, I have thought it desirable to refigure several of them here. Most of these arctic Buccinums have two forms apparently correlated with sex, the males being in several species far

smaller, more slender, and less shouldered and flaring at the aperture. That the female has to carry the material for the enormous ovicapsular mass is a sufficient reason for this difference in form and probably for the difference in size. Apart from this, many of the species have mutations of the coarser sculpture, which result in very unlike individuals. They may be (1) rotund without strong keels or ribs, a state which I have called the normal form; (2) with strong spiral keels; (3) with strong axial ribs but no keels; (4) with both ribs and keels. I have enlarged on this subject elsewhere,[1] and will not repeat the discussion here, but I may note that the males are relatively few in number, and it has been noted by Morse that they hide in rocky crevices too small to be entered by the females. At a time when the latter are on the sand beaches ovipositing the collector would probably find no males with them at all.

On Plate XXXVII will be found illustrated several of the forms referred to. Fig. 3 represents Gray's *angulosum*, a female which is the form named *stimpsoni* by Gould, strongly keeled and ribbed. Fig. 6, variety *normale* Dall, without keels or ribs, a male specimen. Fig. 2 represents a male of the type which carries ribs but no keels, and which in the Point Barrow report I called variety *subcostatum*. This specimen is not quite mature and has not formed the reflected lip. Lastly, fig. 1 represents a female specimen which has a distinct keel, but only faint wrinkles in place of ribs. In like manner fig. 7 represents the normal form of *Buccinum castaneum* Dall, and fig. 9 the carinate form, both being females. The latter when young has an astonishing resemblance to a young *Chrysodomus liratus*.

In some species I suspect the discrepancy between the sexes is less noticeable, but in a keg of some 200 *B. hydrophanum* Hancock, from Baffin Bay, there were only nine males, all dwarfish.

BUCCINUM PERCRASSUM Dall.

Plate XXXVII, fig. 4.

Buccinum (*polare* var. ?) *percrassum* DALL in Mart. u. Chemn. Conch. Cab. neue ausg., *Buccinum* (Kobelt), 1883, p. 86, pl. XCI, fig. 5 (not of Posselt, 1898).
Buccinum percrassum DALL, Proc. U. S. Nat. Mus., 1886, p. 216.

Bering Island, Bering Sea, Grebnitzki. U.S.N.M., 108997.

This remarkably solid species has an exceptionally large lozenge-shaped operculum. The specimen figured by Kobelt was of the type with small keels and riblets; that now figured is the normal form. The minute sculpture is quite distinct from that of *B. ochotense* Middendorff (*B. schrenckii* Verkruzen), which is also a rather solid species. It is nearest related to *B. polare* Gray, but I have not found yet any intermediate specimens.

[1] Nachrichtsblatt d. d. Malak. Ges., 1882, pp. 118–121.

BUCCINUM PLECTRUM Stimpson.

Plate XXXVII, fig. 5.

Buccinum plectrum STIMPSON, Rev. North. Bucc., Can. Nat. for 1865, p. 374.—KOBELT, Conch. Cab. *Buccinum*, p. 83, 1883, pl. XCI, fig. 2.

Bering Strait, in 25 to 30 fathoms, Stimpson; shores of Bering Sea and the Aleutian Islands, Dall. U.S.N.M., 34232.

The specimen figured by Kobelt being imperfect and not very characteristic, I have represented a fine specimen from Kadiak Island, Alaska, no figure being accessible in any American publication.

BUCCINUM CASTANEUM Dall.

Plate XXXVII, figs. 7, 9.

Buccinum castaneum DALL, Proc. Cal. Acad. Sci., VII, 1877, p. 3.—KOBELT, Conch. Cab. *Buccinum*, p. 84, 1883, pl. XCI, fig. 3.

Shumagin Islands, Alaska, in 20 fathoms, Dall (normal form); western Aleutian Islands in 5 fathoms, Dall (var. *tricarinatum*). U.S.N.M., 108973, 108974.

I give figures of the two types of this species already referred to under *B. angulosum*.

This species has a translucent brown outer coat with fine uniform spiral striation.

BUCCINUM TENELLUM Dall.

Plate XXXIX, fig. 9.

Buccinum tenellum DALL, Conch. Cab. neue ausg. *Buccinum*, 1883, p. 88, pl. XCI, fig. 8.

Cape Etolin, north end of Nunivak Island, Bering Sea, Dall. U.S.N.M., 108975.

Shell small, solid, with about six whorls, a rather acute spire, very distinct suture, below which the whorl is pinched or puckered into short inconspicuous ribs; surface brownish yellow with a spiral sculpture of small flat riblets separated by incised lines, the riblets themselves finely uniformly spirally striated; canal short, recurved; siphonal fasciole strong, pillar lip callous, the outer lip expanded, sinuous, not much thickened. Alt., 22.25 mm.

Though not exhibiting any very striking features, this little shell does not fit in with any of the other species of the region well enough to permit it to be united specifically. The figure in the Conchylien Cabinet was not accompanied by a diagnosis, which I now provide.

BUCCINUM PICTURATUM Dall.

Plate XXXVII, fig. 8.

Buccinum picturatum DALL, Proc. Cal. Acad. Sci., VII, Mar., 1877 (p. 3 of extras), p. 8; Conch. Cab. neue ausg. *Buccinum*, 1883, p. 60, pl. LXXXV, fig. 7.

Aleutian Islands; the figured type from Kyska Harbor, Kyska Island, Dall. U.S.N.M., 108976.

The shell is of a cream color with pale brown flammulation which is apt to fade in cabinet specimens and is not represented on the figure of the type, but when the shells are fresh is of a lively color. *B. finmarkianum* Verkruzen, from the northern coast of Norway, is similarly painted but differently sculptured.

Subfamily CHRYSODOMINÆ.

Genus CHRYSODOMUS Swainson.

Murex (sp.) LINNÆUS, Syst. Nat., 10th ed., 1758, p. 754.

Fusus (sp.) BRUGUIÈRE, Encyc. Méth., I, 1789, p. xv, pl. CCCCXXVI.

Rhombus (sp.) HUMPHREY, Mus. Calonnianum, 1797, p. 33.

Neptunea (sp.) BOLTEN, Mus. Boltenianum, 1798, p. 115; LINK, Beschr. Rostock Samml. III, 1807, p. 117.

Chrysodomus SWAINSON, Malac., 1840, pp. 90, 308; type, *Murex antiquus* Linnæus. Not *Chrysodomus* G. O. SARS, Moll. Reg. Arct. Norv., 1878, p. 269 (=*Beringius* Dall).

Atractus AGASSIZ, Min. Conch., German ed., 1840, p. 44; types, *Murex striatus* (=*antiquus* Linnæus) and *M. contrarius* Gmelin; not *Atractus* Wagler, 1828.

>*Tritonofusus* BECK, Amtl. Ber. d. 24 Vers. deutsch. Naturf., Kiel, 1847, p. 114 (type, *Fusus islandicus* Chemnitz); HERRMANNSEN, Ind. Gen., ii, 1849, p. 611.

>*Sipho* MÖRCH, Cat. Yoldi, 1852, p. 104 (examples *Fusus islandicus* Chemnitz and *F. ventricosus* Gray); not *Sipho* Brown, Ill. Conch., 1827, pl. XXXVI, nor *Fabricius*, 1823.

Neptunea MÖRCH, Cat. Yoldi, 1852, p. 104 (first species *Murex antiquus* Linnæus; no diagnosis given).

<*Fusus* MÖRCH, Fort. ov. Grönl. Blöddyr, 1857, p. 13.

>*Tritonofusus* MÖRCH, Fort. ov. Grönl. Blöddyr, 1857, p. 13; not of Beck, 1847.

>*Siphonorbis* MÖRCH, Journ. de Conchyl, XVII, 1869, p. 397 (first species *Fusus lachesis* MÖRCH).

>*Tritonellium* VALENCIENNES, Comptes Rendus, XLVI, 1858, p. 762 (*T. barthi* Valenciennes).

>*Neptunella* VERRILL, Inv. An. Vineyard Sound, 1873, p. 639; Am. Journ. Sci., 3d ser., VI, 1873, p. 439. (Type, *Fusus pygmæus* Gould). Not *Neptunella* Meek, 1864.

>*Siphonella* VERRILL, Checkl. Mar. Inv. Atlantic Coast, 1879, p. 20 (new name for *Neptunella*, preoccupied); not *Siphonella* Hagen, 1851.

The names *Murex*, *Fusus*, *Rhombus*, *Neptunea*, stood in early literature for a heterogeneous mixture of Prosobranchiate gastropods, and the last three were practically synonyms of each other. Humphrey's anonymous catalogue, without diagnoses or references to literature except the almost equally barren Portland catalogue, I have always rejected as not properly entering into scientific synonymy, although

the names have to be cited historically. Any other course would result in upsetting many of the best-established names of molluscan genera and families with nothing but detriment to science. Bolten's names, having proper references to the literature, do not stand on the same footing, but his *Neptunea* was a heterogeneous assembly containing much such a mixture as *Fusus* Bruguière, with no type selected.

The recognizable contents of *Neptunea* Bolten include the following genera, which I give in the order in which they have been diagnosed by other authors: *Nassa* (*reticulata*) Lamarck, 1799; *Nassaria* (*nivea*) Link, 1807; *Trophon* (*magellanicus*) Montfort, 1810; *Monoplex* (*caudatus*) Perry, 1811; *Lampusia* (*rubecula*) and *Melongena* (*corona*) Schumacher, 1817; *Chrysodomus* (*antiquus* and *contrarius*) Swainson, 1840; *Boreotrophon* (*clathrus*) Sars, 1878. So it appears that, even if we disregard the absence of a diagnosis and proceed by the method of elimination, the present group would not be entitled to the name of *Neptunea*. Link, in 1807, gave a diagnosis and divided *Neptunea* into two unnamed groups, one equivalent to *Nassa* Lamarck, and the other containing the larger forms, with which he included the broad Fasciolarias like *F. trapezium*.

The genus *Atractus* Agassiz is an exact synonym of *Chrysodomus*, and the name had been used for Reptiles in 1828, and Insects in 1833.

Beck, in 1847, proposed the name of *Tritonofusus* for the elongated forms like *C. islandicus*, for which Mörch, in 1852, attempted to revive the nonbinomial *Sipho* of Klein, which in binomial nomenclature was already utilized by Brown. In 1858 Valenciennes proposed to substitute for *Tritonium* Müller, as applied to these forms, the name *Tritonellium*, which is superfluous.

For another group of this subfamily Gray, in 1857 (January), proposed the name *Strombella* with a diagnosis. *Strombella*, as a nude catalogue name, had been published by Schlueter, in 1838, covering a number of species of *Strombus* like *S. pugilis*, which are of smaller size than those he regarded as typical. I have regarded this name as not having entered into nomenclature, and therefore not preventing the adoption of Gray's genus; but the present usage seems to be adverse to this view, and therefore I now revert to the name *Volutopsius* of Mörch of nearly even date, but which (emended to *Volutopsis*) was adopted by G. O. Sars in 1878 and properly defined. The synonymy of this genus is as follows:

Genus VOLUTOPSIUS Mörch.

Strombella Gray, Guide Moll. Brit. Mus., 1857, p. 13 (January, type, *Fusus norvegicus* Chemnitz), not of Schlüter, System. Conchyliensamml., 1838, p. 22.

Volutopsius Mörch, Fort. ov. Grönl. Blöddyr, April, 1857, p. 13, and Arctic Manual, 1875, p. 129 (same type).

Volutopsis Dall, Proc. Cal. Acad. Sci., V, 1873, p. 57—G. O. Sars, Moll. Reg. Arct. Norv., 1878, p. 268.

Pyrolofusus (Beck, MS.) Mörch, Annales Soc. Mal. de Belgique, IV, 1869, p. 20 (no diagnosis, sole example cited, *Fusus deformis* Gray).

Heliotropis Dall, Proc. Cal. Acad. Sci., V, April, 1873, p. 61. (Type, *Neptunea harpa* Mörch.)

Subdivisions of this subfamily may be characterized as follows:

Genus **Chrysodomus**. Type, *C. antiquus* (Linnæus).

Shell large, short-fusiform, smooth or spirally sculptured, sometimes with rude axial ribbing or nodosities; outer coat of the shell subtranslucent, with a darker tint than the inner layers and with the periostracum inconspicuous; last whorl longer than the spire, with a wide aperture, the outer lip flaring or subreflected; pillar flexuous, smooth; body without callosities or liræ; the canal rather long, wide, and flexuous; animal short and broad, the penis large, usually sickle-shaped and with a small elongated terminal papilla; operculum ovate with apical nucleus, nearly closing the aperture; ovicapsules massed, either in a heap, as in *Buccinum*, or in a cylindrical erect group. The nepionic shell with a rounded, irregular submammillary nucleus and rapidly increasing subsequent whorls. The dental formula is 1·1·1, the teeth usually tridentate, the central rhachidian cusp and outer lateral cusps usually larger, the minor cusps often irregular, multiple, or obsolete. The habitat of the genus is in cold water of the north temperate or Arctic seas.

Genus **Ecphora** Conrad, 1843. Type, *Fusus quadricostatus* Say, 1824. Miocene of Maryland. Shell vertically depressed, few whorled, the last much the largest; canal short, very deep and narrow with a funicular large umbilical pit; sculpture of strong spiral ribs.

I have already shown[1] that this curious shell is probably closely related to *Chrysodomus*.

Genus **Tritonofusus** Beck. Type, *Fusus islandicus* (Gronovius).

Shell usually smaller than *Chrysodomus*, elongate-fusiform, smooth or spirally sculptured, axial sculpture feeble or none; outer layer of the shell chalky, white, with a conspicuous, often villous periostracum; aperture moderate, with the outer lip acute, entire, not reflected or flaring; canal narrow, elongate, and more or less flexuous; pillar and body smooth; operculum filling the aperture, formed as in *Chrysodomus;* ovicapsules solitary, lentiform or hemispherical, attached by the whole flat side; nepionic shells small, the apical whorl swollen, subglobular, the next succeeding somewhat constricted, and the rest regularly increasing. Dentition as in *Chrysodomus*, the minor cusps variable.

Subgenus **Siphonorbis** Mörch (*Siphonella* Verrill). Type, *Fusus lachesis* Mörch.

Rhachidian tooth with a single cusp, and laterals with two cusps; nepionic shell beginning with a small regular planorboid coil and the

[1] Trans. Wagner Inst., III, 1890, p. 124.

subsequent whorls regularly increasing; otherwise as in *Tritonofusus* s. s.

Subgenus **Plicifusus** Dall, 1902. Type, *Fusus kroyeri* Moller.

Shell solid, usually with developed axial ribs and feebler spiral sculpture; the aperture expanded and with a wide insinuation behind on the outer lip; canal usually short and wide, nearly straight; otherwise as in *Tritonofusus* s. s.

Subgenus **Ancistrolepis** Dall.[1] Type, *Chrysodomus eucosmius* Dall, Bering Sea.

Shell bucciniform, with a short twisted canal and the operculum claw-shaped, concave, with apical nucleus; penis on a stout stalk with the distal extremity pediform, enlarged, without a terminal papilla; dentition as in *Chrysodomus*, but the radula is degenerate and disproportionately small. The periostracum is conspicuous and villous.

Subgenus **Mohnia** Friele, 1878. Type, *Fusus mohnii* Friele.

Shell as in *Siphonorbis* or *Plicifusus*, but the whole nepionic shell smooth (it is sculptured up to the larval whorls in the other species); operculum coiled, pauci-spiral; radula, with one cusp on the rhachidian and two on each lateral tooth; ovicapsules solitary, as in *Tritonofusus*.

Genus **Volutopsius** Mörch. Type, *Strombus norvegicus* Gmelin.

Shell large, solid, with a short spire, ample last whorl and short, wide canal, the ovate operculum not closing the aperture in most of the species; the nucleus small, swollen, globose; the ovicapsules large, solitary, hemispherical, attached by the whole of the broad side, containing several embryos. Dentition as in *Chrysodomus*, but irregular.

In these forms the shape of the shell does not appear to be correlated with sex. The sculpture is variable, often rude, sometimes with broad obscure axial ribs, but usually almost entirely spiral, varying from very fine to coarse in the different species. They are confined to the colder waters of the Northern Hemisphere and are especially numerous in the region of Bering Sea.

Subgenus **Pyrolofusus** (Beck) Mörch. Type, *Fusus deformis* Gray.

Shell large, thin, usually sinistral; spirally striated, axially obscurely folded, with a very large swollen nucleus; operculum much smaller than the aperture, subquadrate; canal short, wide; spire short, last whorl much the largest; dentition chrysodomoid, but rather irregular, the cusps of the rhachidian tooth small, some of them sometimes obsolete; laterals with the terminal cusps large, the central cusp often absent or obsolete; ovicapsules solitary, large, and hemispherical, attached as in *Volutopsius*, containing few embryos.

The Alaskan species is almost alone among the Chrysodomoid forms in exhibiting bright colors (salmon, orange, or rose-pink) in the enamel of the aperture. A pliocene form from Arctic Alaska is dextral and has a few very strong axial ribs.

[1] Proc. U. S. Nat. Mus., XVII, 1895, p. 709.

The following groups have been separated as a subfamily by Fischer on account of the edentulous rhachidian plate, but the advisability of this is as yet uncertain.

Genus **Liomesus** Stimpson. Type, *Buccinum dalei* J. Sowerby.

Shell buccciniform, usually solid, with a short twisted canal, smooth pillar and body, the outer lip thickened but not reflected, the operculum with apical nucleus; periostracum conspicuous, often villous; the rhachidian tooth is replaced by an edentulous plate and the laterals are simple curved denticles; the ovicapsules are pouch-shaped, solitary and pedunculate, attached by the edge of the disk and opening at the top.

Genus **Beringius** Dall, 1879. Type, *Chrysodomus crebricostatus* Dall.

Shell large, the last whorl ample, the canal short and wide; the nucleus subglobular, followed by a series of nearly equal turns, forming a cylindrical tip to the adult shell in most species; operculum small, not fully defending the aperture, somewhat arcuate, subovate, with apical nucleus; radula with an edentulous rhachidian plate; ovicapsules large, pedunculate, resembling those of *Liomesus*.

The sculpture in this group varies from smooth to fine spiral striation and even strong spiral ribs, but no species have been observed with axial ribbing, unless *Chrysodomus kennicottii* Dall should prove to belong to this group.

The family *Buccinidæ* has recently been reviewed by Cossmann[1] in a memoir in which a large number of new names have been applied to fossil forms; but I am unable to regard any arrangement as final which does not take into account our knowledge of the relations of living species based on the anatomy, etc.

Troschelia Mörch (1876,+ *Boreofusus* Sars, 1878), founded on *Fusus berniciensis*, according to the character of the radula is more closely related to *Fusus* than to any of the Buccinoid genera, though, from the form of the shell, often associated with the latter.

CHRYSODOMUS TABULATUS Baird.

Plate XXXVI, fig. 5.

Chrysodomus tabulatus Baird, Proc. Zool. Soc. for 1863, p. 66.—Carpenter, 2d Rep. Brit. Assoc., 1863, p. 604.

Vancouver Island to Catalina Island (in water constantly deeper southward) in 5 to 150 fathoms. U.S.N.M., 15503.

This species is of a yellowish white color, often with a deeper tint in the throat. In its tabulated whorls it is almost unique, the only other form being the *C. pericochlion* of Schrenck, from the Japanese seas. Its analogue in the *Buccininæ* is found in *B. hirasei* Pilsbry and *B. taphrium* Dall, for which I have proposed the section *Sulcosinus*.

[1] Essais de Paléoconchologie comparée, I, Pt. 4, 1901, pp. 96, 136.

TRITONOFUSUS HALLII Dall.

Plate XXXVI, fig. 9.

Sipho hallii DALL, Proc. Cal. Acad. Sci., V, April, 1873, p. 68, pl. II, fig. 3.

Sanborn Harbor, Nagai, Shumagin Islands, Alaska, W. G. Hall. U.S.N.M., 108981.

This shell is of a white color, covered by a polished, closely adherent yellow brown periostracum. It is of a very solid build, with obsolete spiral sculpture visible in a good light.

TRITONOFUSUS (PLICIFUSUS) BRUNNEUS Dall.

Plate XXXIV, fig. 1.

Chrysodomus brunneus DALL, Proc. Cal. Acad. Sci., VII, March, 1877, p. 6; Sci. Expl. Alaska, *Buccinidæ*, 1879, pl. II, fig. 4.

North end of Nunivak Island, Bering Sea, near Cape Etolin, in 10 fathoms: Dall. U.S.N.M., 108984.

This species is of a rosy brown, with a dull surface and sharp sculpture.

TRITONOFUSUS (PLICIFUSUS) VIRENS Dall.

Plate XXXVI, fig. 8.

Chrysodomus virens DALL, Proc. Cal. Acad. Sci., VII, Mar., 1877, p. 6; Sci. Expl. Alaska, *Buccinidæ*, 1879, pl. II, fig. 3.

Kyska Harbor, Aleutian Islands, in 10 fathoms: Dall. U.S.N.M., 108982.

The shell is of a brownish color, covered, when fresh, by a polished grass green periostracum, which in the cabinet gradually fades. Its nearest relative is *Chrysodomus fuscoligatus* E. A. Smith, from Japan.

TRITONOFUSUS (PLICIFUSUS) RECTIROSTRIS Carpenter.

Plate XXXIV, fig. 2.

Chrysodomus rectirostris CARPENTER, Proc. Acad. Nat. Sci. Phila. for 1865, p. 64.—DALL, Sci. Expl. Alaska, *Buccinidæ*, 1879, pl. II, fig. 1.

Puget Sound and the waters around Vancouver Island in 68 fathoms, Kennerley and Richardson. U.S.N.M., 4815.

The shell is white, with a polished olive brown periostracum and a tinge of reddish brown within the aperture. It is frequently eroded, especially near the apex, and the long slender canal is frequently distorted by fracture and repair.

TRITONOFUSUS (PLICIFUSUS) SPITZBERGENSIS Reeve.

Plate XXXVI, fig 7.

Fusus spitzbergensis REEVE, in Belcher's Last of the Arctic Voyages, II, 1855; App. p. 395, pl. XXXII, fig. 6, a—b.

Neptunea (Sipho) terebralis GOULD, Proc. Bost. Soc. Nat. Hist., VII, Sept., 1860, p. 326.

Sipho lividus (Mörch) VERRILL, Proc. U. S. Nat. Mus., VI, 1883, p. 238, pl. IX, fig. 12.

Spitsbergen and the Arctic and Bering seas. U.S.N.M., 108989.

This fine shell was described by Reeve and Gould from the same specimen in the Cumingian collection. It is, when in perfect condition, more or less marbled with dark reddish brown and lighter patches, most conspicuous on the spirals. In weathered specimens the color is apt to be lost. The axial sculpture is obsolete, but can usually be discerned near the apex. The sinuation of the outer lip, near the body, in the adult is profound. The sculpture is somewhat variable and the spiral ridges more or less prominent, fewer or more numerous, and the shell also varies in slenderness. The specimen figured is from Cape Espenberg near Bering Strait.

TRITONOFUSUS (PLICIFUSUS) ROSEUS Dall.

Plate XXXVI, fig. 4.

Chrysodomus roseus DALL, Proc. Cal. Acad. Sci., VII, 1877, p. 7; Sci. Expl. Alaska, *Buccinidæ*, 1879, pl. III, fig. 5.

Arctic Ocean near Bering Strait, Capt. E. E. Smith. U.S.N.M., 108985.

Shell when fresh with a distinct rosy tint, fading in the cabinet to white, with a very thin pale olive periostracum. The apex is not swollen as in most of the species, but on the other hand is not planorboid as in *Siphonorbis*. It has a polished periostracum, and all the specimens dredged had a commensal sponge attached to the spire. The axial sculpture exists only in traces near the apex.

TRITONOFUSUS (PLICIFUSUS) MARTENSI Krause.

Plate XXXIV, fig. 6.

Sipho martensi KRAUSE, Arch. für Naturg. 1885, p. 287, pl. XVIII, fig. 18.—DALL, Proc. U. S. Nat. Mus., 1886, p. 302.

Chrysodomus martensi DALL, Proc. U. S. Nat. Mus., VII, 1884, p. 525. (Name only.)

Fusus (Euthria) conulus AURIVILLIUS, Vega Exp. vet. arb., IV, 1885, p. 354, pl. XIII, fig. 6.

Point Barrow and south to St. Lawrence Island, Bering Sea, in 12 to 55 fathoms. U.S.N.M., 108980.

In its blunted form, very short canal, punctate spiral striæ and obscure axial wrinkles near the suture, this species is rather peculiar. The shell is white with a brownish substratum and pale gray periostracum darker in the spiral grooves. The nucleus in all the specimens I have seen is defective.

TRITONOFUSUS (PLICIFUSUS) HERENDEENI Dall, new species.

Plate XXXVI, fig. 10.

Bering Sea and the Aleutian Islands in 50 to 100 fathoms; U. S. Fish Commission steamer *Albatross*. U.S.N.M., 107006.

Shell with about nine whorls, a slender spire, small but not planorboid nucleus, and pale olive periostracum. It is pinkish white with a yellowish substratum and the periostracum is dull and without polish or villosity; lines of growth distinct, spiral sculpture of fine striæ with wider flattish interspaces, alternately coarser on the base; suture deep, the whorl below it often obscurely puckered near the suture; canal rather short, wide, and recurved. Alt. 70.0, diam. 28.0 mm.

This elegant species has been obtained at a number of localities. The operculum is normal and rather light colored. The individuals vary somewhat in relative slenderness.

VOLUTOPSIUS TROPHONIUS, new species.

Dredged south of the Pribilof Islands, Bering Sea, by the U. S. Fish Commission steamer *Albatross*, at station 3602, in 81 fathoms, mud, bottom temperature, 37° F. U.S.N.M., 109167.

Shell with a short spire and robust body whorl; pale reddish-brown and white, with five or more whorls; nucleus of nearly two whorls, smooth, inflated, blunt above (diam. 6.5 mm.); a subsequent whorl irregular, finely spirally striate; after which the whorls develop (on the fifth about 22) high, thin, sharp, flexuous varices or lamellæ extending entirely over the whorl, somewhat irregular, and more or less spirally finely striated; aperture ovate, canal short, curved, and very wide; pillar thin, concave, short, twisted; outer lip expanded, thin; lon. of shell, 66; of aperture and canal, 40; max. diam. 37 mm.

This very remarkable shell is as profusely covered with lamellæ as the most ornamented *Trophon*, and is the first Northern species of the Buccinidæ to exhibit this kind of ornamentation.

The writer was looking in a jar of mixed alcoholic mollusks for a specimen of *Trophon stuarti* Smith, in order to examine the operculum, and selected this as the largest he had ever seen; but when the specimen was freed from a sponge which enveloped it, it was very evident that something quite distinct from any *Trophon* was in hand. The operculum is as usual in the genus, also the verge and other organs.

The specimen is obviously not fully mature, and must reach a larger size than that indicated by the measurements above given.

VOLUTOPSIUS (BERINGII Middendorff var.?) KOBELTI Dall.

Plate XXXV, fig. 2.

? Tritonium (Fusus) behringii Middendorff, Bull. Acad. St. Petersb., VII, 1848, No. 16, p. 3; Beitr. Mal. Ross., II, 1849, p. 147, pl. III, figs. 5, 6.

Neptunea behringii (ex parte) Kobelt, Mart. Chemn. Conch. Cab., Neue Ausg. *Pyrula et Fusus*, 1881, p. 67, pl. XII, figs. 2, 3.

Strombella beringi Dall, Sci. Expl. Alaska, *Buccinidæ*, 1879, pl. I, fig. 1.

Pribiloff Islands, Bering Sea, and also at Nunivak Island. U.S.N.M., 108990.

The rarity of the specimens of this genus from the Pacific, Arctic, and Bering Sea, and the beach-worn condition of most of those obtained have led in the past to much confusion among the described species. Thus *V. castanea*, *V. beringii*, *Beringius kennicottii*, *V. malleatus*, and the present form have all been regarded as forms of one protean species by the few naturalists in Europe who have considered them at all. Now that fair series of these species have been obtained by the writer and the U. S. Fish Commission, a better discrimination is possible. Middendorff's *Tritonium behringii* (*mel. beringii*, to agree with the name of the explorer as properly spelled) was based on a beach-worn specimen obtained in Bering Sea at St. Paul Island by Wossnessenski. Nothing like it came under my notice for years, and having obtained specimens such as the one now figured I supposed the original type to be merely a somewhat abnormal specimen, and communicated my idea to Dr. Kobelt who figured specimens under Middendorff's name, also copying his figure. Lately, however, I have received a young specimen from St. Paul which agrees exactly with the characteristics of Middendorff's type. It is perfectly smooth, massively heavy and solid, and with very prominent solid ribs. I have no doubt it should be referred to *V. beringii*, and that it is probably distinct from the form which I now propose to call after Dr. Kobelt and have figured.

Beringius (or *Volutopsius*) *kennicottii* Dall is distinguished from all the other species by its more regular and numerous axial ribs and especially by the fine, close, wavy, spiral striation with which it is entirely covered. *V. castaneus* Mörch has no spiral sculpture whatever, and is otherwise sufficiently distinct. *V. kobelti* has the usual basal striation, but above the base the spirals when present are coarse, obsolete, sparse, and irregular. *V. beringii* Middendorff is absolutely smooth, except near the canal. The axial waves (they can hardly be called ribs) of *V. kobelti* are feeble and irregular, the shell is relatively thin and light compared with *V. beringii*, and has much coarser incremental lines, more acute and rather higher spire, and a less effuse

aperture. I am very confident that the receipt of adult specimens of *V. beringii* will confirm my present opinion of the specific distinction of the two forms.

VOLUTOPSIUS CASTANEUS Mörch.

Plate XXXVI, fig. 2.

Neptunea castanea MÖRCH, Novit. Conch., 1858, p. 7.
Neptunea badia MÖRCH, Novit. Conch., 1858, pl. 1, figs. 1, 2.
Strombella castanea DALL, Sci. Expl. Alaska, *Buccinidæ*, 1879, pl. 1, figs. 4, 4a.

Aleutian Islands and eastward to Kadiak, in shallow water. U.S.N.M., 108991.

An abundant species, usually of a livid brown color, rarely white, and with no visible periostracum. The surface is always rude, irregularly wrinkled, and destitute of any spiral sculpture. Mörch gave one name to it in the text of the Novitates, which I have adopted, but another appears by some error on the legend of the simultaneously issued plate.

VOLUTOPSIUS ATTENUATUS Dall.

Plate XXXVI, fig. 3.

Volutopsis attenuata DALL, Proc. Cal. Acad. Sci., V, 1874, p. 252.
Strombella attenuata DALL, Sci. Expl. Alaska, *Buccinidæ*, 1879, pl. 1, fig. 2.

Bering Strait and adjacent Arctic waters.

The type specimen was obtained at Cape Espenberg by Capt. E. E. Smith. U.S.N.M., 108979.

This is a white, delicately spirally striated shell which appears to be rather rare, as only two or three specimens of it have come under my observation.

VOLUTOPSIUS REGULARIS Dall.

Plate XXXVI, fig. 6.

Volutopsis beringi var. *regularis* DALL, Proc. Cal. Acad. Sci., V, 1873, p. 59, pl. II, fig. 6.
Strombella regularis DALL, Sci. Expl. Alaska, *Buccinidæ*, 1879, pl. 1, figs. 5, 5a.

Aleutian and Shumagin Islands, Alaska; rare. U.S.N.M., 108978.

This species is snow-white, with no visible periostracum, regularly formed, smooth, and, while smaller, has a proportionately more elevated spire than *V. castaneus*.

Genus BERINGIUS Dall.

Beringius DALL, Sci. Expl. Alaska, *Buccinidæ*, 1879, pl. II, figs. 1, 1a–c (sole example, *Chrysodomus crebricostatus* Dall); Proc. U. S. Nat. Mus., IX, 1886, p. 304; XVII, 1894, p. 710.
Jumala FRIELE, Norwegian N. Atl. Exp., I, 1882, p. 6 (type, *Fusus turtoni* Bean); Ann. Mag. Nat. Hist., Nov., 1893, p. 352, *olim*.
Ukko FRIELE, in Norman, Ann. Mag. Nat. Hist., 6th ser., XII, 1893, p. 352.

BERINGIUS CREBRICOSTATUS Dall.

Plate XXXV, fig. 1.

Chrysodomus crebricostatus DALL, Proc. Cal. Acad. Sci., VII, 1877, p. 6.
Chrysodomus (Beringius) crebricostatus DALL, Sci. Expl. Alaska, *Buccinidæ*, 1879, pl. II, figs. 1, 1a–c; Proc. U. S. Nat. Mus., IX, 1886, p. 304; XVII, 1894, p. 710.

Unalaska, Aleutians, in 100 fathoms, Dall; Aleutian Islands and the Shumagin Islands, U. S. Fish Commission. U.S.N.M., 122716.

This magnificent shell is perhaps the finest species of the family. It is white with a darker flush in the throat, and covered with a bright yellowish periostracum.

BERINGIUS? KENNICOTTII Dall.

Plate XXXV, fig. 3.

Buccinum kennicottii DALL, Am. Journ. Conch., VII, 1871, Pt. 2, p. 108, pl. XV, fig. 1.
Chrysodomus kennicottii DALL, Proc. Cal. Acad. Sci., IV, 1872, p. 271; Sci. Expl. Alaska, *Buccinidæ*, 1879, pl. IV, figs. 1, 1a.
Neptunea behringi KOBELT, Conch. Cab., 2d ed., *Pyrula* and *Fusus*, 1881, p. 68; not of Middendorff.

The Kadiak group of islands is the headquarters of this species, which extends to the Shumagins and westward, but not abundantly west of the peninsula. It occurs in shallow water, during the spawning season, but at other times retires to 10 or 15 fathoms depth. U.S.N.M., 108992.

This species has a handsome light-brown periostracum, under which the shell is white or purplish, sometimes pinkish in the aperture. It is uncertain whether it should be referred to *Volutopsius* or to *Beringius*, as the dentition has not been examined, but the very cylindrical nepionic whorls rather point toward the latter.

Genus LIOMESUS Stimpson.

Liomesus STIMPSON, Canadian Nat., new ser., II, Oct., 1865, p. 364.
Buccinopsis JEFFREYS, not of Conrad.

LIOMESUS NUX Dall.

Plate XXXVIII, fig. 7.

Liomesus nux DALL, Proc. Cal. Acad. Sci., VII, Mar., 1877, p. 7 (p. 2 of extras).
Buccinopsis nux KOBELT, Conch. Cab., 2d ed., *Buccinum*, 1883, p. 101, pl. LXXXVIII, fig. 4.

East shore of Nagai Island, Shumagins, and at Unalaska in 15 fathoms, Dall. U.S.N.M., 94785.

The shell has a purplish brown substratum more or less obscured by a creamy white outer coat, and in life is covered by a dense velvety periostracum. It is remarkably solid and heavy for its size. The genus is *Buccinopsis* Jeffreys not Conrad, and *Liomesus* of Stimpson in allusion to its unarmed central teeth of the radula, which resemble those of *Beringius*.

LIOMESUS CANALICULATUS Dall.

Plate XXXVIII, fig. 2.

Buccinopsis canaliculata DALL, Proc. Cal. Acad. Sci., V, Feb., 1874, p. 252 (extras p. 6).—KOBELT, Conch. Cab., 2d ed., *Buccinum*, 1887, p. 102, pl. LXXXVIII, fig. 10.

Liomesus canaliculatus DALL, Sci. Expl. Alaska, *Buccinidæ*, 1879, pl. IV, fig. 4.

North end of Nunivak Island, Bering Sea, Dall. U.S.N.M., 108977.

Shell white with a yellow velvety periostracum. This species was figured in my Exploration of Alaska, *Buccinidæ*, Plate IV, fig. 4, and *L. nux* as fig. 5, 1879; but the text for these plates is still unprinted.

LIOMESUS OÖIDES Middendorff.

Tritonium oöides MIDDENDORFF, Bull. Acad. St. Petersb., VII, 1848, No. 16, p. 16; Malak, Ross, II, 1849, p. 175.

Tritonium oroides MIDDENDORFF, Sib. Reise, 1851, p. 236, pl. VIII, figs. 7, 8.

? Liomesus oroides STIMPSON, Canadian Nat., new ser. II, Oct., 1865, p. 364.

Buccinum ovoides KOBELT, Conch. Corb., 2d ed., *Buccinum*, 1883, p. 72, pl. LXXXVII, fig. 6.

Tugur basin, Okhotsk Sea, Middendorff. Bering Strait, Stimpson.

This species, by an easy typographical error, has two names in Middendorff's works. It seems to differ from *L. canaliculatus* Dall by its shorter spire, less regular form, and less distinct spiral sculpture. The species found by Stimpson at Bering Strait is probably *canaliculatus*. Further material may show the desirability of uniting the two, in which case Middendorff's name has twenty-five years priority.

In my plates of *Buccinidæ*, specimens of *Liomesus dalei* Sowerby, var. *eburnea* Sars, from the Doggerbank, were figured for comparison with the Alaskan forms. My friend Dr. Kobelt, in the absence of the text relating to these plates, was led to suppose them from Alaska, and applied the varietal name of *Beringiana* to them.[1] But this species is not found in the western hemisphere as far as I know. I am inclined to doubt the identity of the Crag form with the recent one, and should be disposed to adopt Sars's name in a specific sense. I have never seen any recent specimens at all resembling the massive shells from the British Crag. I may add that another species of this genus, *L. nassula*, was recently described by me from Bering Sea.

ASTYRIS AURANTIACA Dall.

Plate XXXIV, fig. 5.

Astyris aurantiaca DALL, Am. Journ. Conch., VII, 1871, Pt. 1, p. 115, pl. XV, fig. 13 (bad).

Monterey, at low water, Dall. U.S.N.M., 12313.

The color varies from orange yellow to brown or yellow with zigzag brown markings. It is generally subtranslucent.

[1] Conch. Cab., 2d ed., *Buccinum*, 1883, p. 100.

MUREX (PTEROPURPURA) CARPENTERI Dall.

Plate XXXIV, fig. 9.

Pteronotus carpenteri DALL, Nautilus, XII, No. 12, April, 1899, p. 138.

Farallones Islands, California, south to the vicinity of San Diego, California, in 15 to 60 fathoms. U.S.N.M., 122596.

The shell is of a somewhat livid pale brown, pinkish toward the apex and white around the aperture. The surface, except of the nuclear whorls and the anterior faces of the varices, is smooth. The genus resembles *Pterorhytis* Conrad very much, except in the absence of the spur on the outer margin of the aperture. There are three series of confluent varices.

This subgenus was indicated by Jousseaume, in 1880; the name *Pteronotus* Swainson, is preoccupied by Gray, in *Reptilia*. In 1899, however, Rovereto proposed for this group the name *Pterymurex*, which is entirely unnecessary; an occurrence which shows how inadvisable it is to propose new names for those supposed to be preoccupied, without knowing the whole history of the names in question, and their synonyms.

MUREX (PTEROPURPURA) PETRI Dall.

Plate XXXIV, fig. 7.

Murex petri DALL, Nautilus, XIV, August, 1900, No. 4, p. 37.

San Pedro, California, in about 50 fathoms; Oldroyd. U.S.N.M., 122553.

This species is of a yellowish-white color, covered with finely imbricated spiral threads, of which about every fourth one is slightly larger. The aperture is white and the varices distally recurved.

ANTISTREPTUS, new genus.

Shell small, having the general form of *Anachis*, sinistral, with a dextral nucleus; the operculum as in *Trophon*. Type, *A. magellanicus* Dall, Straits of Magellan.

ANTISTREPTUS MAGELLANICUS, new species.

Shell small, porcellanous white with a straw colored periostracum, sinistral with a smooth polished dextral nucleus and about four subsequent whorls; spire rather acute, body whorl moderately rounded; suture distinct; pillar straight, unarmed; canal short, rather wide, slightly recurved; outer lip simple, sharp; no callus on the body; sculpture of strong, high, coarsely beaded spirals with narrower interspaces, the swellings or beads occurring vertically below one another on the several spirals giving the effect of ribs; there are two spirals on

the first whorl and three on the subsequent whorls in front of the suture, and on the last whorl there are nine or ten diminishing in size forward, from the periphery to the end of the canal, but of the same general type; they are crossed only by fine incremental lines. Lon. of shell 4.5; max. diam. 2.5 mm.

Dredged by the U. S. Fish Commission steamer *Albatross* in the straits of Magellan at station 2777, in 20 fathoms, gravel. U.S.N.M., 96190.

This very remarkable little shell has the general form of an *Anachis*, but the sculpture is more like some of the species of *Trophon*, while the pale yellow operculum is also much like that of *Trophon*. If it were not that the torsion of the nuclear and subsequent whorls is in opposite directions, the shell might be taken for a very minute reversed *Trophon* or *Urosalpinx*. It may be that the two specimens which were obtained and which agree perfectly are immature, and that the aperture may be lirate when fully grown, but there is no indication in the shell to suggest it.

Genus TROPHON Montfort.

The genus *Trophon*, founded on the Patagonian species *geversianus* of Pallas, belongs to the Purpuroid group of Murices with *Ocinebra* and *Eupleura*. The larger species show the peculiar rotating imprints on the proximal face of the operculum, which are usually regarded as characteristic of *Purpura*. The smaller species with thin opercula do not always develop these markings. The nucleus of the operculum is on the outer side between the middle and the lower angle, exactly as in some Purpuras, with a callus around the inner margin. The nuclear whorls of *Trophon* are small and either inflated or, by reason of a small carina, flattened above and tilted, so that the plane of the first whorl forms an angle with that of the succeeding whorls. This is sometimes so marked that at first sight it appears as if the nucleus was reversed as in *Pyramidellidæ*, but a careful examination shows that this is not the case. Most species have the nepionic whorls immediately following the nucleus sculptured, and often cancellated, whether the remainder of the whorls are so or not, indicating the derivation of the group from a cancellated, or, at least, a sculptured ancestral type.

The typical Trophons are chiefly austral and have a rather characteristic type of form and sculpture. The boreal forms show more variety and have developed several types among themselves, all different from the antarctic group, and which I therefore separate as a genus, *Boreotrophon* (Fischer, 1884). This genus, again, is divisible into several sections characterized by their sculpture. The typical *Boreotrophon* has lamellar varices, the spiral sculpture is absent or feeble, and the operculum is elongated and narrow with the nucleus apical, and no purpuroid markings on the inner face. The section *Trophonopsis* (B., D., and D., 1882) has spiral sculpture quite emphatic, and some-

times the varices are obsolete. The operculum is short and wide with an apical nucleus, but with purpuroid markings on the inner face. In each group a transition toward the other section may be observed in some species. Both agree in dentition and station. In the majority of species there is occasionally developed a carina at the shoulder over which the varices are elevated into spines or elevated scales.

There are, however, species which always have an angle or varical spine at the shoulder. The development of the varices is different in different individuals of the same species, as in Murex; specimens from a fine sandy or soft bottom will frequently have remarkably broad, thin, expanded varices; while those from an unfavorable situs, as a gravelly bottom, may have the varices degenerated to mere lines hardly raised above the surface except at the shoulder. These differences, though systematically not important, affect the general appearance of the shell very much and are liable to mislead students unfamiliar with the group into an undue multiplication of species. On the other hand the general impression of variability which these mutations give is apt to lead to the ignoring of real differences of a more stable kind, and hence several very distinct species have been consolidated by too hasty monographers.

The species which have a small compact body and spire, coronated with spines, and a long rather straight canal, have been separated as a section *Pagodula* by Monterosato in 1884, with *B. carinatus* Bivona, as type; but taken in connection with other species, these, like the species of *Trophonopsis*, gradually merge into the typical form of the genus, even within the limits of the more variable species. A group which perhaps deserves distinction is that which I will call *Actinotrophon*, based on *B. actinophorus* Dall, in which with the structure of the thin *Boreotrophon* with long coronating spines is united a feature, not elsewhere noted in the genus, of successive canals, so curved that the projecting old ones, recurving from the siphonal fasciole form a whorl of hollow split spines, diverging from a deep umbilical pit, as in some murices. In *Murex*, however, the canal is closed and the aperture has a projecting callous margin.

Another group, possibly worthy of sectional distinction, appears in the fauna of southern California, where it is represented by *Trophon triangulatus* Carpenter, *T. corrosensis* Dall, and *T. pinnatus*, new species. These forms are large, with prominent varices, hardly any spiral sculpture, and brown or yellow coloration. They have the typical purpuroid operculum of the Antarctic *Trophon*, but not its stumpy form or coarse reticulate sculpture. The siphonal fasciole is more or less gyratory and between it and the edge of the aperture is a distinct umbilical chink or even a deep perforation. If these are considered sufficiently marked to deserve a sectional name, they may be referred to the genus *Trophon* with that rank, under the name of *Austrotrophon*.

A subdivision of the old group included under the name of *Trophon* was published[1] by De Gregorio. This was hastily done, and several of the groups had previously been named, while others are heterogenous. Examples are cited, but no types selected. The scheme is as follows:

Genus *Trophon* de Gregorio, 1885, = *Trophon*, Montfort, 1810.

Subgenus *Pinon* de Gregorio, 1885, = *Boreotrophon* Fischer, 1884, + *Fusus* sp. + *Columbarium* von Martens, 1881.

Subgenus *Chalmon* de Gregorio, 1885, = *Trophonopsis* Bucquoy, Dautzenberg, and Dollfus, 1882.

Subgenus *Pirgos*[2] de Gregorio, 1885, may stand as a section of *Trophonopsis* with *Trophon alveolatus* (Sowerby) Wood, as type.

Subgenus *Mipus* de Gregorio, 1885, founded on *Trophon gyratus* Hinds, is probably referable to *Coralliophila* or *Latiaxis*.

There a number of other genera which have been proposed which are closely related to *Trophon*, but which will not be discussed on this occasion.

I need not dwell on some groups proposed by Hutton for Antarctic forms which he places under *Trophon*, but which appear to me to be more properly grouped under genera like *Purpura* or *Ocinebra*. A few notes on austral American species may be offered here.

TROPHON CRISPUS Gould.

Fusus crispus Gould, Proc. Boston Soc. Nat. History, III, May, 1849, p. 141; Otia Conch., p. 64; Shells of the Wilkes Exploring Expedition, 1852, p. 229, pl. xvi, figs. 279, 279*a*, 279*c* (not fig. 279*b*).

Trophon crispus Gould, Otia Conch., p. 245, 1862.

Orange Harbor, Patagonia, Couthouy. Type, U.S.N.M., 5677.

With this as a variety was included the following very distinct species:

TROPHON PELECETUS, new species.

Fusus crispus var., Gould, Shells of the Wilkes Exploring Expedition, 1852, p. 229, pl. xvi, fig. 279*b*.

This remarkable form, though much smaller than the *T. crispus*, has one more whorl, being seven, including the nucleus. The spire is very acute, the last whorl much the largest, with deeply constricted sutures; the whorls tabulate above with nine very strong angular varices, the interspaces narrow and deep, the distal edges of the varices thick and broad, somewhat crenulate by revolving threads, sometimes obsolete between the varices, and on them crossed by prominent incremental lines; margin of the aperture callous, but not denticulate; canal slender, slightly recurved, and rather long. The color is yellowish white. Lon. of shell 16.5; of aperture 9.0; max. lat. of shell 8.0 mm.

[1] Bulletin of the Società Malac. Italiano, XI, p. 27, August, 1885.

[2] Not *Pyrgus*, Hübner, 1816, *Lepidoptera*.

The very peculiar sculpture recalls that of some species of Cancellariidæ of the genus *Trigonostoma*. In the young the revolving threads are more prominent than in the older specimens. U.S.N.M., 98451.

? TROPHON UNICARINATUS Philippi.

Fusus unicarinatus PHILIPPI, Malak. Blätt., XV, Dec., 1868, p. 223.
Trophon unicarinatus TRYON, Man. Conch., II, 1880, p. 151.

Magellan Strait, Acton, *fide* Philippi; dredged by the U. S. Fish Commission steamer *Albatross* in the strait, at station 2777, in 20 fathoms, gravel, U.S.N.M., 96193.

The little shell described by Philippi under the name of *Fusus* has much the aspect of a miniature *Chrysodomus* of the *despectus* type. If so it is the only representative of that group in the Antarctic. It is more likely, in spite of the resemblance, that it is related to the *Trophon*, so abundant in these seas. Unfortunately all the specimens dredged were destitute of the soft parts, so that the anatomical features and operculum remain unknown.

The nucleus is large for the size of the shell, smooth, inflated, and so loosely twisted that it at first suggests a sinistral beginning, which is not confirmed by a closer examination. The whorls are flat above, with a strong, blunt peripheral carina and a second less prominent keel, just below the periphery, on which the suture is laid. The surface is axially faintly striated by the incremental lines. The base is moderately rounded and passes into a slightly recurved canal as in *Chrysodomus*. The body of the shell is of the pale brown, with a slight tinge of purple, characteristic of the Arctic *Chrysodomi*, but the pillar is white and so is the canal, and the keels are lighter than the body color of the shell. The outer lip is simple and hardly thickened and the throat smooth. The largest specimen obtained by the Fish Commission was 8.5 mm. in length and 5 mm. in maximum width. The longest diameter of the aperture was a little less than 5 mm.; there were two nuclear and three subsequent whorls.

Altogether it is a remarkable little shell, which a comparison with the young of several of the larger prosobranchs of the region indicates to be a well-defined and distinct species, worthy of more thorough study than my material makes practicable.

GENUS BOREOTROPHON (Fischer) 1884.[1]

In briefly reviewing the group it may be useful to enumerate the boreal species by geographical regions, namely, that of North Europe, including the northeast Atlantic, Iceland, and Greenland, which belongs more to Europe than America, faunally; of the northeast coast of North America, including the cold deep waters adjacent which carry boreal species far southward of their natural habitat if

[1] If Bolten's undefined names are to be accepted this genus, by elimination, must take the name of *Neptunea*.

we regard only the surface isotherms; and of the North Pacific and Bering Sea, including the adjacent portions of the Arctic and the northern islands of Japan.

The species of the northeast Atlantic are as follows, omitting those of the Mediterranean and the Azores which are clearly subtropical and do not enter the cold abysses or extend their range north of Gibraltar:

BOREOTROPHON CLATHRATUS Linnæus.

This is the *Murex clathratus* Linnæus, 1766, described from an Icelandic specimen; it is the *M. bamffius* Donovan, 1803, and has been confounded with most of the typical arctic species of *Boreotrophon* by authors. Mörch stated in his catalogue of Greenland shells (1857) that this species was called *Tritonium rossii* by Leach, and he sent a specimen to the U. S. National Museum under the name of *Trophon richardsonii* Gray, from Spitsbergen. Both of these names appear to be unpublished—or at least I have been unable to find them in the literature. Reeve in his monograph of *Fusus* figures two species under the name of *bamffius* (sic), but neither is the *bamffius* of Donovan. Mörch also refers to the latter the fossil *Murex costatus* of Hisinger, 1837. It is a small but stout shell with very round whorls, a short and much recurved canal, ten to eighteen rather irregular, rarely prominent, more or less appressed laminar varices, no spiral threads, and only rarely any fine spiral striation. I have seen none exceeding 30 mm. in length, and at the shoulder the angle of the varices is rarely present; and if present, feeble and inconspicuous. Its range extends from Finmark to Greenland. I have never seen an American specimen.

BOREOTROPHON TRUNCATUS Ström.

This is *Buccinum truncatum* Ström, 1767; it is frequently confounded with the preceding and with *B. scalariformis* Gould. It is a small species, not exceeding 17 mm. in length and usually smaller. It was figured by Forbes and Hanley under the name of *bamffius*, but it is not the original *bamffius* of Donovan. It has numerous low, rather irregular and close-set varices which are often obscurely crenulate as if by obsolete spiral threads; there is rather strong spiral striation in well-developed specimens. The canal is short and obliquely truncate, the aperture and canal shorter than the spire. It is the most common North Atlantic species, and extends in 10 to 50 fathoms from Finmark to Greenland and south to Georges Banks on the American coast.

BOREOTROPHON GUNNERI Lovèn.

This species, discriminated by the accurate Lovèn in 1846, has been widely and generally confused with *B. clathratus*, of which it is

usually called a variety. That species sometimes has a feeble varical angle on the shoulder, but the present one is always angular there, the varices stand out from the shell and are distinctly developed; the suture is rather constricted and the whorl in front of it usually excavated; the surface is closely spirally striated, the spire elevated, the canal nearly straight. There are eight to eleven varices and the angle at the shoulder is often nearly spinose. The species reaches a length of 33 mm., and ranges from Finmark to Greenland and Massachusetts in 3 to 200 fathoms. It is a more slender and elegant shell than *B. clathratus*. Reeve's figure of "*Fusus*" *gunneri* in the Iconica does not represent this species.

Section TROPHONOPSIS Bucquoy, Dautzenberg, and Dollfus, 1882.

BOREOTROPHON MACLAINI, new species.

Shell small, yellowish white with five or more whorls; nucleus tilted, smooth, flat above, with the margin of the plane forming a strong carina which is continued as a spiral thread at the shoulder in the subsequent whorls; the first whorl which follows the nucleus has two spiral threads, the number of these gradually increases until the fifth whorl has thirteen, closer in front of the suture and behind the shoulder and also on the base; less crowded on the periphery, and crossing (on the fifth whorl twenty) arcuate, regular, slightly elevated ribs with subequal interspaces which extend over the periphery and fade out on the base; spire longer than the aperture; canal straight or slightly recurved, short; pillar straight, obliquely truncate in front; periostracum yellowish; lon. of shell 6.5; of aperture 3.2; max. diam. 3.0 mm.

Dredged off the coast of Greenland by Ensign C. S. McClain, of U. S. S. *Alert*. U.S.N.M. 126974.

This is a *Trophonopsis*, somewhat of the type of *B. barvicensis*, which, however, has a rounded nucleus and lamellar varices. The single specimen obtained is not fully mature and the species doubtless attains a somewhat larger size. It can not be mistaken for any of the other species of the region.

BOREOTROPHON CRATICULATUS Fabricius.

This is the *Tritonium craticulatum* Fabricius in 1780 (not the *Murex craticulatus* of Linnæus), the *T. fabricii* Beck, 1842, and the *T. borealis* of Reeve (as *Murex*), 1845.

Greenland is its metropolis, but it extends, in 30 to 80 fathoms, to the Newfoundland Banks on the south and Finmark on the east. It is the type of the section Trophonopsis, and is readily recognized by its elongate form, thin, rather rude varices and strong spiral threading. It rarely develops a varical angle at the shoulder.

BOREOTROPHON BARVICENSIS Johnston.

This species, described in 1818, is of a southern reticulate muricate type, resembling *B. muricatus* Montagu. Like the latter, it reaches British shores, though its metropolis is to the southward, in 15 to 1,000 fathoms. It has been reported, erroneously, from the American coast.

BOREOTROPHON MURICATUS Montagu.

This is the *Murex muricatus* Montagu, 1803; the *Fusus variabilis* Cristofori and Jan, 1833; and the *Fusus echinatus* Philippi, 1836.

It is a very elegantly sculptured form, extending from British waters to the Atlantic coast of Morocco, in 2 to 1,000 fathoms.

Section PAGODULA Monterosato, 1884.

BOREOTROPHON CARINATUS Bivona.

This is the *Murex carinatus* Bivona, 1822; the *M. vaginatus* Cristofori and Jan, 1833; the *M. calcar* Scacchi, 1836; *Fusus echinatus* Kiener, 1838, and the type of the section *Pagodula* Monterosato, in 1884. It extends from Marseilles in the Mediterranean to the Atlantic coast of Morocco, in 15 to 1,600 fathoms. It is mentioned here because it has been erroneously reported as having been obtained near Marthas Vineyard on the American coast.

BOREOTROPHON CLAVATUS Sars.

This species, which has been confused with *B. carinatus* Bivona, was described by Sars in 1878. It appears to be confined to northern Scandinavia, though some American forms were, for a time, erroneously referred to this species, a mistake which has since been corrected.

The following species have been described from the Mediterranean and tropical East Atlantic, most of which are deep-water or even abyssal forms: *B. decoratus*, *B. cossmanni*, and *B. deversus* Locard, 1897; *B.* (*Trophonopsis*) *varicosissimus* Bonelli (1841, + *multilamellosus* Philippi, 1844); *B.* (*T.*) *droueti* and *B.* (*T.*) *dubuegi* Dautzenberg, 1889; *B.* (*T.*) *richardi* and *grimaldii* Dautzenberg and Fischer, 1896. *Orania* Pallary, 1900, appears to be a section of *Ocinebra* and not referable to *Trophonopsis*.

The following species are known from the east coast of North America:

BOREOTROPHON TRUNCATUS Ström.

Arctic seas and south in deeper water to Georges Banks.

BOREOTROPHON GUNNERI Lovèn.

Same distribution as the preceding.

BOREOTROPHON SCALARIFORMIS Gould.

This is the *Fusus scalariformis* Gould, in 1838, a large species, which has been confounded with *B. clathratus*, but is easily identified. It is the largest Atlantic species, sometimes reaching a length of 53 mm., having 13 to 16 rather rude sharp lamellar varices, 8 whorls, a higher and more conical spire, a straighter and a more gradually attenuated canal and less excavated base. There is rarely any angle at the shoulder; if the varix is elevated here it is bluntly rounded, and the surface has only obsolete spiral striation or none. Its range is from Iceland to the Newfoundland Banks and Massachusetts Bay, and most of the specimens have been obtained from the stomachs of the haddock.

BOREOTROPHON CRATICULATUS Fabricius.

This species, which is characteristically Arctic, extends its range southward as far as the Newfoundland Banks.

BOREOTROPHON ACULEATUS Watson, var. LACUNELLA Dall.

I do not feel able to separate specifically the variety described in 1889, from Watson's species dredged off Pernambuco in deep water by the *Challenger*, and named in 1882. The differences are those which may be observed in any large series of a single species of arctic *Trophon*. The variety was described from the vicinity of Cape Fear, North Carolina, and I am unable to separate from it the *Trophon verrilli*, described in 1893, from the same locality by Miss Bush. An extremely similar form was dredged off the coast of Senegal in about 875 fathoms by the *Travailleur*, and described by Locard in 1897, under the name of *T. cossmanni*. It appears to differ only by the presence of a few feeble spiral threads visible between the varices. The variety *lacunella* ranges in deep water from the vicinity of Cape Fear south to the lesser Antilles, in 227 to 769 fathoms, and also occurs in the Gulf of Mexico.

BOREOTROPHON ABYSSORUM Verrill.

This is *Trophon abyssorum* Verrill, 1885, and its variety *limicola* with obsolescent spines, which was erroneously identified by Jeffreys with *T. vaginatus* Cristofori and Jan, of the Mediterranean, and with *T. clavatus* Sars of Norway. It is a small, well-defined species, with sharp laterally flaring spines at the shoulder, and the varices obsolete elsewhere. In the variety *limicola* the spines are obsolete and the varices more in evidence. The known range of both extends from Georges Bank off Cape Cod, south to the vicinity of Cape Hatteras, North Carolina, in 843 to 1,859 fathoms. This and the preceding species are referable to the section *Pagodula*.

Section ACTINOTROPHON Dall, 1902.

BOREOTROPHON ACTINOPHORUS Dall.

This is *Trophon actinophorus* Dall, 1889, dredged by the U. S. S. *Blake* off Barbados, Santa Cruz, and Martinique, in 140 to 248 fathoms. It is figured in the Blake report, and with its two whorls of channeled spines can not be mistaken for any other species.

This completes the list of known East American species, which will doubtless be enlarged when more dredging is done on our southern coasts.

The northwest coast of America is very rich in species, but the monographs of Sowerby and Tryon are so unsatisfactory that they afford little help, and confound perfectly discriminable species together. The following list is made out from the species in the National Collection, where there is preserved an unparalleled series of the group from this region. I begin with the species referable to *Trophonopsis*.

Section TROPHONOPSIS Dautzenberg.

BOREOTROPHON TENUISCULPTUS Carpenter.

This elegant and variable form was described by Carpenter in 1866, from the Pleistocene of Santa Barbara, California. It now ranges from Estero Bay, near San Luis Obispo, California, northward to the Aleutian Islands. It is the *Trophon subserratus* Sowerby, 1880, described from Vancouver. It is found in the north from low water to 10 fathoms, but the Californian specimen was dredged in 92 fathoms. I have not found it west of Unalaska and it is very rare south of Cape Mendocino. It has the usual mutations, the whorls either rounded, with close fine imbricate spiral sculpture, or with a coronated angle at the shoulder. The northern specimens are larger and heavier than those from the south and less disposed to be spinose, but the change, geographically, is gradual.

BOREOTROPHON SCITULUS Dall.[1]

Described in 1891 from specimens dredged off Unalaska, in Bering Sea, at a depth of 225 to 309 fathoms. Its range in deep water probably extends to San Pedro Channel, California.

BOREOTROPHON KAMCHATKANUS, new species.

Shell small, solid, yellowish white, with about five whorls; nucleus lost; subsequent whorls with (on the fifth twenty-one) low, rude, riblike varices, crossed by four or five obscure revolving cords, of which two are visible behind the sutures; in front of the suture is a sloping space somewhat constricted, at the shoulder is a cord, followed by others with wider interspaces and toward the canal more feeble; the

[1] Figured in Proc. U. S. Nat. Mus. XVII, 1895, pl. xxvii, fig. 5.

incremental lines are also conspicuous; canal twisted, recurved, rather short and wide, aperture white, body and pillar callous, the latter twisted and obliquely truncate in front, forming a nearly pervious axis; lon. of shell 25; of aperture and canal 15; max. diam. 12 mm.

Dredged by the U. S. Fish Commission steamer *Albatross* on the southeast coast of Kamchatka, at station 3644, in 96 fathoms, shelly bottom, temperature 33° F.

This species very much resembles *Trophon dronati* Dautzenberg dredged in some 600 fathoms near the Azores, but is nearly twice as large, with a relatively shorter canal. Owing to the low, thick, rib-like varices it does not at first recall *Boreotrophon* so much as some of the *Fusus* group from deep water. The operculum, however, is like that of *Trophonopsis* and not like that of *Fusus*. The species would be referable to the group named *Pirgos* by de Gregorio in 1885, and founded on two Pliocene forms from the English Crag.

BOREOTROPHON ORPHEUS Gould.

This is *Fusus orpheus* Gould, 1849, and *Trophon fabricii* Carpenter, 1863, not of Beck, 1842. The present writer, misled by an error of Carpenter, in common with most of the malacologists of the Pacific coast, identified this with *Trophon stuarti* Smith for many years, but the more careful study of Gould's type and the reception of full-grown specimens show that it is a well-defined and distinct, though apparently rather rare, species. It may be distinguished from the young of *B. stuarti* by having more than two spiral threads on the upper whorls. Adult it is a much smaller species than *stuarti*, slender and with low numerous varices. It ranges from Vancouver Island to Cape Mendocino.

BOREOTROPHON STUARTI E. A. Smith.

This fine species was first described in 1880, though it had been well known to California collectors for twenty years under the mistaken name of *Trophon orpheus*. It ranges from the Shumagin Islands, Alaska, to Santa Cruz, California, in from 16 to 202 fathoms, living in shallower water at the north and following the temperature into deeper water at the south. It has from seven to twelve varices with the interspaces crossed by four or five rounded spiral cords, and reaches a length of 52 mm. The varices may be wide and thin with prominent spines at the shoulder, or low and hardly stronger than the spirals and without any spines, a form which has a very different aspect from that of the type, the cancellation being very conspicuous.

BOREOTROPHON (STUARTI var.?) SMITHI, new species.

This form is known to range from Fuca Strait to Santa Barbara, California, in 39 to 75 fathoms. It much resembles *B. stuarti* in general, but differs by more slender whorls with a more constricted

suture, relatively wider varices, and the absence of any spiral sculpture. It has six to eight varices, very thin, wide and sharp with high, strongly recurved spines at the shoulder. It reaches a length of 47 and a width of 23 mm. with six whorls exclusive of the nucleus. The canal is strongly recurved and imbricating remnants of old canal ends are noticeable on the siphonal fasciole. It may, perhaps, prove to be a deep-water form of *B. stuarti*, but if so it is yet to be shown by intermediate mutations. It is of a whitish color with a pale-brown or yellowish periostracum. U.S.N.M., 122582.

Section **BOREOTROPHON** s. s.

BOREOTROPHON PEREGRINUS, new species.

Shell small, yellowish white, with eight whorls; nucleus rounded, smooth, tilted, with a whorl and a half; subsequent whorls with seven or eight procumbent broad varices, strongly angulated at the shoulder, where the varices form compressed elevated spines; behind the angle the whorl is somewhat excavated; base of the whorl constricted with a short, recurved, imbricate canal; aperture squarish, white within; surface with fine spiral striation; lon. of aperture and canal 12, of shell 23 mm.; max. lat. 11 mm.

Dredged off Catalina Harbor, Santa Barbara Islands, California, in 16 fathoms, gravel, by W. H. Dall in 1873.

This pretty little species strongly recalls the Japanese *Trophon candelabrum* Adams and Reeve, but differs in being relatively stouter and shorter, with procumbent instead of erect varices, a shorter canal, an absence of the brown painting of the Japanese species, and the presence of spiral striation. From *B. multicostatus* Eschscholtz it differs in color and varical sculpture, having also a proportionately shorter spire. The varices are so broad and procumbent that, when they are unbroken, the varix covers not only the interspace in front of it but also part of the next varix, but without adhering to the whorl.

BOREOTROPHON MULTICOSTATUS Eschscholtz.

This is the *Fusus multicostatus* Eschscholtz, 1829, the *Trophon gunneri* and *Polypler gracilis* of Carpenter, 1863, not of Lovèn, 1846, or Perry, 1811. It has been generally consolidated with *B. gunneri* or *B. clathratus* by authors. It is certainly near to *B. gunneri*, which is the later name, but I am inclined to believe it distinct. The typical *B. gunneri* of Lovèn has a smaller and less solid shell, with a larger average number of varices and less tabulated whorls, above which the varical spines are more elevated. I have never seen among the Atlantic shells the livid brown throat which is so general in those from the Pacific. In the latter the canal is stouter, relatively shorter and wider. G. O. Sars gives as an average length for *B. gunneri* 21 mm.; among adult *multicostatus* a length of 36 mm. is not uncommon,

though both species have the same number of whorls. At any rate, if either name is to be changed the Atlantic species will have to take Eschscholtz's name.

The geographical range of this form is from the north end of Nunivak Island, Bering Sea, on the verge of the arctic fauna, south to Mendocino County, California, in 2 to 50 fathoms; also on the northern coast of Japan in 3 to 43 fathoms. Some of the Japanese specimens collected by Capt. St. John, R. N., measure 46 mm. in length, with six whorls and nine varices.

BOREOTROPHON BERINGI, new species.

Shell greenish white, elegantly ovate-fusiform, with a rather elongated curved canal, the aperture and canal longer than the spire; whorls with the base gradually attenuated, not constricted, about six in number, with a distinct but not deep suture and 9 to 12 low sharp rounded varices, with no obvious angle at the shoulder; surface with fine revolving striation, sometimes partly obsolete; aperture white; long., 40; max. lat., 17; long. of spire above aperture 16 mm. Operculum dark brown.

The geographical range of this species is from the north end of Nunivak Island, Bering Sea, to Cook's Inlet on the southeast and northern Japan on the southwest in 2 to 81 fathoms. U.S.N.M. 109051.

This is the shell regarded by Jeffreys, Adams, and Carpenter as *B. clathratus* in the north Pacific area; but if well-developed adult specimens be compared it will be seen that they are really not very similar. The young *B. beringi* are notably short and broad, and often show a pinkish tint with the varices whiter.

BOREOTROPHON PACIFICUS, new species.

This species resembles the preceding in miniature except that it has, with the same number of whorls, closer and more numerous varices, and the throat is sometimes pale brownish. The varices number from 15 to 20, and the largest specimens measure from 20 to 27 mm. in length. The average length appears to be about an inch when adult. The species is the faunal analogue of *B. truncatus* Ström, of the Atlantic fauna, but differs from it by the absence of the spiral sculpture and larger size.

The geographical range of *B. pacificus* is from the Sea Horse Islands, in the Arctic Ocean, south through Bering Sea and along the coast of Alaska as far as Sitka Harbor, in 5 to 60 fathoms. It is the commonest Pacific coast species, and has been called by Dr. Carpenter *Trophon scalariformis* on his labels, but it is not the *scalariformis* of Gould. Jeffreys labeled it usually as *Trophon truncatus*. U.S.N.M. 109100.

BOREOTROPHON DISPARILIS Dall.[1]

This was described in 1891, from 52 to 77 fathoms, in the vicinity of Grays Harbor, Washington, and extends down the coast in deep water to the San Pedro channel. Possibly a *Trophonopsis*.

BOREOTROPHON TRIPHERUS, new species.

Shell small, thin, delicate, white, with a thin yellowish periostracum and about five whorls; nucleus eroded in all the specimens; early whorls tabular, with about 14 low, sharp varices, sharply angulated, but hardly spinose on the shoulder, and growing feebler on the subsequent whorls; below the shoulder are three feeble spiral threads which slightly undulate the varices; these threads grow feebler with age, and are hardly perceptible on the last whorl; aperture ovate, passing into the long, slightly twisted canal, which is strongly recurved; suture very distinct; outer lip thin, deeply flexuous behind; pillar thin, attenuated in front, twisted, with a pervious axis; operculum normal, pale brown; lon. of shell 22.5; of spire without the nucleus 7; max. lat. of shell 9 mm.

Dredged on the northwest coast by the U. S. Fish Commission steamer *Albatross*, off Destruction Island, State of Washington, in 516 fathoms, mud, at station 3343, bottom temperature 38°.2 F.; and at station 3346, off Tillamook Bay, Oregon, in 786 fathoms, bottom temperature 37°.3 F.; U.S.N.M. 109044 and 109045.

This interesting species belongs to the same group as *B. scitulus* Dall, and *B. disparilis* Dall, but is abundantly distinct from either of them. The development of spines, as in the former, is not a character of deep systematic import, and sometimes varies widely in different individuals of the same species. These may perhaps belong in *Trophonopsis*.

BOREOTROPHON ALASKANUS, new species.

Shell creamy white with a more translucent substratum, the nucleus eroded, and five subsequent whorls; the whorls are rounded and bear eight narrow varices which are only prominent at the shoulder where they rise into long blunt spines which curve backward and somewhat toward the axis of the shell; there is no spiral sculpture, the incremental lines are not conspicuous, but magnification shows the surface when not eroded to be covered with a fine, sagrinate or subgranular sculpture, unlike anything I have noted on other species. The spire is elevated, the suture very distinct, the canal slender, long, and strongly curved; the aperture is subovate, the pillar white and polished, the outer lip thin and slightly patulous opposite the base of the pillar; alt. of shell 32; of spire (nucleus missing) 12; max. diameter of shell, exclusive of the spines, 14 mm. Operculum normal, dark brown.

[1] Figured in Proc. U. S. Nat. Mus., XVII, 1895, pl. XXVII, fig. 4.

Dredged by the U. S. Fish Commission steamer *Albatross* in Bering Sea north of Unalaska, at station 3227, in 225 fathoms, mud, bottom temperature 38°.6 F.; U.S.N.M., 122594.

The peculiar muricoid spines and sagrinate surface sufficiently distinguish this from any of the other species of the region, though it has a general superficial resemblance to those of the *clathratus* type.

BOREOTROPHON MAZATLANICUS, new species.

Shell small, thin white with a thin grayish periostracum and five or more whorls; whorls with a strong peripheral carina in front of which, equidistant, are two feebler spiral cords; axial sculpture of fine, sharp, close-set low lamellæ, extending over the whole whorl, sparser on the early whorls; suture distinct, not channelled, the whorl in front of it sloping, rooflike; canal rather straight, but broken in the unique type, length of three whorls without the canal 7; max. lat. 5 mm.

Dredged by the U. S. Fish Commission steamer *Albatross* at station 3431, off Mazatlan, Mexico, in 995 fathoms, mud, bottom temperature 37° F.; U.S.N.M., 123022.

This is evidently a *Boreotrophon* though the sculpture is so unusual, the varices being reduced to low close-set lamellæ. Although decollate and with the canal broken off it seemed too remarkable a shell to ignore.

BOREOTROPHON PANAMENSIS, new species.

Shell thin, white, slender, elongate, with the spire shorter than the canal and aperture; whorls five or more, nucleus eroded; subsequent whorls with two or even three low revolving cords between the sutures and two fainter ones on the base, one of which may be obsolete; axial sculpture of rather coarse close-set elevated lines of growth, which on the early whorls are sparser and stronger, forming a more or less irregular reticulation with the spirals, the posterior of which is the shoulder, the space between it and the sutures is slightly convex and rather wide; aperture kite-shaped, rather small; the canal very long and wide, the pillar somewhat twisted and anteriorly obliquely attenuated. Lon. of aperture and canal 11.5; of shell 18.0; max. lat. 6.5 mm. Another specimen is 22 mm. long.

Dredged in the Gulf of Panama by the U. S. Fish Commission steamer *Albatross* at station 3392, in 1,270 fathoms; bottom temperature 36°.4 F.

This species is related to the preceding and also to *B. disparilis*. Perhaps both should be placed in *Trophonopsis*.

BOREOTROPHON AVALONENSIS, new species.

Shell small, delicate, white, fusiform, with 1½ nuclear and five subsequent whorls; nucleus tilted, rounded, smooth; subsequent whorls finely spirally striated, with eight or nine sharp, appressed varices rising into radiant, narrow-grooved spines at the shoulder; suture very

distinct, aperture subovate, canal moderate, more or less recurved, pillar twisted, anteriorly attenuated; base hardly constricted; long. of shell 16.5, of aperture and canal 10.0; max. lat. 8 mm.

Dredged off Avalon, in the Santa Barbara channel, California, by the U. S. Fish Commission steamer *Albatross*, at station 3664, in 80 fathoms, sand, bottom temperature 50° F.; U.S.N.M., 109109.

B. (AVALONENSIS variety?) EUCYMATUS Dall.

Shell not spiny at the shoulder, larger, with 15 to 18 varices, hardly raised and barely angular at the shoulder; long. 27; max. lat. 9.5 mm.

Dredged at station 2935, in 124 fathoms, off San Diego, California; bottom temperature 49°.2 F.; U.S.N.M., 109087.

A still more slender specimen has only 7 varices, and is somewhat intermediate between the type and the variety. It is a common thing for the aspinose variety of any species of *Boreotrophon* to have a greater number of varices than the spiny form, in harmony, perhaps, with some law of secretion.

BOREOTROPHON ROTUNDATUS, new species.

Shell small, with rather short spire and five or more fully rounded whorls; nucleus eroded; subsequent whorls with (on the last) about 14 keeled ribs, angular, but not spinose, at the shoulder, passing over the whorl to the base; spiral striation obsolete or none; aperture subovate, yellowish within; canal moderate, recurved; lon. of shell 16; of aperture and canal 10; max. lat. 7 mm.

Dredged in Bering Sea, southeast from the Pribilof Islands, by the U. S. Fish Commission steamer *Albatross* at station 3609, in 74 fathoms, mud and sand, bottom temperature 38° F.; U.S.N.M., 149614.

I am unable to unite this pretty little shell with any of the other species. It is, perhaps, most similar to the *B. cepula* Sowerby, var. *cymatus* Dall, a much larger shell. It differs from nearly all the other species in having the varices represented by stout ribs, and not by a sharp lamina or imbrication.

BOREOTROPHON CEPULA Sowerby.

This is the shell described in 1880 in the Thesaurus Conchyliorum, and regarded as the *Fusus lamellosus* Gray, 1839, a specific name preoccupied in both *Fusus* and *Trophon*. The true *lamellosus* of Gray is a variety or mutation of *Boreotrophon dalli* Kobelt, and not the species now under consideration. *B. cepula* is found in from 41 to 85 fathoms in Bering Sea north of Unimak Island, and in the Pacific south of Unimak; also dredged by Captain St. John in 48 fathoms on the north coast of Japan.

The same species has been received from Pleistocene terraces on the shores of Volcano Bay, Japan, collected by Pumpelly. It has from

14 to 20 sharp laminose varices, more or less angular and rarely spinose at the shoulder; there is a marked descent from the suture to the shoulder in typical examples. The shell is usually finely spirally striated and has about five whorls and an average length of 30 mm.

This somewhat resembles small specimens of *B. dalli*, but with care is easily discriminated, especially by its more fusiform outline.

A variety *cymatus* has the angle obsolete and the whorls rounded; it was dredged in 71 fathoms west of the Pribilof Islands, Bering Sea, by the U. S. Fish Commission steamer *Albatross*. U.S.N.M., 109091.

BOREOTROPHON DALLI Kobelt.

This is the *Fusus lamellosus* Gray, 1839, the *Trophon muriciformis* Dall, 1877, and the *Trophon dalli* of Kobelt, 1878. In 1880 Sowerby figured it under the name of *Trophon gooderichi*, having found it in the British Museum labeled *T. goodridgei* by Forbes, a name unpublished. He also confounded it with *T. coronatus* A. Adams, a much smaller species. It is not the *Trophon muriciformis* of King, 1831, nor the *T. lamellosus* of Gmelin. The present species has been figured.[1]

The distribution of this shell is known to extend from Cape Franklin in the Arctic Ocean south through Bering Sea and into the Pacific, where it has been dredged to the eastward of Sannak reefs, in 32 to 71 fathoms by the U. S. Fish Commission steamer *Albatross*.

A variety with the spines obsolete, the shoulder of the shell sloping, and the canal short is the original of Gray's *F. lamellosus*. There is one in the National Museum from which his figure might have been drawn.

Another variety, *altus*, has the spire exceptionally elevated.

The chief peculiarity of this species, apart from its muricoid form, is the appearance of the spines on the shoulder, which vary in number from 15 to 21, and which often have an appearance as if they were independent of the varices and had been separately stuck on to the whorl.

There are usually five whorls, exclusive of the nucleus, and full-grown specimens reach about 60 mm. in length. The spire and long canal are frequently distorted, and the aperture, usually white, is sometimes internally tinged with yellow.

Section AUSTROTROPHON Dall, 1902.

TROPHON TRIANGULATUS Carpenter.

This shell was named by Carpenter in 1863, and more fully described from a very young specimen in 1865. Later Mrs. Oldroyd and Miss Hale discovered the adult at San Pedro, and after a careful study of

[1] New edition of the Conchylien Cabinet, *Fusus*, pl. CXXIV, fig. 1, and also in the Proc. U. S. Nat. Mus., IX, 1886, pl. IV, fig. 6.

them I identified the species with Carpenter's immature type and figured both.[1] It is always a little difficult to be certain about such identifications, as the young of various species are very much alike, but in this case both have the same form, color, and seven varices, and after reviewing the matter I see no reason for changing my original opinion. So far this species is only known from San Pedro Channel and Catalina Island in 30 to 90 fathoms. The adults are large, solid, and strong, of a streaked brown color, with seven varices, usually more or less chipped, the spinose prolongations wavy and more or less twisted and often very long. There is an obsolete spiral striation and five or six whorls. The shell is much attenuated toward the canal, and reaches a length of about 100 mm. It has been obtained through the fishermen in considerable numbers.

TROPHON CERROSENSIS Dall.

This is a considerably smaller shell, more delicate and with more numerous varices. It is of the same general type as the preceding, but has well-marked spiral threading, about ten varices, and, with the same number of whorls, measures only about 40 mm. in length. It is of a yellowish color, and has been dredged near Cerros Island, Lower California, in 9 to 48 fathoms. It is figured.[2] U.S.N.M., 97072. The young shells are quite different from the young *B. triangulatus*, being decidedly more slender and longer, with the same number of whorls.

TROPHON PINNATUS, new species.

Shell large, thin and delicate, with a low spire, seven to ten broad thin varices much expanded near the canal and elongated into spines at the shoulder; surface with fine incremental and obsolete fine spiral striation; there are about five whorls beside the nucleus, which between the suture and shoulder are tabulate; the spines resemble those of the two preceding species; the aperture is rounded, with a long, wide, open canal, a strongly marked more or less imbricate siphonal fasciole, and a deep umbilical perforation; the color is white, pale brown, or more or less spirally banded brown or yellowish white. Long. 80; of aperture and canal 45; max. lat. (including spines) 57 mm.

Dredged in Magdalena Bay and near Point Abreojos, Lower California, by the U. S. Fish Commission steamer *Albatross* at stations 3040, 3043, and 3045, in 21 to 74 fathoms.

This fine species belongs to the same group as the two preceding, and may be distinguished from *B. triangulatus*, which is nearest to it, by its more numerous varices and their wide expansion anteriorly, its deeply perforate axis, and the absence of the anterior attenuation, which is so noticeable in that species. It is also of a lighter and more

[1] Proc. of the U. S. Nat. Mus., XIV, 1891, pl. v, figs. 1, 3, and 6.

[2] Idem, pl. v, figs. 5 and 7.

yellowish color. The operculum is like that of the Magellanic Trophons, purpuroid, and not like that of the Boreotrophons, which is fusoid.

This concludes our review of this interesting group, to which we may expect many species to be added when the deeper waters along the continental margin are more thoroughly explored.

TYPHIS MARTYRIA, new species.

Shell small, solid, reddish brown, with about six whorls; each whorl carries four varical nodes, the long anal tubule in each case nearer to the varix behind it than to the one in front; at the shoulder is a keel, between which and the suture the whorl is deeply excavated; the early varices are nodular but the final varix is expanded, recurved, convex in front, excavated behind, with a recurved spine at the shoulder, and slightly crenulated at the outer margin; below the aperture the varix is very broad, filling the space between the curved canal and the aperture; nucleus lost; surface of the whorls nearly smooth, with faint incremental lines and elevated lines on the final varix radiating from the aperture; the latter is small, nearly a regular oval, with a continuous raised margin; aperture internally white with four narrow brown spiral lines near the edge; canal wholly closed, long, slender; operculum normal; long. of shell 27; diam. of shell 14; of aperture 4 mm.

Dredged in the Gulf of California, off the island of San Pedro Martir, in 14 fathoms, sand, by the U. S. Fish Commission steamer *Albatross*, at station 3013, bottom temperature 65° F. U.S.N.M. 130629.

This curious little shell belongs to the typical section of the genus, and is most nearly allied to *T. quadratus* Hinds, from Guayaquil. The latter is a shorter and wider species, which attains only a smaller size.

PEDICULARIA CALIFORNICA Newcomb.

Plate XXXVIII, fig. 5.

Pedicularia californica Newcomb, Proc. Cal. Acad. Sci., III, 1864, p. 121; IV, 1872, pl. 1, fig. 9.

Farallones Islands, California, and south to Monterey, attached to the stems of Gorgonians. U.S.N.M., 56469.

This beautiful shell is white, clouded with deep rose color, and is more or less modified in form by the surface to which it clings.

ANAPLOCAMUS BOREALIS Dall.

Plate XXXVIII, fig. 4.

Anaplocamus borealis Dall, Proc. U. S. Nat. Mus., XVIII, 1895, pp. 8–9.

Pacific Ocean, south of Unimak Island, Alaska, in 61 fathoms, muddy bottom, U. S. Fish Commission steamer *Albatross*. U.S.N.M., 122592.

This singular shell is bluish white with an olivaceous brown periostracum, and is usually more or less eroded. In the adult there seems to be a patch of darker color on the body just outside the callus. Its resemblance to a fresh-water shell is obvious, but pending an anatomical examination it is provisionally referred to the vicinity of *Trichotropis*.

LITORINA ALEUTICA Dall.

Plate XXXIX, figs. 4, 6.

Litorina aleutica DALL, Proc. Cal. Acad. Sci., IV, 1872, p. 271, pl. 1, figs. 3, 3a.

Gull Rocks in Akutan Pass, and on wave-worn rocks at Nazan Bay, Atka Island, Aleutians. Dall. U.S.N.M., 130623.

The shells are mostly yellow brown, sometimes with lighter bands, the throat dark, and the broad pillar white, with a minute umbilical perforation.

LITORINA ATKANA, new species.

Plate XXXIX, fig. 11.

Western Aleutians, from Atka Island westward. Figured specimen from shore of Little Kyska Island, Kyska Harbor. U.S.N.M., 108986, 108987.

Typical form of shell large, solid, nearly smooth, the whorls flattened next the suture, a few obsolete striations on the base, the general form as figured, the outer lip thin, the pillar broad and white. Alt. 20.0, lat. 17.0 mm.

The most abundant form is of a dark chestnut brown throughout, except on the pillar. The variety figured has white bands at the suture, periphery, and umbilical region. These bands do not vary in position.

A third mutation, which involves both the preceding color forms at times, has the spiral sculpture stronger and more extended over the surface, though it never reaches the prominence sometimes attained in *L. sitkana* Philippi, which is a much smaller shell without the broad white pillar. The periostracum, usually not very conspicuous, is sometimes of a light yellow brown and dense enough to obscure the underlying white bands.

I have recognized and distributed this species under the above name for some years, but I believe, by some inadvertence, it has never been formally described.

AMAUROPSIS PURPUREA Dall.

Plate XXXVIII, fig. 9.

Amauropsis purpurea DALL, Am. Journ. Conch., VII, Pt. 2, 1871, p. 124, pl. xv, fig. 16.

St. Michael, Norton Sound, Alaska, and northward to Point Barrow. U.S.N.M., 108988.

Shell purplish, with the callosities of the aperture white, and an adherent periostracum of olive, more or less streaked with brown, sometimes with black stains. This species differs from the smaller and more slender *A. islandicus* Gmelin, with which it has sometimes been confused, by its color, the persistency of its periostracum, and its distribution. *A. islandicus* is not known from the Alaska region or the adjacent Polar sea, it is white invariably and the periostracum is caducous. It reaches a height of 25 mm., but *A. purpurea* attains nearly 50 mm.

CALLIOSTOMA VARIEGATUM Carpenter.

Plate XXXIX, fig. 10.

Calliostoma variegatum CARPENTER, Proc. Acad. Nat. Sci. Phila. for 1865, p. 61.

Puget Sound and south to San Pedro Channel, California, in 30 to 60 fathoms. U.S.N.M., 122567.

This species was described from a young shell dredged by Dr. Kennerley, and only a quarter of an inch (6 mm.) in height. It has long remained unique, but of late years the U. S. Fish Commission and the seaside laboratory of the University of California at San Pedro have obtained adult specimens which reach a height of 28 mm. and a width of 26 mm. The adolescent shell has the apical whorls rose color, the rest yellowish white, with the alternate spirals stronger, and articulated with madder brown both on the spire and the base. As the shell gets fully adult the color becomes less lively and the articulation less distinct, so that the general tone of the shell appears to be of a yellowish pink with indications of the nacre shining through.

CALLIOSTOMA TURBINUM Dall.

Plate XXXIX, fig. 1.

Calliostoma turbinum DALL, Proc. U. S. Nat. Mus., XVIII, 1895, p. 8.

Off Point Conception, California, and eastward to San Diego in 100 to 500 fathoms, U. S. Fish Commission. U.S.N.M., 122578.

Shell small, turbinate and thin, the nacre shining with a peculiarly coppery luster, the apex white, the periphery painted with purple-brown flammules and the spirals more or less articulated with the same color. The pillar is white. No attempt has been made in the figure to express the color markings.

CALLIOSTOMA IRIDIUM Dall.

Plate XXXIX, fig. 3.

Calliostoma iridium DALL, Proc. U. S. Nat. Mus., XVIII, 1895, p. 7.

Off Panama, in 127 fathoms sand, bottom temperature 56° F., U. S. Fish Commission steamer *Albatross*. U.S.N.M., 122957*a*.

Color of the shell pinkish waxen, the apex somewhat darker, with variable delicate brown flammules, and darker brown ones on the periphery of the last whorl. The base is destitute of flammules, and the pillar is white. These delicate colors in this as in most shells tend to fade somewhat in the cabinet.

GIBBULA CANFIELDI Dall.

Plate XXXIX, fig. 2.

Gibbula canfieldi DALL, Am. Jour. Conch., VII, 1871, p. 129.

Monterey, Dall; Santa Barbara, Button. U.S.N.M., 162005.

The color of the shell is pearly with bronze-yellow pencilings obliquely to the suture. The original type was long inaccessible, but another specimen was obtained by Mr. Button, and it also occurs in the Pleistocene. Only two recent specimens are known.

SOLARIELLA CARLOTTA, new species.

Shell rather depressed, pearly white covered with a dense, rather fibrous, olive-gray periostracum; nuclear whorls eroded, but the shell exhibits about four and a half whorls; sculpture of, on the base eight minutely distantly nodulous spiral threads stronger and more distant as one proceeds from the verge of the umbilicus to the periphery; peripheral spiral separated from another above it by an excavated channel; these two are the strongest on the shell, and between the upper one and the suture is another much feebler thread; the upper two are all that show on the spire, as the outer lip runs just above the peripheral thread; the radial sculpture comprises incremental lines, and on the last whorl about twenty low narrow somewhat oblique riblets about a millimeter apart, extending from the suture to the first peripheral keel, but not beyond; these riblets nodulate the weak spiral, but are only about half as numerous as the nodules on the peripheral spirals; suture distinct, not channeled; base rounded; the umbilicus funicular, of moderate size, bounded by an inconspicuous keel, above which the walls are vertically striated; margins of the aperture simple, sharp, the upper lip advancing where it joins the body; pillar lip thin, slightly excavated, the distal angle not prominent. Alt. 9.0; max. diam. 13.5 mm.

Dredged at station 3342, off the Queen Charlotte Islands, in 1,588 fathoms, ooze, bottom temperature 36 .3 F., by the U. S. Fish Commission steamer *Albatross*. U.S.N.M., 109020.

This species resembles in its type of sculpture *S. actinophora* of the Antilles; the general appearance is dull and unattractive. Only a single individual, tenanted by a small hermit crab, was obtained.

GANESA ? PANAMENSIS, new species.

Shell rather large for the genus, evenly, roundly turbinate, the nucleus lost, with about two and a half subsequent inflated whorls; suture distinct, the whorl in front of it narrowly marginate; surface smooth, except for fine incremental lines, polished, with about ten faint grooves around the very narrowly perforate umbilicus; aperture rounded, simple, the outer lip sharp, the inner arcuate and slightly thickened, the body with a thin callus; operculum pale horn color, with about five whorls; the foot of the animal rather short, with several pseudopodial lateral rather stout filaments. Alt. of shell 4.5; max. diam. 4.75 mm.

Dredged by the U. S. Fish Commission steamer *Albatross* in the Gulf of Panama at station 3393, in 1,020 fathoms, mud; bottom temperature 36°.8 F. U.S.N.M., 109029.

I have been somewhat puzzled where to place this little shell, which appears to agree in general form very well with *G. nitidiuscula* Jeffreys, as figured in the Proceedings of the Zoological Society of London for 1883. I have not seen this species; the other of the two originally described by Jeffreys is very distinct, having a continuous peritreme and the last whorl near the aperture often entirely free from the preceding whorl, while the surface is finely granular. This form I named *Granigyra*, of which there are half a dozen species. I may add that the figure of *Ganesa* (*Granigyra*) *pruinosa* Jeffreys, in the publication above referred to, is exceedingly bad, as it agrees neither with the diagnosis given by Jeffreys nor with his specimens. I do not think that the interruption of the peritreme by the surface of the penultimate whorl is a systematic character of great importance, since many species show this interruption in youth and have a complete peritreme later; and sometimes even adult specimens appear to vary in this respect in the same species. Miss Bush's useful paper hardly carries the subject far enough to resolve all doubts. The distinction between her genus *Lissogyra* and the older *Ganesa*, as above restricted, is not very clear. But until we know more of the anatomy of these small creatures, there will, doubtless, be always more or less uncertainty about them. For the present, I shall refer this species to *Ganesa* provisionally.

MARGARITES VORTICIFERUS Dall.

Plate XXXIX, figs. 7, 8.

Margarita vorticifera DALL, Proc. Cal. Acad. Sci., V, 1873, p. 59, pl. II, figs. 4a–b.

Southern portion of Bering Sea, Akutan Pass, and westward to Atka Island, Aleutians. U.S.N.M., 126758.

The shell is of a salmon pink color varying in depth with the individual and its state of preservation. It is a characteristic member of the Aleutian subfauna.

ZEIDORA FLABELLUM Dall.

Plate XXXVIII, fig. 8.

Emarginula flabellum DALL, Proc. U. S. Nat. Mus., XVIII, 1895, p. 10.

Off Clarion Island, Lower California, in 460 fathoms, sand, at station 2992, U. S. Fish Commission. U.S.N.M., 122577.

The shell is subtranslucent white. It was crushed by the trawl and the fragments held in place by the soft parts when received, so that it seemed unwise to attempt to free the pieces from the animal and the narrow "deck" of the limpet was not discovered. More study and careful examination revealed the true genus, to which it is accordingly transferred. It is the first west coast species of the genus. The corrected measurements are: Lon. 12.5; lat. 7.75; alt. 3.25 mm.

SUBEMARGINULA YATESI Dall.

Plate XXXVIII, figs. 1, 3.

Subemarginula yatesi DALL, Nautilus, XIV, No. 11, Mar., 1901, p. 125.

Monterey, California, Dr. L. G. Yates. U.S.N.M., 162062.

The shell is rude and of a whitish color, somewhat tinged with greenish olive. The furrow and shallow anterior sinus point a little to the right of the median line of the shell. It was obtained from a dealer in shells at Monterey, who told Dr. Yates that he got two or three living specimens from stones brought up in the fishermen's nets in the Bay of Monterey. It is a near relative of *S. gigas* Martens of Japan.

LEPIDOPLEURUS MESOGONUS, new species.

Chiton of moderate size, yellowish or ashy white, with a narrow girdle dusted with very minute spicules; valves laterally compressed, almost keeled at the jugum, and with the sides meeting there at an angle of 69°, slightly rounded at the junction; body narrow, ctenidia about a dozen on each side, the most anterior even with the front edge of the seventh plate; anterior valve simple, without insertion plates, sculptured with moderately strong concentric resting stages and fine, low, close-set rounded pustules; posterior plate large, similarly sculptured, with a prominent mucro nearer the posterior than the anterior edge of the plate, the anterior and posterior areas hardly defined; intermediate valves with the lateral areas more or less irregularly concentrically ridged, the pleural and jugal tracts less distinctly so, the whole covered with uniform pustulation and the inner areas defined very obscurely by faint depressions; though angular, the jugum is not beaked anteriorly. Lon. of animal about 35; lat. (with dry girdle) 9; alt. 6 mm.

Dredged by the U. S. Fish Commission steamer *Albatross* in the Pacific, off the Queen Charlotte Islands, British Columbia, at station 3342, in 1,588 fathoms, ooze, bottom temperature 35.3° F.; U.S.N.M., 109019.

This species is remarkable for the sharp angle made by the planes of its valves and for the absence of any regional differentiation of its minor sculpture. It is somewhat unusually large for the genus.

LEPIDOPLEURUS HALISTREPTUS, new species.

Chiton in general rather similar to the last species and best described by a differential diagnosis. The girdle is closely and profusely minutely spinulose; the scales, being longer and more dense, do not give the dusty effect of those of *L. mesogonus;* the valves are rounded above, without well-defined lateral areas or notable concentric rugosities; their mesial angle is about 104°; the minute pustulation is smaller and rather more prominent; in the posterior valve the mucro is depressed and the areas even more feebly defined; internally the valves are callous, the sutural laminæ small and subtriangular, the laminæ of insertion wholly absent and the girdle attached to a surface merely a little rougher than the rest. Lon. of animal about 35; lat. 10; alt. 4.5 mm.

Dredged by the U. S. Fish Commission steamer *Albatross* off Acapulco, Mexico, at station 3415, in 1,879 fathoms, mud, bottom temperature 36° F. (U.S.N.M., 109032), and station 3418, in 660 fathoms, bottom temperature 39° F.; U.S.N.M., 109031.

The rounded back of this species immediately separates it from *L. mesogonus*, a conclusion which the minor characters confirm. In the alcoholic specimen the line of the ctenidia extended forward to the anterior edge of the fifth valve.

LEPIDOPLEURUS LURIDUS, new species.

Chiton small, solid, narrow, of a lurid smoky color, darker on the lateral areas; girdle densely pilose, with whitish spicules; back rounded, with the jugum defined feebly, most conspicuous as a distinct mucro, mesially, on the intermediate valves; pleural areas divided by obscure depressed lines radiating from the mucro to the inner edges of the pleural laminæ; lateral areas prominent, more or less concentrically rugose; anterior valve simple, normal: posterior valve with a conspicuous central mucro, behind which it is more or less concave; the whole surface is covered with minute, quincuncially arranged pustulation; on the intermediate valves the pustules on the lateral and pleural areas appear to diverge from the inner margin of the lateral areas; internally there is a wide unattached margin on the under side of the posterior edge, mesially, in the intermediate valves; the pleural laminæ are short and all the valves callous internally, with the points of attachment to muscles and girdle impressed; there is no linear

arrangement of the pustules on the jugum; the ctenidia only reach the seventh valve. Lon. of animal about 16; lat. 6; alt. 3 mm.

Dredged in Panama Bay by the U. S. Fish Commission steamer *Albatross*, at station 3393, in 1,020 fathoms, mud, bottom temperature 36.8° F.; U.S.N.M., 109027.

In the solidity of its valves, its mucronate jugum, and the arrangement of the pustular sculpture this seems sufficiently distinct from any of the described species.

LEPIDOPLEURUS FARALLONIS, new species.

Chiton small, thin, wide, with a low rounded back and yellowish-white color; girdle narrow, sparsely spiculose, with very short, fine, bristly spicules; jugum hardly defined, with no obvious mucro; lateral areas slightly elevated and feebly concentrically rugose; anterior valve simple; posterior conspicuously mucronate and, behind the mucro, concave; surface entirely covered with minute, low, close-set pustules, arranged quincuncially and to some extent concentrically from the mucronal points; pleural laminæ short, subtriangular; ctenidial line reaching the fifth valve. Lon. of animal about 10; lat. 5.5; alt. 2 mm.

Dredged by the U. S. Fish Commission steamer *Albatross* off the Farallones Islands, near San Francisco, California, at station 3104, in 391 fathoms, coral, bottom temperature 41° F.; U.S.N.M., 109025.

This little species has no very striking characters, but, having been compared with all the boreal and Pacific species hitherto recorded, it was found not to be identical with any of them.

ISCHNOCHITON STEARNSII, new species.

Chiton of moderate size, yellowish or buff color; the girdle yellowish-white, covered with subcylindric, blunt, smooth, close-set, large spines, the ends of which have a pebbly appearance, mixed with a smaller proportion of small but rather similar spinules; the ends of the large spines, when worn flat, have a pavement-like aspect; back not keeled, but rather steeply rounded; gills ambient; intermediate valves with a dorsal angle of about 90°, the lateral areas prominent, with about five radial riblets in each, divaricating to seven or ten at the girdle margin, and cut into beads by numerous fine concentric furrows; pleural areas and jugum hardly differentiated, sculptured with fine, slightly irregular, longitudinal wrinkles, finer mesially, crossed by inconspicuous, less elevated transverse lines; anterior valve with fine, beaded, divaricate radial riblets, the insertion plates and eaves very short, smooth, not spongy, with about 17 slits; the posterior valve with a small, low, subcentral mucro, from which two elevated lines extend to the margin, one on either side, forming two areas, and from which the wrinkled sculpture, less prominent on the anterior area, diverges; posterior

slits about 15, lateral slits 2; sinus rather wide, entire; pleural laminæ rather wide and short. Lon. of animal about 25; lat. 15; alt. 6 mm.

Dredged by the U. S. Fish Commission steamer *Albatross*, at station 3104, off the Farallones Islands, in 391 fathoms, coral, bottom temperature 41° F. U.S.N.M., 109024.

This species has somewhat the aspect of *Trachyradsia*, but presents such a mingling of characters that I am in doubt as to which section of *Ischnochiton* would best receive it.

ISCHNOCHITON SARCOSUS, new species.

Chiton rather elongate, marbled with scarlet and white, paler mesially, rather low and not carinate; the girdle densely set with small, curved, smooth bristles of different sizes, dark red and white mixed; underside of the girdle chocolate color, and the interior of the valves flesh pink; dorsal angle somewhat more than 110°, the jugal region being rounded off; intermediate valves with prominent lateral areas hardly concentrically or radially sculptured, but finely punctate all over and more or less serrate near the girdle on the posterior margin; jugum not defined, central area of the valves longitudinally sculptured with low inosculating wrinkles which sometimes form diamond-shaped interstitial excavations; the whole sculpture has an obsolete appearance; anterior valve finely punctate, feebly concentrically sculptured; posterior valve the same, with a low subcentral mucro as in *I. magdalenensis;* anterior valve with about 8, posterior about 10 slits, intermediate valves with 2 slits; sinus wide, entire; pleural laminæ, wide, short; lon. in the dry state 36, lat. 15, alt. 5 mm.

Dredged in 30 fathoms off San Martin Island, Lower California, by Dr. Fred Baker, of San Diego, and also collected at Portuguese Bend, near San Pedro, California, by Mr. T. S. Oldroyd. U.S.N.M., 109043.

This is an attractive species on account of its fine coloration. It would probably go best in Carpenter's section *Maugerella*, differing from *Stenoradsia* by the elongate bristly armature of the girdle.

PELECYPODA.

LEDA HAMATA Carpenter.

Plate XL, fig. 9.

Leda hamata Carpenter, Suppl. Rep. Brit. Assoc., 1864, pp. 98, 130; Proc. Cal. Acad. Sci., III, Feb., 1866, p. 210.

Near Catalina Island, California, in about 50 fathoms. U.S.N.M., 107420.

Shell small, compressed, and of a dark chestnut brown. I have figured most of the *Ledidæ* of the present northwest American fauna in the Bulletin of the Natural History Society of British Columbia,[1] and now add to them this interesting but hitherto unfigured species.

[1] No. 2, January, 1897.

PECTEN RANDOLPHI Dall.

Plate XL, fig. 2.

Pecten randolphi DALL, Nautilus, XI, No. 8, Dec. 1897, p. 86.

Occurring in deep water from Bering Sea to west Mexico, in from 225 to 1,005 fathoms, U. S. Fish Commission steamer *Albatross*. The figured specimen is from west of Destruction Island, State of Washington, in 516 fathoms, bottom temperature 38° F. U.S.N.M., 107749.

The shell is subtranslucent white, glassy, and extremely thin. It belongs to the section *Pseudamusium*.

PECTEN DAVIDSONI Dall.

Plate XL, figs. 5, 6.

Pecten davidsoni DALL, Nautilus, XI, No. 8, Dec., 1897, p. 86.

Bering Sea and the Aleutian Islands and eastward to Kadiak Island, Alaska, in 280 to 351 fathoms. U.S.N.M., 107747.

Shell waxen white, having the aspect of a *Propeamusium* externally, but really belonging in the section *Pseudamusium*. It is named in honor of Prof. George Davidson, the distinguished geographer and astronomer of San Francisco, California.

CRENELLA MEGAS, new species.

Shell elongate-oval, inflated, thin, white, slightly perlaceous internally; beaks small, low, anteriorly directed; surface very closely, finely, evenly, radially threaded, the threads crossed by fine, less obvious, incremental lines emphasized at the resting stages; margins very finely crenulate internally; ligament long, produced within the hinge line to the apex of the beaks, seated on a very thin elongate nymph, which in the absence of the ligament looks like a long lateral tooth or lamina; hinge line interrupted by the ligament; muscular impressions obscure. Alt. 25.5; lat. 17.0; diam. 16.5 mm.

Dredged at station 2795, in Panama Bay, at a depth of 33 fathoms, sand, bottom temperature 64° F., by the U. S. Fish Commission steamer *Albatross*. U.S.N.M., 96256.

This is by all odds the largest *Crenella* known. It is very delicate and basally the oval profile is attenuated. Only one valve was obtained. The hinge line is not strongly crenulated, owing to the delicacy of the radial threading.

LIMOPSIS PANAMENSIS, new species.

Shell small, moderately convex, of a pale slate color, covered with a dark blackish brown pilose periostracum more or less disposed in radiating lines; beaks low, plump; hinge area narrow, with a well-marked fossette; interior of shell dull bluish white, with six posterior

and three (or four) anterior teeth bifid at their summits; basal margin of the valves and part of the anterior and posterior margins denticulate, the upper portions plain. Lon. 6.0; alt. 6.0; diam. 3.0 mm.

Dredged in Panama Bay, at station 3393, in 1,020 fathoms, mud; bottom temperature 36°.8 F. U.S.N.M., 109028.

This little shell is quite similar to *L. minuta*, but is constantly smaller, of a different color, and with the pelage much blacker and in closer-set lines; the form of the valves when compared with *L. minuta* of the same size is more quadrate, the denticulation of the inner margin less extended, and the valves are more delicate.

VENUS KENNICOTTII Dall.

Plate XL, fig. 7.

Mercenaria kennicottii DALL, Am. Journ. Conch., VII, Pt. 2, 1871, p. 147, pl. xvi, fig. 1.

Neah Bay, State of Washington (Swan), and at Little River, Mendocino County, California (Harford). U.S.N.M., 75017.

Shell of a yellowish white with some ferruginous stains externally. The original type specimen obtained from the Indians at Neah Bay and a young valve obtained by Harford are all the specimens known of this rare and interesting species. It belongs to the typical *Venus* of Lamarck (1799), which was named *Mercenaria* by Schumacher.

PANOPEA GLOBOSA Dall.

Plate XL, fig. 1.

Panopea (*generosa* var.?) *globosa* DALL, Trans. Wagner Free Inst. Sci., III, June, 1898, p. 831.

Valves were collected on the beaches at the head of the Gulf of California by Dr. Edward Palmer. U.S.N.M., 74884.

The shell is of a yellowish white color, shorter, thinner, and more globose than *P. generosa* and probably distinct. It reaches 160 mm. in extreme length.

PANOMYA AMPLA Dall.

Plate XL, figs. 3, 4.

Panomya ampla DALL, Trans. Wagner Free Inst. Sci., III, June, 1898, p. 833.
Panopœa norvegica MIDDENDORFF (part) Malak. Rossica, III, 1849, p. 78, pl. xx, fig. 11; not of Spengler.

Recent in the Aleutian region, Gulf of Alaska, and Okhotsk Sea in shallow water, and fossil in the Pleistocene of the same region. U.S.N.M., 151221.

The shell is chalky white with a black dehiscent tarry periostracum, which is rarely preserved even in the living animal, which the valves only partially cover.

CETOCONCHA SCAPHA, new species.

Shell small, thin, elongate, subequilateral, evenly rounded in front, arcuate below, slightly attenuated and obliquely subtruncate behind; valves moderately convex, subtranslucent white with a pale-yellow very thin periostracum, with close, very fine radial lines of almost microscopic granulations; beaks plump, but not elevated, ligament short, brown, situated in the anterior sixth of a narrow escutcheon, bounded by a low keel; anterior hinge line slightly arched with a single minute obsolete right cardinal tubercle; posterior hinge line straight, the margin subangulate at its extremity behind; ligamentary nymph inconspicuous; interior of the valves polished, pallial line simple and with the muscular impressions, hardly visible; margins entire, shell slightly gaping behind; soft parts as in *C. elongata* Dall; lon. 12.6, alt. 8.2; diam. 6.0 mm.

Dredged by the U. S. Fish Commission steamer *Albatross* in the Gulf of Panama, off Cocos Island in 100 fathoms, mud, at station 3367, bottom temperature 57°.1 F. U.S.N.M., 109026.

This species resembles most nearly *C. elongata* Dall, from 200 fathoms in the Straits of Florida, a species which is larger and proportionately higher. It is interesting as being from the most shallow water in which the genus is yet known to occur, most of the specimens having come from great depths.

BRACHIOPODA.

TEREBRATALIA HEMPHILLI, new species.

Plate XL, figs. 8, 10.

Pliocene of Santa Barbara, between one-half and 1 mile inland from the sea, in Arroyo Burro on the Hope ranch; collected by J. Howard Wilson. U.S.N.M., 108495.

Shell substantially as figured, thin, rather compressed or not very convex; transverse, valves with low, flattish, ill-defined radial riblets, which, except near the beaks, become obsolete toward the middle of the valves. Mesial flexure shallow, broad mesially concave. Area narrow, ill defined; foramen narrow, high, incomplete below; punctation fine and profuse. Alt. 30.0, lat. 33.0, diam. 12.0 mm.

Owing to the condition of the shell, which is full of consolidated matrix, the interior could not be examined, but the characteristics all point toward the species being one of a group abundant on the west coast in a recent state and containing such species as *T. transversa* Sowerby and *T. obsoleta* Dall. A specimen supposed to be of the same species has been found in the Pliocene of San Pedro, but I have not had an opportunity to make a critical comparative study of the two.

CRANIA PATAGONICA, new species.

Upper valve rather depressed, white, rounded except at the posterior margin, which is subtruncate; vertex small, prominent, situated at the posterior third; surface concentrically rather slightly rugose but not lamellose; covered somewhat sparsely with numerous radiating, short, minute tubercles or spines; interior of the valve minutely, profusely, conspicuously punctate, the muscular and genital impressions feeble, the valve feebly marginated; impressions of the divaricator muscles feeble; what appears to be a minute accessory impression occurs outside of each divaricator impression close to the margin; in the center, between the divaricators, is a small obscure prominence close to the margin; the impressions of the adductors in the valve studied are somewhat irregular, reniform, and small; between them but not in contact medially are the also irregular, smaller imprints of the dorsal adjusters; in front of these is an obscure trilobed impression, and in front and then still further forward are some very faint vascular markings feebly lobulate or dentate near the margin. Lon. of valve 7.5, lat. 8.5, alt. 2.0 mm.

Dredged in 122 fathoms, mud, bottom temperature 48° F., at station 2783, on the west coast of Chilian Patagonia, in the Madre de Dios Archipelago, by the U. S. Fish Commission. U.S.N.M., 130516.

The single valve which was obtained is undoubtedly new, since no spinose *Crania* has hitherto been known. It is also the first indication of *Crania* in this region, the only Antarctic species hitherto reported being *C. suessii* Reeve, the locality of which is probably Moreton Bay, Australia, although it was erroneously referred to Sydney by its describer.

In this connection the existence of a spinose *Hemithyris* in Japan may be recalled, though in that form the spinules are more intimately associated with the lamellose incremental sculpture than in the present case.

EXPLANATION OF PLATES.

PLATE XXVII.

Fig. 1. *Nanina* (*Macrochlamys?*) *diadema* Dall, basal view; major diameter 18.0 mm.; p. 499.
2. The same, in profile.
3. The same, from above.
4. *Vitrea raderi* Dall, basal view, the margin of the aperture slightly defective; major diameter 4.0 mm.; p. 500.
5. The same, in profile.
6. The same, from above.
7. *Punctum randolphii* Dall, from below; major diameter 1.4 mm.; p. 500.
8. The same, in profile.
9. The same, from above.
10. *Zonitoides* (*Pseudohyalina*) *pugetensis* Dall, from below; major diameter 1.5 mm.; p. 500.

Fig. 11. *Ashmunella rhyssa* Dall, profile; diameter 16.0 mm.; p. 500.
12. *Zonitoides* (*Pseudohyalina*) *pugetensis* Dall, from above; major diameter 1.5 mm.; p. 500.
13. *Ashmunella pseudodonta* Dall, from below; diameter 14.0 mm.; p. 500.
14. *Ashmunella rhyssa* Dall, from below; diameter 16.0 mm.; p. 500.
15. *Ashmunella pseudodonta* Dall, from above; diameter 14.0 mm.; p. 500.

PLATE XXVIII.

Fig. 1. *Ceres nelsoni* Dall, from above; diameter 27.0 mm.; p. 501.
2. *Holospira* (*Haplostemma*) *hamiltoni* Dall, profile of the basal whorls; p. 501.
3. *Ceres nelsoni* Dall, basal view; diameter 27.0 mm.; p. 501.
4. *Ashmunella ashmuni* Dall, basal view; diameter 14.0 mm.; p. 501.
5. Portion of surface of *Ceres nelsoni*, enlarged to show granular sculpture.
6. *Ashmunella ashmuni* Dall, from above; diameter 14.0 mm.; p. 501.
7. *Ashmunella pseudodonta* Dall, profile; diameter 14.0 mm.; p. 500.
8. *Ceres nelsoni* Dall, profile; diameter 27.0 mm.; p. 501.
9. *Ashmunella ashmuni* Dall, profile; diameter 14.0 mm.; p. 501.
10. *Siphonaria lineolata* Orbigny, basal view; longitude 24.0 mm.; p. 501.
11. *Holospira* (*Haplostemma*) *hamiltoni* Dall, profile; altitude 19.6 mm.; p. 501.
12. *Siphonaria alternata* Say, basal view; longitude 24.5 mm.; p. 501.
13. *Siphonaria lineolata* Orbigny, profile; longitude 24.0 mm.; p. 501.
14. *Siphonaria alternata* Say, profile; longitude 24.5 mm.; p. 501.

PLATE XXIX.

Fig. 1. *Cylichna verrillii* Dall; altitude 7.5 mm.; p. 502.
2. *Retusa mayoi* Dall; altitude 8.3 mm.; p. 502.
3. *Daphnella engrammata* Dall; altitude 9.0 mm.; p. 503.
4. *Admete microscopica* Dall; altitude 4.3 mm.; p. 504.
5. *Muricidea philippiana* Dall; altitude 17.4 mm.; p. 504.
6. *Terebra rushii* Dall; altitude 15.0 mm.; p. 503.
7. *Conus stimpsoni* Dall; altitude 37.0 mm.; p. 503.
8. *Terebra texana* Dall; altitude 137.0 mm.; p. 502.
9. *Terebra floridana* Dall; altitude 70.0 mm.; p. 503.
10. *Scala scipio* Dall; altitude 16.0 mm.; p. 506.
11. *Aurinia dubia* Broderip; altitude 69.0 mm.; p. 504.

PLATE XXX.

Fig. 1. *Muricidea* (*Pseudoneptunea*) *multangula* Philippi; altitude 31.0 mm.; p. 505.
2. *Muricidea ostrearum* Conrad; altitude 28.0 mm.; p. 505.
3. *Scala* (*Amaea*) *mitchelli* Dall; altitude 36.0 mm.; p. 506.
4. The same, basal view; diameter 14.0 mm.; p. 506.
5. *Umbraculum* (*Hyalopatina*) *rushii* Dall; longitude 9.3 mm.; p. 502.
6. *Latirus cayohuesonicus* Sowerby and Melvill; altitude 16.0 mm.; p. 505.
7. *Scala* (*Cirsotrema*) *cochlea* Sowerby; altitude 20.0 mm.; p. 506.
8. *Scala nitidella* Dall; altitude 13.5 mm.; p. 505.
9. *Scala* (*Acrilla*) *retifera* Dall; altitude 12.5 mm.; p. 506.

PLATE XXXI.

Fig. 1. *Arca adamsi* Smith, var. *conradiana* Dall; longitude 7.0 mm.; p. 508.
2. *Arca* (*Cucullaria*) *sagrinata* Dall; longitude 6.0 mm.; p. 508.
3. *Pandora* (*Kennerleyia*) *bushiana* Dall; longitude 10.0 mm.; p. 511.
4. *Pandora* (*Clidiophora*) *trilineata* Say; longitude 19.0 mm.; p. 511.
5. *Mercenaria* (*Transennella*) *conradina* Dall; longitude 13.5 mm.; p. 509.

Fig. 6. *Mactra richmondi* Dall; longitude 20.75 mm.; p. 510.
7. *Meretrix* (*Transennella*) *conradina* Dall, part of a left valve greatly magnified to show the oblique grooving of the margin; p. 509.
8. *Chama lactuca* Dall, attached valve from above; longitude 22.0 mm.; p. 509.
9. *Asthenothærus hemphilli* Dall; longitude 6.25 mm.; p. 510.
10. *Chama lactuca* Dall, free valve, from above; longitude 14.0 mm.; p. 509.
11. *Crenella pectinula* Gould, from cotype; longitude 16.0 mm.; p. 507.
12. *Crenella faba* Müller; longitude 18.0 mm.; p. 508.

PLATE XXXII.

Fig. 1. *Meretrix* (*Agriopoma*) *texasiana* Dall; longitude 67.0 mm.; p. 509.
2. *Lima albicoma* Dall; longitude 8.0 mm.; p. 507.
3. *Meretrix simpsoni* Dall; longitude 15.2 mm.; p. 510.
4. *Philobrya atlantica* Dall, dorsal view showing nepionic umbones; longitude 4.0 mm.; p. 507.
5. The same, side view; longitude 4.0 mm.
6. *Astarte globula* Dall; longitude 8.5 mm.; p. 508.
7. *Pandora* (*Clidiophora*) *gouldiana* Dall; longitude 27.5 mm.; p. 511.
8. *Mactrella iheringi* Dall; longitude 65.0 mm.; p. 510.
9. *Pecten* (*Plagioctenium*) *gibbus* var. *amplicostatus* Dall; latitude 51.0 mm.; p. 507.

PLATE XXXIII.

Figs. 1–3. *Argonauta expansa* Dall, three views; longitude 94.0 mm.; p. 511.

PLATE XXXIV.

Fig. 1. *Tritonofusus* (*Plicifusus*) *brunneus* Dall; altitude 19.0 mm.; p. 525.
2. *Tritonofusus* (*Plicifusus*) *rectirostris* Carpenter; altitude 32.0 mm.; p. 525.
3. *Fusus?* (*Roperia*) *roperi* Dall, from type; altitude 26.0 mm.; p. 517.
4. *Pleurotoma* (*Antiplanes*) *vinosa* Dall; altitude 33.0 mm.; p. 514.
5. *Astyris aurantiaca* Dall; altitude 5.0 mm.; p. 531.
6. *Tritonofusus martensi* Krause; altitude 40.0 mm.; p. 526.
7. *Murex* (*Pteropurpura*) *petri* Dall; altitude 50.0 mm.; p. 532.
8. *Pleurotoma* (*Antiplanes*) *perversa* Gabb; altitude 44.0 mm.; p. 513.
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3. *Buccinum angulosum* Gray, female; typical form on which the species was founded, strongly carinated and sharply ribbed; altitude 48.0 mm.: p. 518.
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5. *Pedicularia californica* Newcomb; altitude 10.0 mm.: p. 550.
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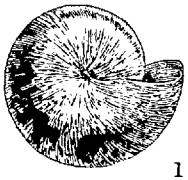
[Names in italics are newly proposed.]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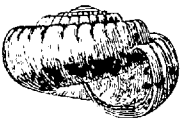
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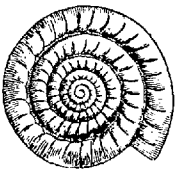
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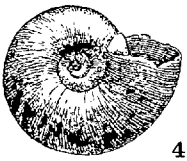
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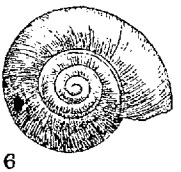
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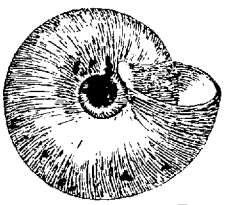
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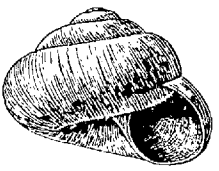
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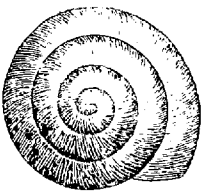
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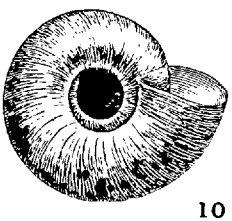
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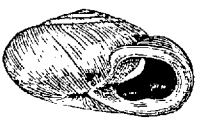
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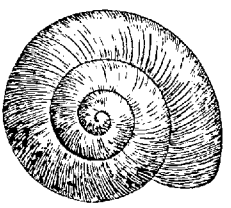
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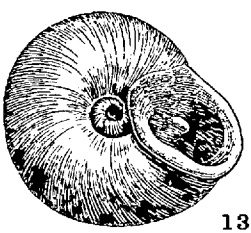
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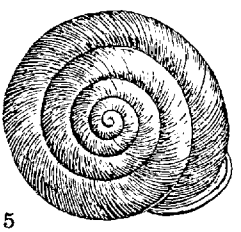
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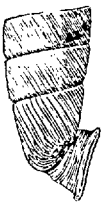
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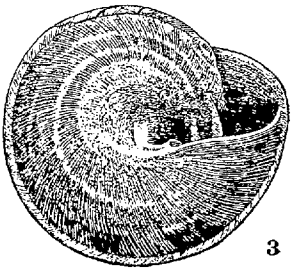
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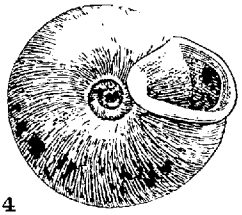
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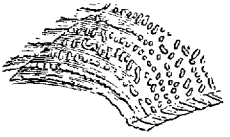
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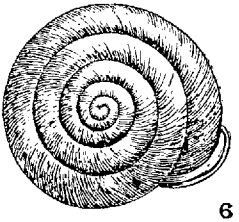
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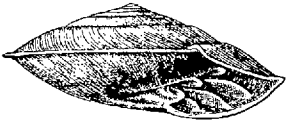
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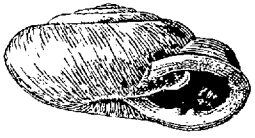
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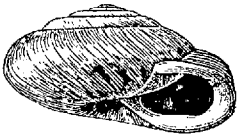
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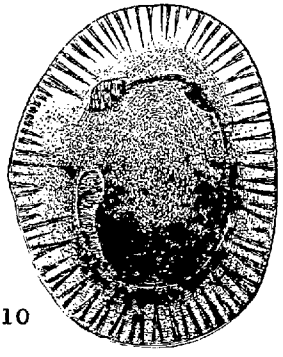
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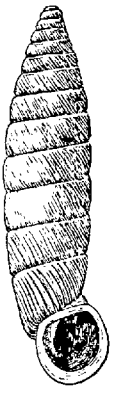
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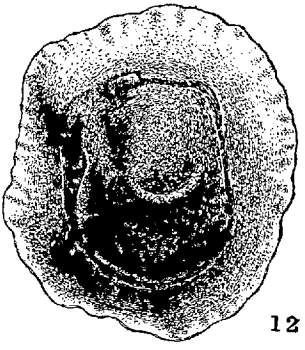
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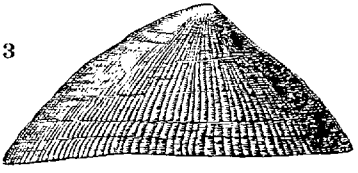
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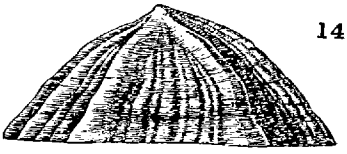
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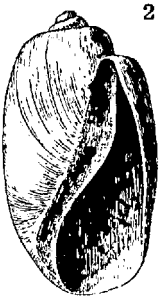
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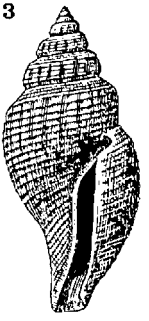
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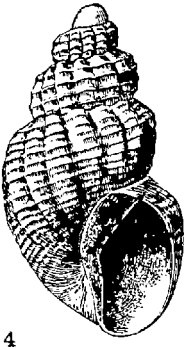
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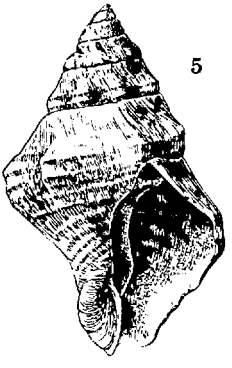
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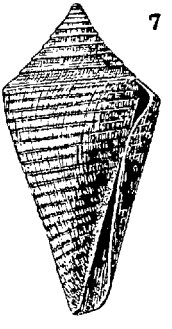
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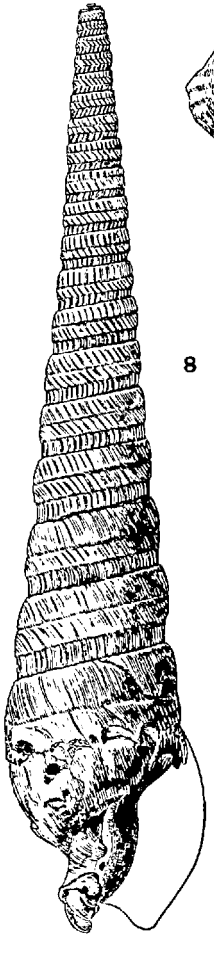
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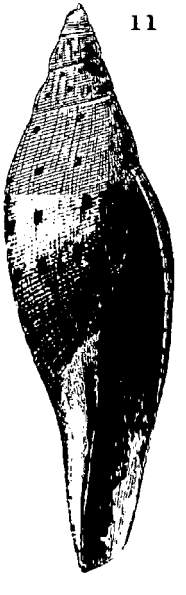
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EAST AMERICAN GASTROPODS.

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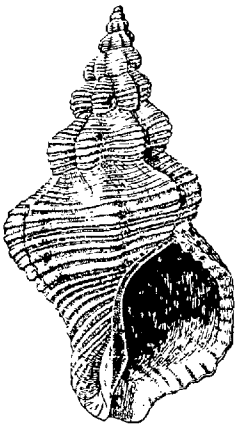

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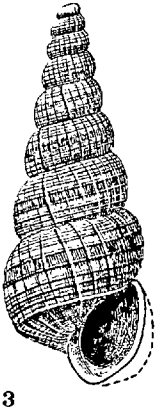

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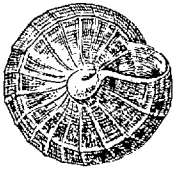

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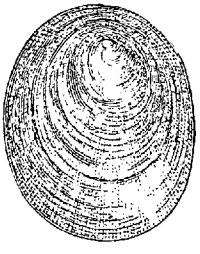

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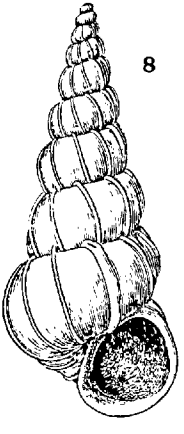

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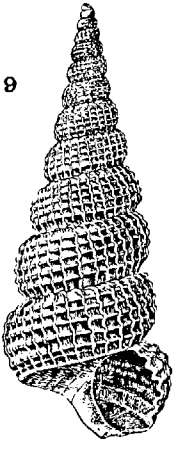

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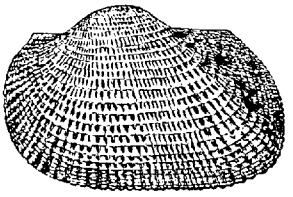
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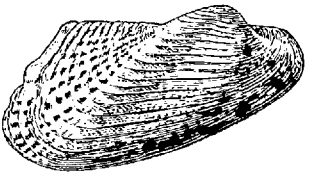
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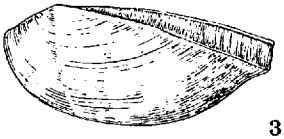
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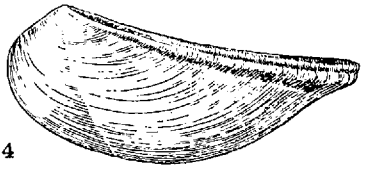
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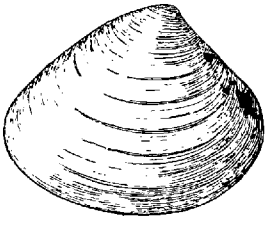
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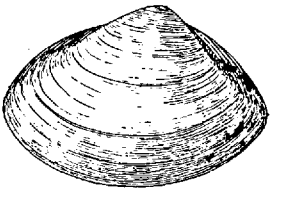
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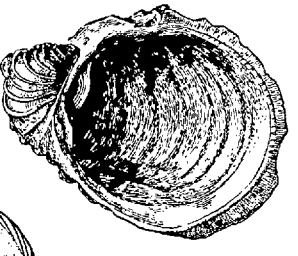
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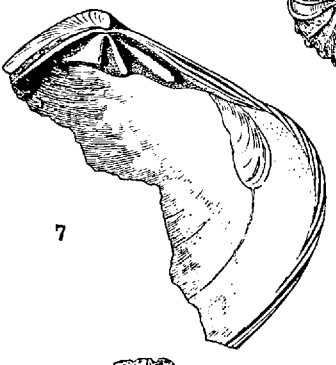
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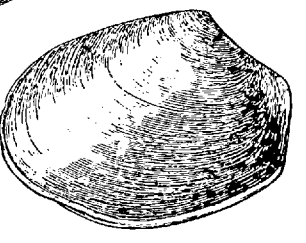
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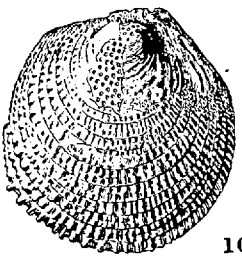
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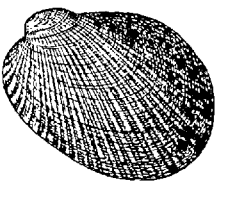
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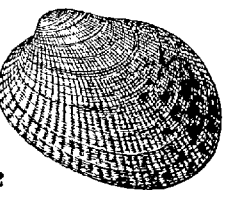
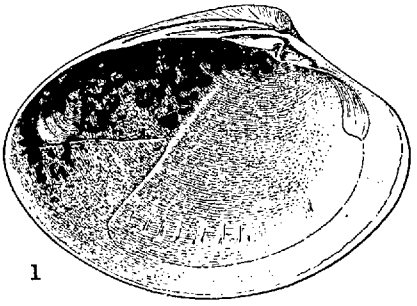


EAST AMERICAN PELECYPODS.

FOR EXPLANATION OF PLATE SEE PAGE 563.



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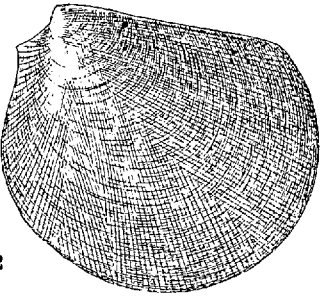

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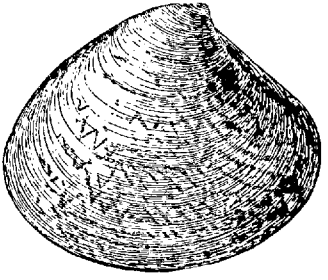

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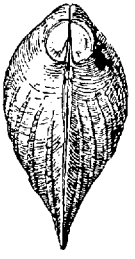

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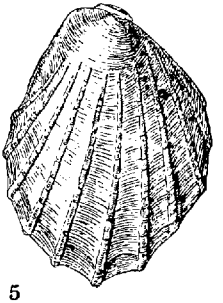

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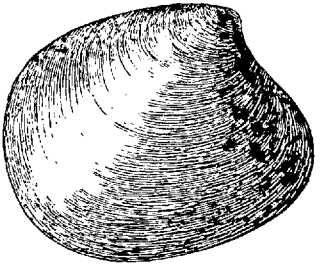

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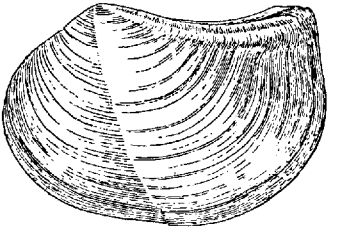

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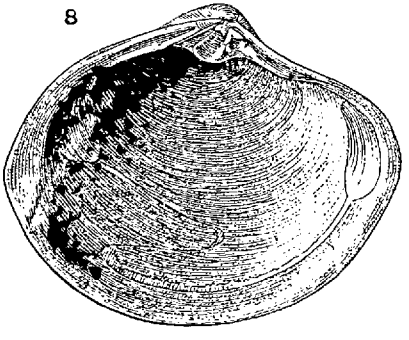

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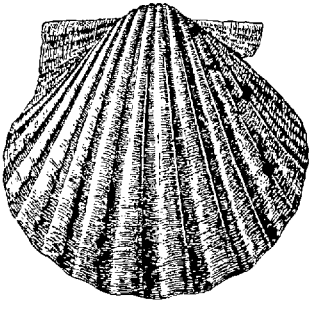
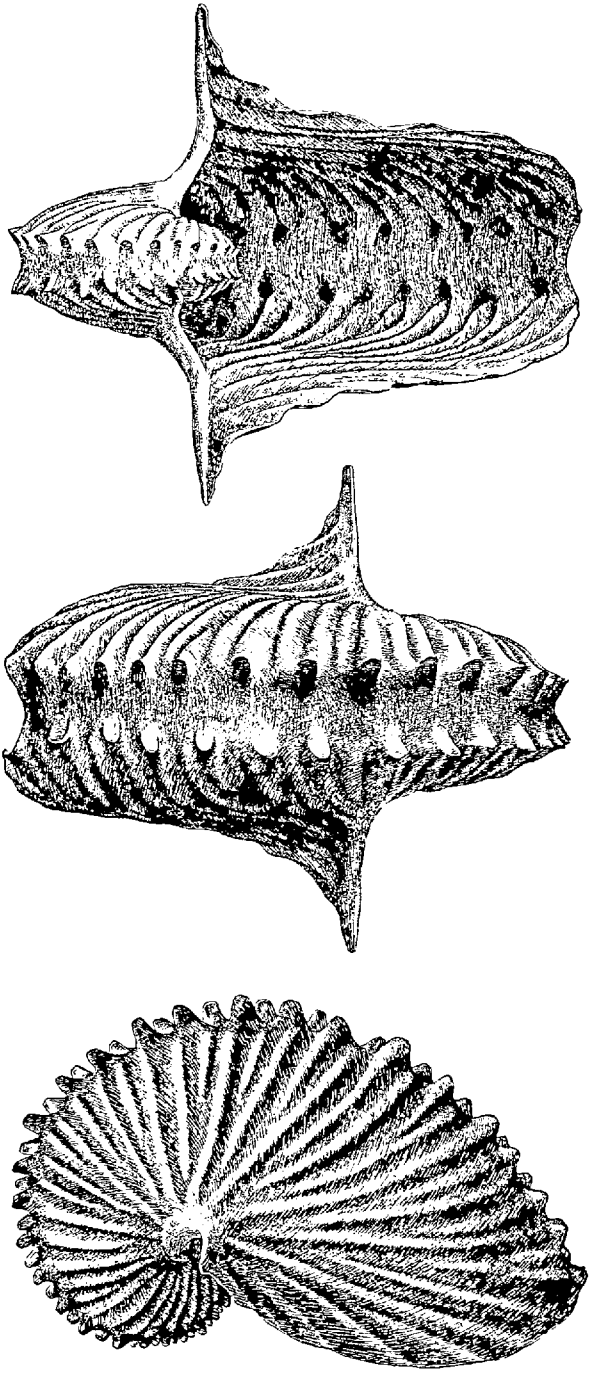


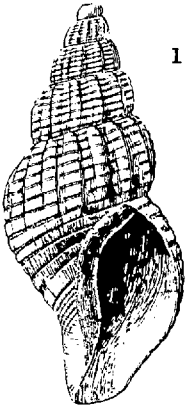
EAST AMERICAN PELECYPODS.

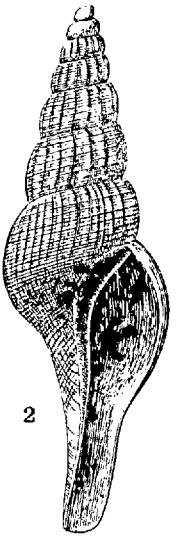
FOR EXPLANATION OF PLATE SEE PAGE 564.

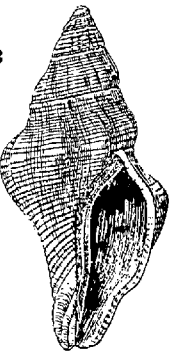


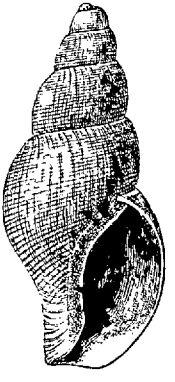
ARGONAUTA EXPANSA DALL, GULF OF CALIFORNIA

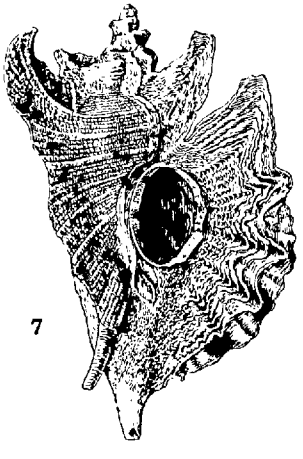
FOR EXPLANATION OF PLATE SEE PAGE 564.

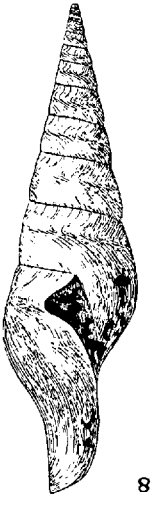


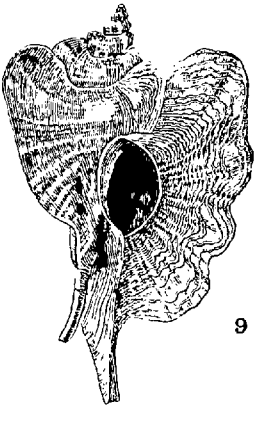






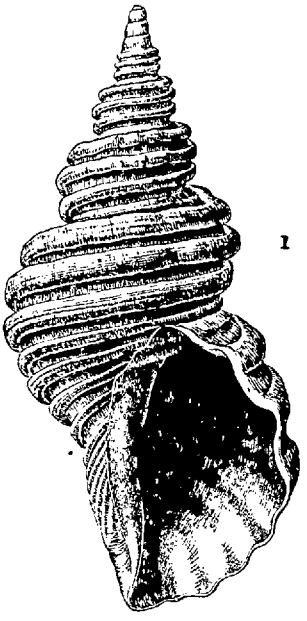


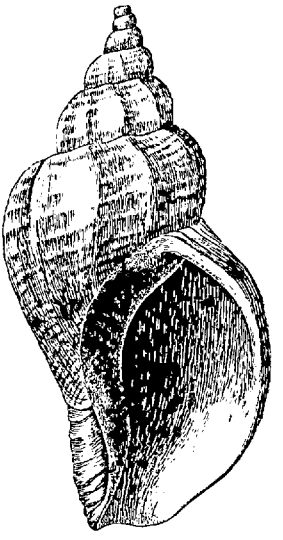


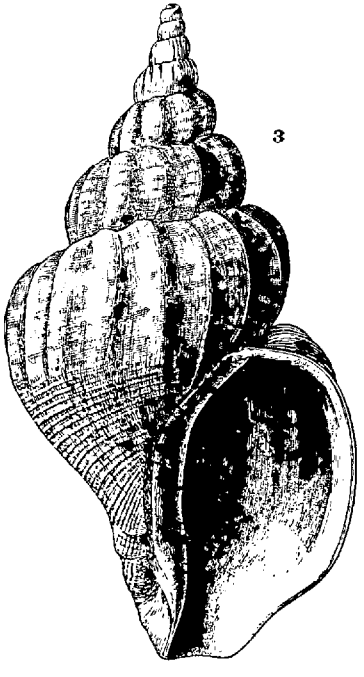


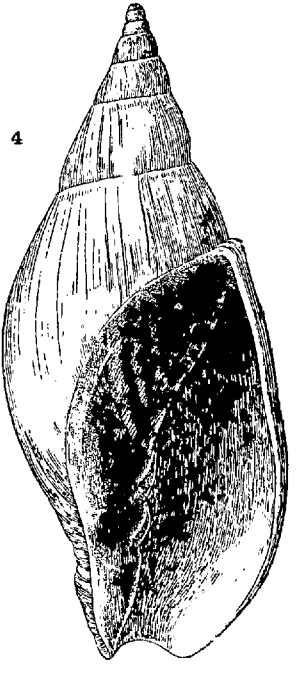
WEST AMERICAN GASTROPODS.

FOR EXPLANATION OF PLATE SEE PAGE 564.



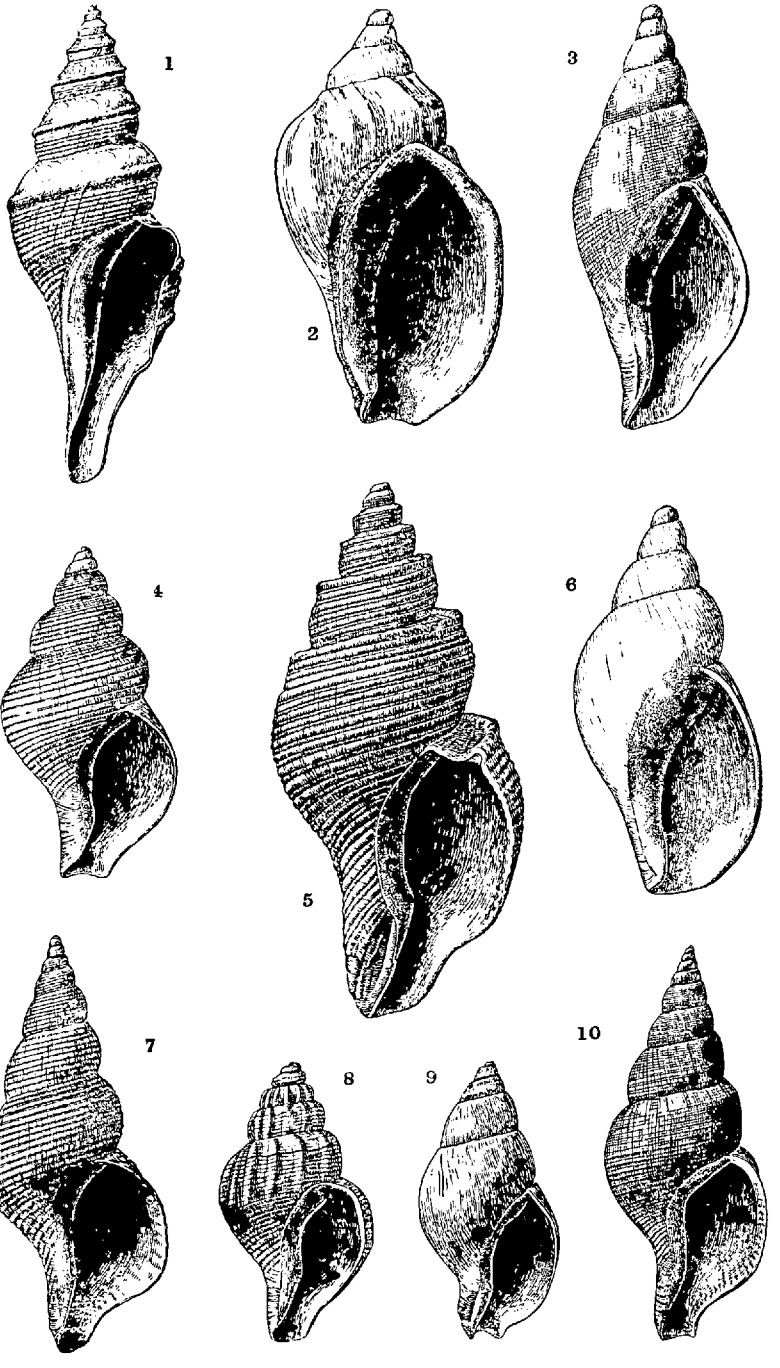






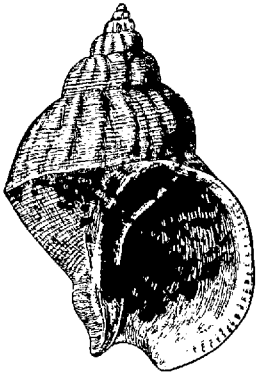
WEST AMERICAN GASTROPODS.

FOR EXPLANATION OF PLATE SEE PAGE 564.



WEST AMERICAN GASTROPODS.

FOR EXPLANATION OF PLATE SEE PAGE 564.



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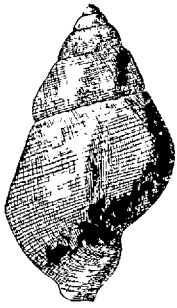

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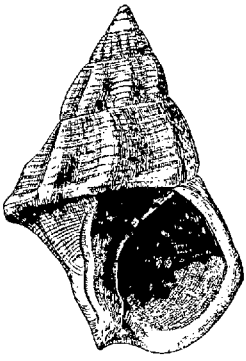

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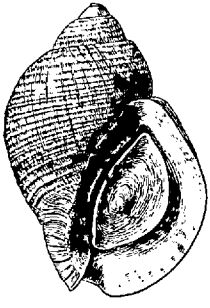

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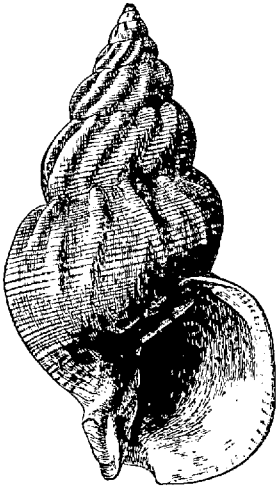

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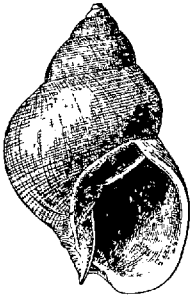

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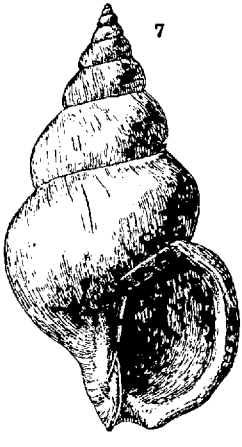

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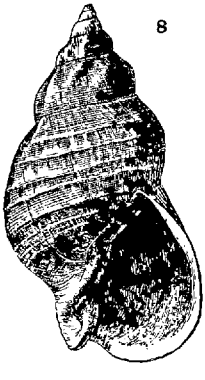

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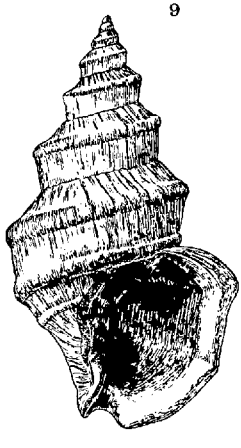
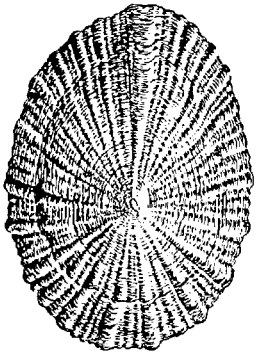


9

ALASKAN BUCCINUM.

FOR EXPLANATION OF PLATE SEE PAGE 565.



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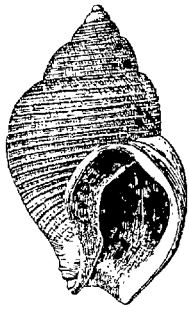

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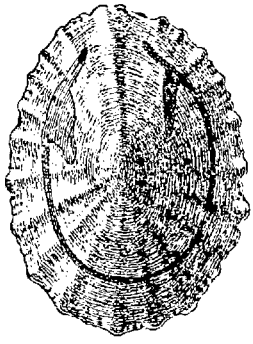

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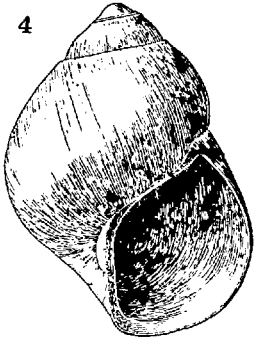

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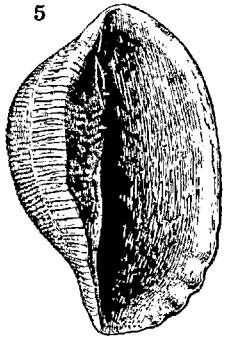

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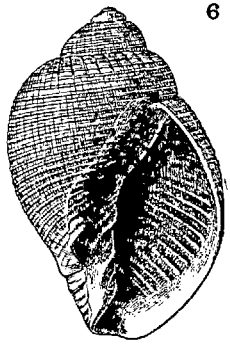

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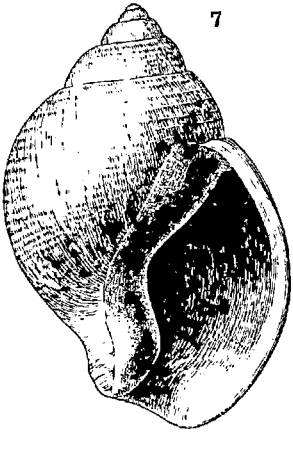

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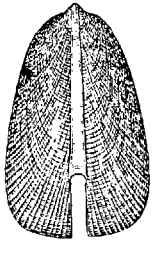

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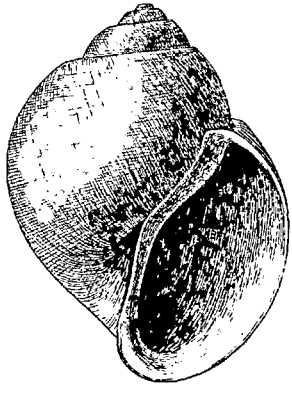

9

WEST AMERICAN GASTROPODS.

FOR EXPLANATION OF PLATE SEE PAGE 565.