It is probable, however, that it grows to a much larger size than any of the specimens obtained.

It is named in honor of Mr. James E. Benedict, for several years zoölogist in charge on the steamer *Albatross*, through whose care and great interest so many small species were brought to light.

CHLAMYS COSTELLATA Verrill and Bush.

(Plate LXXXVI, fig. 6.)

Chlamys costellata VERRILL and BUSH, in VERRILL, Trans. Conn. Acad., X, pp. 75, 91, 1897.

Shell small, thin, translucent, bluish white, covered on both valves with continuous, elevated and somewhat thickened, well-separated, radiating riblets, of which there are more than thirty in the left valve of the largest example. Length of the shell considerably less than its height. Dorsal hinge-margin elongated, especially on the anterior end. In the right valve the anterior auricle is considerably elongated, obtusely rounded or subtruncated at the end, with a wide, angular byssal notch beneath it, having two or three pectinidial teeth; it has a broad, smooth, angular area next the body of the shell, above which there are three well-marked, angular, radial ridges, separated by wider concave interspaces; the posterior auricle is small, triangular, the outer corner forming a little more than a right angle, and the posterior margin nearly straight, without any distinct notch. The dorsal margins of the body of the shell are nearly straight and diverge at less than a right angle; the ventral margin is pretty evenly rounded, a little produced in the middle. The beak is small, acute, appressed, and does not project beyond the margin. The radial ribs are very distinct, clean cut, thickened, rounded at the summit, separated by nearly smooth intervals, two or three times as broad as the ribs themselves; the ribs increase regularly in width from near the umbo to the margin; a few intermediate ridges commence near the margin. The left valve is badly broken; it is, however, somewhat more convex than the other, and the radial ribs are crossed by numerous concentric striations giving them a finely crenulated or beaded appearance; the anterior auricle is broad, triangular, the outer end slightly rounded, with a slight incurved notch below; it is crossed by about six small, radial ribs, similar to those on the body of the shell; raised lines of growth also occur at irregular intervals. Inner surface smooth and lustrous, showing the grooves corresponding to the external ribs and also a very distinct microscopic structure, but it is destitute of radial liræ. Internally, the hinge-margin is thin and narrow, with a sharply impressed, submarginal groove on each side; the resilial pit is excavated in the margin of the hinge itself; the anterior auricle has internal grooves corresponding to the external ribs.

Length of the largest specimen, 6 mm.; height, 6.5 mm.

Three live specimens, at two stations, off the Grand Banks, in 67 to 72 fathoms, 1885–86.

HYALOPECTEN DILECTUS Verrill and Bush.

(Plate XCVII, fig. 9.)

Hyalopecten dilectus VERRILL and BUSH, in VERRILL, Trans. Conn. Acad., X, pp. 80, 92, 1897.

Shell small, thin, fragile, strongly undulated, slightly oblique, with the ventral margin broadly rounded, dorsal margin straight. In the right valve the anterior auricle is rather narrow, elongated, with a deep angular notch beneath; the posterior auricle is shorter, with a prominent dorsal angle which is less than a right angle, owing to the emargination of the posterior end. In the left valve the anterior auricle is broad, with its posterior end nearly rectilinear, and forms a right angle with the dorsal margin; the posterior auricle has a slightly prominent dorsal angle and posterior emargination as in the right valve. The beaks are a little prominent and project somewhat above the dorsal margin, more in the upper or left valve. The surface in both valves is covered with broad and rather regular undulations, which are most prominent in the left valve, and are crossed by regular, well-spaced, thin, raised, radial lines, which become fine and more crowded at the ends of the valve; they are nearly obsolete in the right valve, being represented by microscopic striæ. In both valves the anterior auricle is marked by several fine, rough, radial ridges which are stronger and more numerous in the left valve. The interior is strongly undulated, and the left valve is marked by distinct, radial grooves. Resilium small, central. Color yellow, or dirty white.

Length, 8 mm.; height, the same.

One live, imperfect specimen (No. 52539), station 2570, off Marthas Vineyard, in 1,813 fathoms, 1885.

This species is closely allied to *Hyalopecten fragilis* (Jeffreys) and resembles very nearly his figure,[1] which probably represents a species distinct from the original type described by him, and may be identical with our shell. The latter differs decidedly from the original description of *H. fragilis*. Moreover, we have obtained from several stations a shell of similar size which appears to be the true *fragilis*,[2] as it agrees closely with the description. *Hyalopecten pudicus* (Smith) from east of Marion Island, in 1,375 fathoms, is a closely related species, as is also *Hyalopecten undatus* Verrill.

These four species agree in having the valves thin and translucent and sculptured with distinct concentric undulations, while the radial sculpture does not form strong ribs. They seem to be related to the genus or subgenus *Syncyclonema* Meek, which was based on a cretaceous species and has not hitherto been reported as still living. But the exact characters of the typical fossil species are not yet known.

[1] Proc. Zoöl. Soc., London, pl. XLV, fig. 1, June, 1879.

[2] The true *Hyalopecten fragilis* (Jeffreys) was taken at five stations between N. lat. 40° 6′, W. long. 68° 1′ 30″, and N. lat. 35° 49′ 30″, W. long. 74° 34′ 45″, in 578 to 1,525 fathoms, 1883–1886.

CAMPTONECTES GRŒNLANDICA (Sowerby) Verrill.

(Plate LXXXV, fig. 7.)

Pecten grœnlandicus SOWERBY, Thesaurus Conchyliorum, Pt. II, p. 57, pl. XIII, fig. 40, 1842.—HANLEY, Recent Shells, p. 274, 1842 to 1856.—JEFFREYS, Ann. and Mag. Nat. History, p. 231, 1877.

Pecten grønlandicus G. O. SARS, Moll. Reg. Arct. Norveg., p. 23, pl. 2, figs. 4, *a–c*, 1878.

Pecten grœnlandicus JEFFREYS, Proc. Zoöl. Soc. London, p. 560, 1879.—VERRILL, Check-list, p. 26, 1879.

Pecten grönlandicus VERRILL, Trans. Conn. Acad., V, p. 581, 1882.

Pecten grœnlandicus LOCARD, Campagne du *Caudan*, Annales de l'Université de Lyon, p. 217, 1896.

Camptonectes grœnlandica VERRILL, Trans. Conn. Acad., X, pp. 82, 91, 1897.

The shell is rounded, inequivalved, very thin, hyaline, nearly smooth, often with a violet iridescence when fresh. The left valve is covered, even from the nucleus, with fine microscopic camptonectes sculpture, in the form of thin, raised, divergent riblets, more or less irregular and wavy, most visible by translucency. The left valve sometimes has, also, fine radial striæ and delicate lines of growth. The margins are thin and smooth, that of the right valve turns up a little against the other, which is larger, and the valves close very tightly, so that anteriorly there is scarcely any visible gape, even at the byssal notch or at the end of the auricle. The byssal notch is well-marked and the pectinidial teeth are small and few. The byssus is probably very slender. The auricles are not oblique and are nearly equal. The hinge-plate is very thin; the single longitudinal ridge is scarcely visible.

A row of six or seven ocelli can be seen through the shell in alcoholic specimens.

A few live specimens were dredged by the United States Fish Commission at four stations, off Newfoundland Banks, in 130 to 224 fathoms, between N. lat. 47° 40′, W. long. 47° 35′ 30″, and N. lat. 44° 46′ 30″, W. long. 59° 55′ 45″, 1884–1886. It is also known from the Arctic Ocean and off northern Europe.

CYCLOPECTEN NANUS Verrill and Bush.

(Plate LXXXV, figs. 2–4.)

Cyclopecten nanus VERRILL and BUSH, in VERRILL, Trans. Conn. Acad., X, pp. 85, 92, pl. XVI, figs. 12–12*c*, 1897.

Shell small, the breadth and height about equal, the valves nearly equal in size and convexity. Dorsal hinge-margin rather long and straight; auricles relatively large and broad, both ends in the left valve subtruncated or a little convex and forming nearly a right angle with the dorsal margin, and having a small incurved notch, well differentiated from the body of the shell. In the right valve the anterior auricle is narrow, somewhat more elongated, obtusely rounded at the

end, with a sharp, angular, byssal notch beneath it, separated from the body of the shell by a narrow groove. The dorsal margins of the body of the shell are nearly straight and form more than a right angle; the ventral margin is broadly rounded, nearly semicircular, forming a very obtusely rounded angle, where it joins the dorsal margins. Umbos a little prominent, with a small, smooth, rather acute, incurved beak, which projects a little above the hinge-margin. The surface of the left valve is everywhere thickly covered with fine, almost microscopic, radiating striæ, which become a little more distinct on the anterior auricle; slightly raised thin lines of growth are often very distinct on some parts of the shell, especially on the anterior auricle, where they become closer, more regular, and often produce, in crossing the radial striations, a quite regular, microscopic decussation; the sculpture on the posterior auricle is sometimes similar but finer, although in many specimens the surface is nearly smooth or marked only by very fine radial striæ. The right valve is less convex than the left (its ventral edge does not quite reach that of the opposite valve), the umbo is less prominent, the beak less acute, and scarcely projects beyond, and often falls short of, the hinge-margin; the inequality is less marked than in most of the allied species. The body of the shell in this valve is smooth, except for very fine, irregular lines of growth; on the anterior auricle there are from three to six, or more, distinct radial ridges, roughened by conspicuous lines of growth; the margin below the byssal notch is entire, without pectinidial teeth; the posterior auricle is nearly smooth. The internal hinge-plate is thin in the middle, but relatively broad on each auricle, and is crossed by numerous fine, well-marked, transverse striations; these are much more conspicuous than in any of the related species, whether young or old. The resilial pit is small, rounded, situated just under the beak. The inner surface is smooth and glossy, although in fresh specimens the external radiating lines show through by transparency. There are no internal liræ.

The ground color of the right valve is yellowish or grayish white, with more or less numerous light yellowish brown and reddish brown spots or blotches, and sometimes with irregular patches of opaque white; the right valve is white, sometimes with a few yellowish brown spots. Some specimens are nearly destitute of spots.

Length of one of the largest specimens, 7 mm.; height, 6 mm.; dorsal hinge-margin, 4 mm.

It has been taken in considerable numbers, live and dead, at three stations between N. lat. 37° 7′ 40″, W. long. 74° 35′ 40″, and N. lat. 35° 42′, W. long. 74° 54′ 30″, in 43 to 132 fathoms, 1884.

Although very small, this species seems to be adult. It is so distinct from all other species of our coast that a detailed comparison is unnecessary. It resembles the young of *P. clintonius* more than any other native species, but a comparison of specimens of the same size shows marked differences.

CYCLOPECTEN LEPTALEUS Verrill.

(Plate LXXXV, fig. 1.)

Pecten leptaleus VERRILL, Trans. Conn. Acad., V, pp. 232, 281, 1882; Expl. *Albatross*, Report U. S. Com. Fish and Fisheries for 1883, p. 577, 1885.—DALL, Bull. Mus. Comp. Zoöl., XII, p. 221, 1886.
Pseudamusium leptaleus DALL, Bull. U. S. Nat. Mus., No. 37, p. 34, 1889.
Cyclopecten leptaleus VERRILL, Trans. Conn. Acad., X, pp. 85, 92, 1897.

Mr. Dall has expressed a doubt as to this species being distinct from *Pecten imbrifer* Lovén, therefore a very much enlarged figure of the shell is here introduced for comparison.

In addition to the published description, it should be stated that the concentric lines are somewhat thickened and elevated, even where thinnest, and that the beaded character is quite unlike anything found on *C. imbrifer*, or allied species. The beads are closely arranged, elliptical in form, and most elevated at the center, the elevation being often greater than the diameter; the summit is smooth and glassy, so that when viewed from above, under a lens, they often appear to have a central cavity. The radial lines are comparatively very thin and delicate, and not visible, except when considerably magnified. The beaks are more acute than in *C. imbrifer*, and the nucleus smaller and smoother.

Two live specimens, station 2109, off Cape Hatteras, North Carolina, in 142 fathoms, 1883.

CYCLOPECTEN PUSTULOSUS Verrill.

(Plate LXXXV, figs. 5, 6, 10, 11.)

Pecten pustulosus VERRILL, Amer. Journ. Science, V, p. 14, 1873; Trans. Conn. Acad., III, p. 50, 1874.
Pecten hoskynsi var. *pustulosus* VERRILL, Trans. Conn. Acad., V, p. 581, pl. XLII, figs. 22, 22*a*, 1882 (not pl. XLIV, fig. 11). Not *Pecten hoskynsi* G. O. SARS.
Pecten pustulosus VERRILL, Trans. Conn. Acad., VI, p. 261 (p. 281 in part), 1884; Expl. *Albatross*, Report U. S. Com. Fish and Fisheries for 1883, p. 557 (in part), pl. XXXI, figs. 142*a*, *b*, 1885.
Pecten imbrifer DALL, Bull. Mus. Comp. Zoöl., XII, p. 220 (in part), (not pl. IV, figs. 4*a*, 4*b*), 1886; Bull. U. S. Nat. Mus., No. 37, p. 34 (in part), pl. LXIV, figs. 142*a*, *b*, 1889 (not pl. IV, figs. 4*a*, 4*b*). Not *Pecten imbrifer* LOVÉN.
Cyclopecten pustulosus VERRILL Trans. Conn. Acad., X, pp. 70, 83, 92, pl. XIX, figs. 3, 4, 1897.

This species has been referred to *Propeamusium hoskynsi* by Jeffreys, and to *Pecten* (*Cyclopecten*) *imbrifer* by Dall. It never has the internal ribs, like the former, which it resembles in sculpture. From the latter, as originally described by Lovén, and redescribed and figured by G. O. Sars, it differs especially in the character of the ornamentation of the left valve. The Scandinavian form, according to these authors, has the vesicles much less crowded in each radial row and subconical and mucronate in form; while in ours they are usually

closely crowded, often even in contact in the radial rows, and in form either rounded or elliptical with the longest diameter in the direction of the concentric lines, with the summit evenly rounded, showing no tendency to the subconical or mucronate form. When perfect they resemble small blisters with the surface roughened or minutely granulose under the microscope; when broken or worn off, as frequently happens, the basal part remains in the form of a semicircular or semielliptical, imbricated, arched scale, usually considerably elevated above the surface and connected by very delicate concentric raised lines. The surface of the anterior auricle of the left valve is roughened by close, elevated, concentric lines, and from four to six well-marked radiating ridges or ribs, upon which the concentric lines form regular elevated arched projections, often so crowded as to be imbricated; in some young examples, like the one figured, the concentric lines on the auricle are less crowded and only two or three of the radial ribs are developed; in such examples the vesicles on the body of the shell are relatively fewer, larger, more rounded, and much less crowded in the radial series. In some specimens the posterior margin, below the auricle, is nearly smooth or marked only by the fine lines of growth, while in others, especially larger specimens, this region is covered by rather sharp granules, some of which, toward the ventral margin, change to pointed scales arranged in crowded radial rows. The raised concentric lines on the right valve are generally more or less appressed and sometimes imbricated; toward the ventral margin some of them show very fine microscopic crenulations, which are much less distinct than on *C. imbrifer*, as figured by Sars.

This species is distinct from that figured by Mr. Dall[1] under the name of *C. imbrifer*. His specimen apparently belongs to the following species.

Several live and dead specimens, at eleven stations between N. lat. 44° 34′, W. long. 56° 41′ 45″, and N. lat. 39° 48′ 30″, W. long. 70° 54′, in 99½ to 547 fathoms, 1872–1885.

CYCLOPECTEN SUBIMBRIFER Verrill and Bush.

(Plate LXXXV, figs. 8, 9.)

Pecten hoskynsi VERRILL, Trans. Conn. Acad., V, p. 581, pl. XLIV, fig. 11, 1882. Not Forbes.

Pecten (Pseudamusium) imbrifer DALL, Bull. Mus. Comp. Zoöl., XII, p. 220 (in part), pl. IV, figs. 4*a*, 4*b*, 1886; Bull. U. S. Nat. Mus., No. 37, p. 34 (in part), pl. IV, figs. 4*a*, 4*b*, 1889.

Cyclopecten subimbrifer VERRILL and BUSH, in VERRILL, Trans. Conn. Acad., X, pp. 84, 92, 1897.

Shell small, inequivalved, white or grayish white, translucent, length and height nearly equal. Dorsal margin straight. Anterior auricle in the left valve rather large and broad, the outer end obtusely rounded,

[1] Blake Mollusca, pl. IV, figs. 4*a*, 4*b*.

covered with small, close, radial ribs and crowded concentric ridges; posterior auricle much smaller, with from one to three faint, radial ridges and many concentric, raised lines, and with its outer end forming less than a right angle, with a slight incurved notch below. In the right valve the anterior auricle has a similar radial sculpture and the byssal notch is rather deep and narrow. The dorsal lines of the body of the shell form rather less than a right angle; the ventral margin forms nearly a semicircle with an obtuse angle where it meets the dorsal outline. Umbos a little prominent; beaks small, acute, smooth, and projecting beyond the margin of the hinge. The surface of the left valve is covered with slightly raised concentric lines, which are interrupted or broken up by small arched scales which are sometimes semicircular, but more frequently somewhat angulated or V-shaped, and usually are separated by intervals about equal to their breadth; these scales vary in number, but are usually arranged in about forty radial rows, and increase regularly in size from the umbos, where they are replaced by thin, slightly raised, radial lines crossing the stronger, more elevated, concentric lines, but not rising into points. In some specimens the radial arrangement is scarcely discernible; the scales appear as irregularities in the concentric lines. The postero-dorsal area below the auricle is nearly smooth, except for the fine lines of growth, but sometimes shows minute granules. The right valve, which is smaller than the left, is covered by fine, thin, close, concentric, raised lines, which sometimes show microscopic striations. The anterior auricle is decussated by from six to eight, or more, small radial ridges, which are crossed by the raised, concentric lines; the latter rise into sharp scales at the dorsal margin; the small posterior auricle has finer concentric lines and only two or three faint, radial ridges.

Comparatively few specimens, at three stations, between N. lat. 42° 45′ 30″, W. long. 62° 43′, and N. lat. 39° 53′ 30″, W. long. 71° 13′ 30″, in 121 to 312 fathoms, 1877–1885.

C. kermadecensis (Smith), from north of Kermadec Islands, in 600 fathoms, is a related species.

PROPEAMUSIUM THALASSINUM (Dall) Verrill.

(Plate LXXXVII, fig. 6.)

Amussium fenestratum VERRILL, Trans. Conn. Acad., V, p. 582, 1882.
Amussium sp. VERRILL, Trans. Com. Acad., VI, pp. 261, 281, 1884.
Pecten (*Pseudamusium*) *thalassinus* DALL, Bull. Mus. Comp. Zoöl., XII, p. 221, 1886; Bull. U. S. Nat. Mus., No. 37, p. 34, 1889.
Propeamusium thalassinum VERRILL, Trans. Conn. Acad., X, pp. 87, 92, pl. XIX, figs. 5–7, 1897.

Found at thirteen stations, between N. lat. 40° 5′ 39″, W. long. 70° 23′ 52″, and N. lat. 35° 42′, W. long. 74° 54′ 30″, in 43 to 317 fathoms, 1880–1885. South to Barbados, in 22 to 317 fathoms.—Dall.

Family ARCIDÆ.

BATHYARCA Kobelt.

Type.—Bathyarca pectunculoides (Scacchi).

Shell oblong, subovate, or rounded, rather thin, usually finely cancellated, with hairy or scaly epidermis, more or less equilateral, frequently slightly inequivalved, with a slight byssal sinus. Byssus very small. Ligamental area lanceolate, longer and narrower behind the beaks, with a sagittate posterior ligament. Hinge-margin nearly straight, usually narrow and edentulous in the middle, with a series of small, oblique, striated and crenulated teeth on each end, the distal ones becoming larger and more oblique; those of the posterior series usually longer and more oblique, or divergent, than those in the anterior.

The animal of *B. pectunculoides* var. *grandis*, preserved in alcohol, has the margin of the mantle plain without ocelli, with a well-developed muscular septum, posteriorly; the foot large and thick, geniculate, pointed posteriorly, with a strong byssal groove and a slender, solid, byssal stem; two pairs of rather small, long, lanceolate palpi; the rectum with a free terminal portion; two pairs of rather large gills, with the posterior end of the stem free for some distance, curved, and tapered to a point, and with the reflected portion of the filament of the same length as the direct; the filaments are very slender, delicate, and soft and but slightly attached to each other.

This division, which is probably of generic value, includes a number of small and mostly deep-water species which have been variously placed by recent authors. Mr. E. A. Smith puts several of them in *Scapharca* with a mark of doubt. Mr. Dall puts two allied species in the Jurassic genus *Macrodon*,[1] with which they do not seem to agree very closely, and mentions the affinity of others to *Barbatia*.

The last group differs in the stout, rough shell, strongly gaping ventrally for the large byssus, and in the character of the teeth and ligament. *Scapharca* has a thick, strongly ribbed, inequivalved shell, a firm byssus, and continuous, strong, lanceolate ligament. *Macrodon* has, on the posterior hinge-plate long, divergent lamellæ, nearly parallel with the dorsal margin.

We would refer the following species to *Bathyarca*.—*B. pectuncu-*

[1] The two West Indian species described by Mr. Dall as *Macrodon asperula* and *M. sagrinata*, should, perhaps, form a separate genus, characterized by the few very oblique, sublamellar, posterior teeth and several smaller, nearly transverse anterior ones. It may be designated as *Bentharca*, with *Bentharca asperula* as the type.

These are closely related to one of the Eocene fossil species (*Arca adversidentata*), which Deshayes placed in his group of "Cucullaires," but later writers (Conrad, 1869, Fischer, and others) have taken his first species (*heterodonta*) of that group as the type of the genus "*Cucullaria*," which differs in having the anterior as well as the posterior teeth long and lamelliform; hence we would associate Tertiary species like *Bentharca adversidentata* with the living deep-water forms.

loides (Scacchi) and its varieties, *grandis* Verrill, *Freilei* Jeffreys, *septentrionalis* Sars, *crenulata* Verrill, *orbiculata* Dall, from off St. Vincent, northward. *B. glacialis* (Gray), Arctic America and Europe. *B. anomala* Verrill and Bush, Gulf of Maine. *B. abyssorum* Verrill and Bush, off Delaware Bay. *B. profundicola* Verrill, from off West Indies, northward. *B. glomerula* (Dall), *B. polycyma* (Dall), *B. culebrensis* (Smith), off West Indies. *B. inæquisculpta* (Smith), *B. pteroessa* (Smith), Atlantic and Pacific. *B. imitata* (Smith), Pacific.

Bentharca asperula (Dall), and *B. sagrinata* (Dall), are from the West Indies, in deep water.

BATHYARCA ABYSSORUM, new species.

(Plate LXXVI, fig. 9.)

Shell small, short, well-rounded at both ends, swollen, inequilateral, slightly oblique, with a rather long, straight hinge-margin. Umbos large, swollen, prominent. Beaks prominent and curved strongly forward, situated considerably in front of the middle. Surface everywhere covered with nearly equal, delicate, raised, radiating lines and small, rather even, raised lines of growth; these together produce a finely cancellated surface which, when fresh, is covered with a thin brownish-yellow epidermis forming small scale-like points at the intersection of the lines; the surface is also marked with slight, irregular, concentric waves or undulations.

The anterior margin is shorter than the posterior and forms an obtuse, rounded angle at its junction with the hinge-margin; the ventral margin is obliquely curved, most prominent behind the middle, where the curve forms nearly the segment of a circle; posterior margin is very broadly rounded and forms a distinct obtuse angle where it joins the dorsal margin. The ligamental area is lanceolate, moderately large, decidedly wider just in front of the beaks, becoming narrow and pointed posteriorly. The dark ligamental patch is arrow-shaped, situated behind the beaks. The hinge-margin is rather wide and strong, with a small, central edentulous space, mostly behind the beaks. The teeth, which are striated on the sides and crenulated on the edge, are equally and decidedly oblique in the two series; the proximal ones are small and the others increase in size and obliquity to near the end of the series, where one or two of the outermost are decidedly smaller and very oblique. In the largest specimen there are about six teeth in the anterior and eight in the posterior series. The inner surface shows faint radial grooves and ridges, much coarser than the external striæ; there is also a fine, impressed line, with a finely crenulated edge close to the margin.

Length of the largest specimen, 6 mm.; height, 6.5 mm.; thickness, 5.5 mm.; length of the hinge margin, 3.5 mm.

Three specimens were found at stations 2713 and 2714, off Delaware Bay, in 1,825 to 1,859 fathoms, 1886.

This species is allied to *B. glomerula* Dall. The latter differs in having a less rounded form with a longer hinge-margin, more definite terminal angles, and much more numerous and smaller teeth which are nearly continuous. In our specimens of *B. glomerula* of corresponding size, there are about ten teeth in each series and they are about one-half as large. According to Mr. Dall's figures, the umbos of his species are larger than in the more northern form, but our specimens of his species have the umbos smaller than is indicated by his figures. The position of the beaks and form of the ligamental area is nearly the same in both species; but the latter appears to be a little wider in ours and the beaks are a trifle more oblique. The external sculpture is similar but the radial lines are decidedly stronger and less numerous in *glomerula*, and the sculpture is quite different in the two valves, while in ours there is no perceptible difference. *B. inæquisculpta* (Smith) is also a closely allied species which Mr. Dall considers identical with *B. glomerula*. Mr. Smith's figures are quite different from those of Mr. Dall, and also from our West Indian specimens of the latter, and still more different from *B. abyssorum*.

BATHYARCA PROFUNDICOLA (Verrill).

(Plate LXXVIII, fig. 2.)

Arca profundicola VERRILL, Trans. Conn. Acad., VI, p. 439, pl. XLIV, figs. 23, 23*a*, 1885.—DALL, Bull. Mus. Comp. Zoöl., XII, p. 245, 1886.

Macrodon profundicola DALL, Bull. U. S. Nat. Mus., No. 37, p. 42, pl. XLVI, figs. 23, 23*a*, 1889.

A very few specimens, at three stations, between N. lat. 40° 29′, W. long. 66° 4′, and N. lat. 37°, W. long. 71° 54′, in 1,769 to 2,620 fathoms, 1884 and 1885. Also among Foraminifera, station 2385, N. lat. 28° 51′, W. long. 88° 18′, in 730 fathoms.

BATHYARCA ANOMALA, new species.

(Plate LXXVII, fig. 8.)

Shell small, oblong, inequilateral, much swollen with large prominent umbos, and pointed beaks, curved strongly forward and considerably separated, owing to the unusually wide, lanceolate, ligamental area, which is covered behind the beaks with the remains of a dark thickened ligament. Dorsal margin straight for nearly its entire length; anterior and posterior ends broadly and about equally rounded, the posterior a little the more swollen below and longer; ventral margin broadly rounded, a little prominent in the middle, with a slight byssal indentation in front. Surface everywhere covered with fine, regular, raised, radiating lines which are decussated by finer lines of growth; the rather thin brown epidermis is scaly or chaffy on the radii, especially toward the margins, where it forms minute points. Hinge-margin considerably thickened, increasing in strength toward the ends; in the

middle, where it is narrowest, it is nearly smooth and rounded, with only slight indications of one or two transverse teeth on each side; next these there are two or three somewhat oblique, slightly divergent, irregular, longitudinal, slightly striated and crenulated folds, separated distally by rather deep grooves nearly parallel with the inner margin. The inner edge of the ventral margin is thin and plain.

Length, 8.5 mm.; height, 7 mm.; thickness, 6 mm.

One living specimen (No. 74081) was dredged by the *Bache* at station 52, off Cashes Ledge, in 27 fathoms, 1874.

As only a single specimen has been found, it is possible that it is but an abnormal variety, although it appears to have been healthy and well-grown in every respect. It is related to *B. pectunculoides* (Plate LXXVII, fig. 6), but differs remarkably in the character of the hinge, which has the transverse teeth scarcely discernible, and oblique, irregular folds on the distal parts of the margin, and also in the greater width of the ligamental area.

Family LIMOPSIDÆ.

LIMOPSIS SULCATA, new species.

(Plates XCII, fig. 2; XCV, fig. 9; XCVI, fig. 1.)

Shell very oblique (young specimens are less oblique and in some cases are more nearly circular), broad-ovate, the posterior ventral margin much produced and obtusely rounded; auricles only slightly developed. The dorsal margin is short and straight, with a narrow, smooth area beneath the beaks; the anterior margin is subtruncate, or very obtusely rounded; the ventral margin is oblique, broadly rounded, forming an obtusely rounded angle with the posterior margin, which is strongly sloping and only a little convex. The umbos are small and somewhat prominent; the beaks small, pointed, and curved inward. The entire surface is covered with strongly marked, concentric grooves and prominent rounded, narrow ribs; the latter are crossed by numerous fine, radiating, incised striations, which divide them into beadlike, or squarish, portions, which are most obvious on the middle and posterior parts and become very faint anteriorly. The hinge-margin is much thickened and bears a curved series of rather large, flattened teeth, of which about eight are situated in front of the beaks and about ten behind them; those nearest the center are small; the resilial pit extends upward to the beak in the form of a small triangular depression. The inner surface of the shell is marked by fine, radiating striæ; the margin is thickened and cut away near the edge; no crenulations have been observed in our specimens.

Greatest length, 12 mm.; greatest height, 13 mm.; breadth, 6 mm.

A number of separate valves, at about ten stations, between N. lat. 40° 8′, W. long. 68° 45′, and N. lat. 37° 7′ 4″, W. long. 74° 35′ 40″, in 64 to 349 fathoms, 1880–1884.

LIMOPSIS MINUTA (Philippi).

(Plates LXXV, fig. 1; LXXVIII, fig. 7.)

Limopsis minuta VERRILL Trans. Conn. Acad., V, p. 576, 1882; VI, p. 280, 1884; Expl. *Albatross*, Report U. S. Com. Fish and Fisheries for 1883, p. 577, 1885.—SMITH, E. A., Report Voy. *Challenger*, Zoöl. Lamellibranchiata, XIII, p. 258, 1885.—DALL, Bull. Mus. Comp. Zoöl., XII, p. 236, 1886; Bull. U. S. Nat. Mus., No. 37, p. 42, 1889.—BUSH, Bull. Mus. Comp. Zoöl., XXIII, p. 235, pl. I, fig. 8, 1893.—LOCARD, Campagne du *Caudan*, Annales de l'Université de Lyon, p. 198, 1896.

A very common and abundant species, at eighty-two stations, between N. lat. 44° 7′ 30″, W. long. 57° 16′ 45″, and N. lat. 35° 49′ 30″, W. long. 74° 34′ 45″, in 116 to 2,221 fathoms, 1880–1887. South to Barbados, in 30 to 2,221 fathoms.—Dall.

LIMOPSIS AFFINIS Verrill.

(Plate LXXV, fig. 2.)

Limopsis affinis VERRILL, Trans. Conn. Acad., VI, p. 442, 1885.

Two live specimens, at station 2092, N. lat. 39° 58′ 35″, W. long. 71° 30″, in 197 fathoms, 1883.

LIMOPSIS PLANA Verrill.

(Plate LXXV, fig. 5.)

Limopsis sp. (?) VERRILL, Trans. Conn. Acad., V, p. 280, 1884.
Limopsis plana VERRILL, Trans. Conn. Acad., VI, p. 441, 1882; Expl. *Albatross*, Report U. S. Com. Fish and Fisheries for 1883, p. 577, 1885.
Limopsis aurita, var. *plana* DALL, Bull. U. S. Nat. Mus., No. 37, p. 42, 1889.
Limopsis plana BUSH, Bull. Mus. Comp. Zoöl., XXIII, pp. 240, 244, pl. II, figs. 19, 20, 1893.

Three live specimens and one valve, at two stations, between N. lat. 38° 22′, W. long. 70° 17′ 30″, and N. lat. 37° 40′ 30″, W. long. 70° 37′ 30″, in 1,825 to 2,221 fathoms, 1883–1886. South to Dominica, West Indies, in 1,131 to 2,221 fathoms.—Dall.

The largest specimen, from station 2710, is 18.5 mm. long; 18.5 mm. high; hinge-margin, 11 mm. long; ligamental area, 3 mm. long.

LIMOPSIS AURITA (Brocchi) Jeffreys.

(Plate LXXV, fig. 3.)

? *Arca aurita* BROCCHI, Conch. foss. Subap., II, p. 485, pl. XI, fig. 9 (t. Jeffreys).
Limopsis aurita JEFFREYS, British Conch., II, p. 161, pl. IV, fig. 3, 1864; V, pl. XXX, fig. 1, 1869.—SMITH, E. A., Report Voy. *Challenger*, Zoöl., Lamellibranchiata, XIII, p. 257, 1885.—DALL, Bull. Mus. Comp. Zoöl., XII, p. 237, 1886; Bull. U. S. Nat. Mus., No. 37, p. 42, 1889.—LOCARD, Campagne du *Caudan*, Annales de l'Université de Lyon, p. 197, 1896.
Not *Limopsis aurita*, variety, VERRILL, Trans. Conn. Acad., VI, p. 440, 1885.

One valve, among Foraminifera, station 2385, N. lat. 28° 51′, W. long. 88° 18′, in 730 fathoms. South to Grenada, in 21 to 1,582 fathoms.—Dall.

The northern specimens (*L. profundicola*) formerly referred doubtfully to this species prove to be distinct. The single specimen now included agrees well with a specimen of the fossil form from Europe.

LIMOPSIS PROFUNDICOLA, new species.

(Plates LXXV, fig. 4; LXXXIII, fig. 4.)

Limopsis aurita, variety (?) VERRILL, Trans. Conn. Acad., VI, p. 440, 1885.

Comparatively few specimens, at ten stations, between N. lat. 41° 7′, W. long. 65° 26′ 30″, and N. lat. 36° 47′, W. long. 73° 9′ 30″, in 1,525 to 1,859 fathoms, 1884–1886.

Family MYTILIDÆ.

CRENELLA FRAGILIS Verrill.

(Plate LXXXIII, figs. 1, 2.)

Crenella fragilis VERRILL, Trans. Conn. Acad., VI, p. 444, 1885.—DALL, Bull. U. S. Nat. Mus., No. 37, p. 40, 1889.

One valve and a fragment, station 2265, N. lat. 37° 7′ 40″, W. long. 74° 35′ 40″, in 70 fathoms, 1884.

GLOMIDÆ, new family.

Glominæ VERRILL and BUSH, Amer. Journ. Sci., III, pp. 53, 59, January, 1897.

Shell short, roundish at both ends. Hinge-plate with a row of transverse teeth each side of the middle. Ligament thick, elongated, attached for most of its length to the inner surface of the posterior hinge-plate and running forward in a narrow groove beneath the beaks, so that its anterior portion is external and its thickened posterior portion is partly internal. No pallial sinus. Animal not known.

This group includes, so far as known, only the genus *Glomus* Jeffreys, which has been referred by several writers to the Arcidæ, and by others to the Ledidæ, from both of which it differs widely. Its relations to the Nuculidæ are somewhat uncertain, owing to our ignorance of the soft parts. In the form and position of the ligament it differs entirely from all other genera of Nuculidæ and Ledidæ.

A more mature consideration of this group, since the publication of our former article, leads us to consider it as a family distinct from Nuculidæ.

GLOMUS Jeffreys.

Glomus JEFFREYS, Annals Mag. Nat. Hist., p. 433, November, 1876.—VERRILL and BUSH, Amer. Journ. Sci., III, pp. 53, 59, January, 1897.

Type.—Glomus nitens Jeffreys.

Shell thin, smooth, subequilateral, rounded at both ends, with the beaks turned forward. No lunule or escutcheon. Hinge with two series of obliquely transverse teeth; a small lateral tooth may be present.

The following are described species:

G. nitens Jeffreys, North Atlantic (Europe) and from off Marthas Vineyard south to off Rio de la Plata (America); *G. jeffreysi* Smith; *G. simplex* Smith, and *G. inæquilateralis* Smith, West Indies; *G. japonicus* Smith, off Japan.

GLOMUS NITENS Jeffreys.

(Plate XCVII, figs. 1, 2.)

Glomus nitens JEFFREYS, Annals Mag. Nat. Hist., p. 433, November, 1876; Proc. Zoöl. Soc., London, p. 573, pl. XLV, fig. 5, June, 1879.—VERRILL, Trans. Conn. Acad., VI, p. 231, 1884; Expl. *Albatross*, Report U. S. Com. Fish and Fisheries for 1883, p. 576, 1885.—SMITH, E. A., Report Voy. *Challenger*, Zoöl., Lamellibranchiata, XIII, p. 248, 1885.—DALL, Bull. U. S. Nat. Mus., No. 37, p. 46, 1889.—VERRILL and BUSH, Amer. Journ. Sci., III, p. 53, figs. 1, 2, January, 1897.

The specimens which we refer to this species agree closely in size and form with Jeffreys's figures, but there is in both valves a small submarginal lateral tooth just beyond the posterior series of teeth, and in the right valve a similar but less prominent one just beyond the anterior series. These are not mentioned in Jeffreys's description. In the posterior series there are fewer teeth than in his figure and they have an acute, oblique, V-shaped outline and are but little raised; in the anterior series there are four larger, oblique teeth which are not so distinctly V-shaped, owing to their oblique position and because the surface of the hinge-plate is turned downward. The posterior ligament is strong, long, wedge-shaped, widest distally where it occupies most of the width of the hinge-plate; the narrow prolongation runs forward under the beaks in a narrow groove. There is a thickened, edentulous space under the beaks, separating the two series of teeth, which has, when highly magnified, a very small, angular notch in the middle of its lower edge, which in our specimen is filled with what appears like the remains of a resilium; there is also a very minute, V-shaped notch in the external margin. The beaks turn forward. The pallial impression is rather indistinct, but appears entire. Interior somewhat lustrous, but not at all nacreous.

Two imperfect specimens, at two stations, off Marthas Vineyard and off Delaware Bay, in 1,544 and 1,608 fathoms, 1883 and 1886. South to Rio de la Plata, in 294 to 1,900 fathoms.—Dall and Smith.

REVIEW OF THE GENERA OF LEDIDÆ AND NUCULIDÆ OF THE ATLANTIC COAST OF THE UNITED STATES.[1]

These families are often united by modern malacologists under a single family (Nuculidæ), while others regard them as distinct. They are certainly closely related anatomically, as well as by the structure of the shell. Thus all the members of both families have a single pair of

[1] An abstract of the portion of this article relating to these families was published in the American Journal of Science, III, p. 51, January, 1897.

simple "foliobranchiate" (or protobranchiate) gills; two pairs of large labial palpi, the outer ones furnished with long extensile labial tentacles; a large muscular foot with an expanded, concave, terminal disk, adapted for rapid motions in jumping and swimming, as well as for creeping; and all have two series of transverse or oblique teeth on the hinge-margin. The peculiar structures of foot and gills appear together elsewhere only in the family Solemyidæ, which is evidently a related group, though it lacks hinge-teeth and has a very different shell. As these three families have gills of a peculiar and simple structure, each one consisting of two rows of flat lamellæ, attached to a single stem, they have recently been regarded as forming a special order (Protobranchiata).

This group is of special interest because of its great antiquity. Large numbers of fossil forms very closely allied to existing genera and species occur even in Silurian and Devonian formations.

Thus the common living genera *Nucula* and *Leda* are represented by numerous Devonian species, many of which can not be separated from the recent forms, even as subgenera, by any tangible characters. Other species of the same age, referred to *Palæoneilo*, agree in nearly all essential characters with the living genus *Tindaria*. These fossil shells are generally larger and stronger than the corresponding living species. Many Palæozoic genera which are now extinct were as highly organized and as much specialized as their living allies.

The thin-shelled, strongly siphonate genera, such as *Yoldia*, *Yoldiella*, etc., do not appear so early in geological time and may be regarded as more modern specializations of the Leda-like forms. They are also the forms that swim and jump with the greatest activity. Therefore the thin and light character of their shells may be regarded as having been secondarily acquired, partly in consequence of their active movements, in which a heavy shell would be disadvantageous, and partly because the development of long siphons enables them to live concealed much of the time beneath the surface of the soft mud in which they generally live. In *Solemya* the shell is still lighter and thinner, in accordance with more developed swimming habits, combined with burrowing when at rest. Such forms as *Nucula* and *Tindaria*, which have no siphon tubes, must live at or near the surface of the mud, over which they creep with their large expanded pedal disk. These have, for their protection, comparatively solid shells similar to those of Palæozoic species, in form, texture, and sculpture.

The family Nuculidæ differs from Ledidæ mainly in having no siphon tubes, the mantle edges being completely disunited. The Ledidæ are remarkable for the great variations in the structure of the hinge-teeth, ligament, cartilage, and mantle, as well as in the form of the shell. The pallial sinus may be wanting or well-developed. Some genera have long united siphons (*Yoldia*); some have shorter ones, more or less separated (*Leda*); while in *Tindaria* there is no true siphon, but only an

efferent orifice differentiated. The ligament may be wholly external, as in *Malletia*, *Tindaria*, etc., or it may be rudimentary and replaced by an internal cartilage or "resilium," or both may coexist in varying degrees of development and degeneration. The hinge-teeth may be very numerous and regularly V-shaped in each series, or they may be comparatively few and irregular, sometimes becoming oblique and lamelliform (*Silicula*). The beaks generally turn backward (*Yoldia*, *Leda*, *Nucula*), but in *Malletia*, *Tindaria*, and some other genera they turn forward. On this account, when there is neither pallial sinus nor external ligament, it is often difficult, if not impossible, to tell which is the anterior end of the shell without the soft parts. Hence many fossil and some recent species have probably been reversed in the descriptions. Thus many of the Palæozoic species referred to *Nucula* are described as having the beaks turned forward, the longer end of the shell being considered posterior, but in modern *Nuculæ* the beaks turn backward and the shorter end is posterior. Many of the deep-sea species with small, thin shells show no distinct muscular nor pallial scars, which increases this difficulty. When a differentiated external ligament is present, we have assumed that it is posterior to the beaks (opisthodetic), though a narrow extension usually runs under and forward of the beaks in a groove. When the shell of a dimyarian bivalve gapes posteriorly, the existence of a siphon may generally be assumed; for otherwise the internal soft parts would be exposed to enemies. The existence of a posterior rostrum or a protrusion of the posterior margin defined by an inferior emargination indicates the existence of a siphon, or at least an anal tube, but these organs may exist without such modifications of the shell. If these rules be applied to Palæozoic forms we must conclude that the rostrate and subrostrate forms of *Palæoneilo*, etc., had some sort of a siphon, and therefore were not true Nuculidæ.

Numerous Palæozoic species referred to the genus *Palæoneilo* probably belong to or near the Tindarinæ. Some of the species[1] from the American Devonian rocks can hardly be distinguished from *Tindaria* by any important structural characters, unless it be the form of the teeth. It is probable that *Nuculites* and several related genera belong near this division, for they have an external ligament and no resilium. In these genera the plain, transverse teeth are very numerous and more simple than in the modern genera, seldom showing any trace of the acute, V-shaped form characteristic of most modern genera, though in some species the teeth are slightly angulated in the middle.

Mr. Dall has proposed the family Ctenodontidæ[2] to include numerous Palæozoic species belonging to *Ctenodonta*, and allied genera, some of which Zittel and others refer to Arcidæ on account of their thickened pectunculoid shells. They seem to be allied rather to Tindarinæ.

[1] For example see *P. constricta* Hall, *P. plana* Hall in Palæontology of New York, V, Pt. I, pp. 333, 334, pl. XLVIII, figs. 1–28, 1885.

[2] Trans. Wagner Free Inst., III, p. 515, 1895.

The Ledidæ, as here understood, were divided into five subfamilies by Fischer, namely:

(1) Cucullellinæ = Ctenodontidæ Dall + *Palæoneilo* and *Cardiolaria;* (2) Sareptinæ (for *Sarepta* only); (3) Ledinæ; (4) Malletinæ (including *Tindaria*); (5) Lyrodesmatinæ (for ancient fossil forms like *Lyrodesma*, but including the living genus *Phaseolus* or *Silicula*). An additional group was formed for some other doubtful fossil genera. The second of these groups is not well founded, for *Sarepta* agrees closely with *Yoldia*, except in the alleged absence of a pallial sinus, but its gaping shell indicates a siphon tube. The fourth should not include *Tindaria*, which lacks the pallial sinus and siphon tubes characteristic of the rest of the group and should be taken as the type of a new subfamily. The fifth should not include *Phaseolus*, which differs widely from the fossil forms and belongs in the Ledinæ. The other genera of this group are referred to Trigoniadæ by other authors, and that would seem to be a more correct arrangement.

Family NUCULIDÆ.

NUCULINA d'Orbigny, 1845.

Pleurodon S. WOOD, 1840.
Nuculina D'ORBIGNY, 1845.
Nucinella S. WOOD, 1848.
Nuculina VERRILL and BUSH, Amer. Journ. Sci., III, pp. 53, 59, January, 1897.

We have included *Nuculina* in the Nuculidæ with some doubt, because authors differ as to its structure. Some state that its ligament is wholly external and others to the contrary. Fischer places it in the Arcidæ, near *Limopsis*, but it has no ligamental area.

Mr. Dall kindly forwarded to us excellent unpublished figures of two American species of this genus. In these the thickened ligament is external to the hinge-plate, on the end of the shell which is destitute of a lateral tooth, and is the shorter (posterior?). The beaks turn toward this end. Mr. Dall states that the shells are not distinctly nacreous within.

The following are some of the known species:

N. miliaris Deshayes; *N. ovalis* S. Wood; *N. calabra* Seguenza, fossil; *N. munita* Carpenter, from the Catalin Islands; *N. sulcata* A. Adams, from Korean Straits; *N. adamsi* Dall, from Florida and the West Indies.

NUCULA Lamarck, 1799.

Nucula LAMARCK, Prodrome d'une Nouv. cl. des Coquilles, p. 87, No. 104, 1799.
Nuculana LINK, Beschr. Rost. Samml., p. 155, 1807 (not of Adams, 1858, nor of Harris, 1897).
Nucula DALL, Bull. Mus. Comp. Zoöl., XII, p. 245, 1886.

Type.—Nucula nucleus Lamarck.

Nuculana (Link) was an exact synonym or variant of *Nucula*, of earlier date, as the description plainly shows. There was, therefore,

no valid excuse for applying it to a different group (*Leda*), that had already received a valid name, as was done by H. and A. Adams.

That a species belonging to *Leda* was mentioned by Link does not alter the case, for all the species of *Leda* and *Yoldia* then known were referred to *Nucula* by Lamarck and all other conchologists.

NUCULA PROXIMA Say, variety OVATA, new.

(Plates LXXXI, fig. 6; LXXXVIII, fig. 5.)

We designate by this name a single specimen which differs so widely in form from the ordinary type of *Nucula proxima* that it could well be taken for a distinct species if it had occurred in large numbers or in a remote locality. It is broad-ovate or elliptical in form and much less angular and oblique than the typical *proxima*. It is decidedly compressed with the umbos much less prominent than usual. The surface is glossy, grayish white, marked with distinct lines of growth and microscopic radiating striæ. The anterior end is evenly rounded and more produced than in *proxima;* the ventral margin is broadly and evenly rounded; the posterior end is obtuse, slightly produced and scarcely angulated; the postero-dorsal margin is convex and slopes much less rapidly than in *proxima*, so that the posterior end is more evenly rounded and broader. Internally the margin is plain. The hinge-teeth are much as in *proxima*, but the two series are less curved and meet in a broad angle.

Length, 3.5 mm.; height, 3 mm.

One live specimen (No. 73467), station 863, in Vineyard Sound, off Cuttyhunk, in 18 fathoms, 1880.

NUCULA SUBOVATA, new species.

(Plates LXXXI, fig. 8; LXXXIII, fig. 5.)

Shell small, broad-ovate, with somewhat prominent umbos, and rather acute, somewhat prominent beaks behind the middle. Surface smooth and lustrous, covered with rather regular, concentric lines of growth, which are scarcely visible to the naked eye. Epidermis thin, pale yellowish green. The antero-dorsal margin is nearly straight at first; then, forming a convex curve, slopes gradually to the bluntly rounded anterior end which is somewhat produced but not angulated; the postero-dorsal margin is convex, sloping rapidly, and forms a slight rounded angulation in the middle of the posterior end, where it joins the broadly rounded, ventral margin. Hinge-margin rather broad and strong in proportion to the size of the shell, with a moderately large rounded, slightly oblique chondrophore projecting considerably within the margin. The portion of the hinge-plate behind the beaks is considerably shorter than that in front and bears about six, strong, V-shaped teeth of which the two distal ones and the two proximal ones are much smaller than the others; in front of the beaks it is broad and

strongly curved, and bears about nine broad, elevated, strong, transverse teeth of which five or six in the middle are much larger than the others; above these the outer hinge-margin is somewhat expanded and everted. There is a thin, continuous ligament both before and behind the beaks. Epidermis thin, pale greenish yellow. The inner ventral margin is thin and plain.

Length, 4.9 mm.; height, 3.9 mm.

Some of the smaller specimens have a narrower and less thickened hinge-plate with the teeth more delicate than in the type.

Four specimens, at four stations, between N. lat. 40°, W. long. 71° 14′ 30″, and N. lat. 37° 8′, W. long. 74° 33′, in 157 to 444 fathoms, 1881–1885.

This species has some resemblance to *N. tenuis*, but it is much less oblique and more elongated in form, and is less inequilateral, the posterior end not being subtruncated, while the anterior end is narrower, relatively shorter, and much less oblique. The hinge-margin is also different; the teeth are fewer and much stronger, and the hinge-margin much broader, while the chondrophore is smaller, more rounded, much less oblique, and projects freely from the inner hinge-margin instead of being united closely to it.

It also bears some resemblance in form to *Nucula pernambucensis* Smith,[1] but there are marked differences in the hinge and number of teeth.

NUCULA GRANULOSA Verrill.

(Plates LXXXI, fig. 2; LXXXVIII, fig. 8.)

Nucula granulosa VERRILL, Trans. Conn. Acad., VI, p. 280, 1884; Expl. *Albatross*, Report U. S. Com. Fish and Fisheries for 1883, p. 576, 1885.—DALL, Bull. U. S. Nat. Mus., No. 37, p. 42, 1889.

Taken at about sixteen stations, between N. lat. 41° 53′, W. long. 65° 35′, and N. lat. 38° 36′ 3″, W. long. 73° 6′, in 384 to 1,061 fathoms, 1880–1886.

NUCULA VERRILLII Dall.

(Plate XCV, fig. 10.)

Nucula trigona VERRILL, Trans. Conn. Acad., VI, p. 438, 1885 (not Bronn, 1849, not Seguenza, 1877).

Nucula verrillii DALL, Bull. Mus. Comp. Zoöl., XII, p. 248, 1886; Bull. U. S. Nat. Mus., No. 37, p. 42, 1889; Proc. U. S. Nat. Mus., XII, p. 257, pl. XIV, fig. 4, 1889.—BUSH, Bull. Mus. Comp. Zoöl., XXIII, pp. 240, 243, pl. I, fig. 6, 1893.

Comparatively few specimens, at six stations, between N. lat. 39° 43′ 45″, W. long. 70° 7′, and N. lat. 36° 47′, W. long. 73° 9′ 30″, in 1,140 to 1,825 fathoms, 1884–1886. South to Yucatan, in 430 to 1,685 fathoms.—Dall.

[1] Report Voy. *Challenger*, Zoöl. Lamellibranchiata, XIII, p. 227, pl. XVIII, figs. 10–10*a*, 1885.

NUCULA CANCELLATA Jeffreys.

(Plates LXXXI, fig. 3; LXXXVI, fig. 5.)

Nucula cancellata VERRILL, Trans. Conn. Acad., VI, pp. 231, 280, 1884; Expl. *Albatross*, Report U. S. Com. Fish and Fisheries for 1883, p. 576, 1885.—DALL, Bull. U. S. Nat. Mus., No. 37, p. 42, 1889; Proc. U. S. Nat. Mus., XII, p. 258, 1889.

A very abundant species, at forty-four stations, between N. lat. 42° 47′, W. long. 61° 4′, and N. lat. 37° 27′, W. long. 73° 33′, in 384 to 2,033 fathoms, 1883–1887. South to off Tobago, West Indies, in 880 fathoms.—Dall.

Family LEDIDÆ.[1]

Subfamily LEDINÆ.

LEDA Schumacher, 1817.

Leda VERRILL and BUSH, Amer. Journ. Sci., III, pp. 54, 62, January, 1897.
Nuculana HARRIS, Cat. British Museum, p. 348, 1897 (not Link, 1807).

Type.—*Leda rostrata* (Montagu, 1808).

This genus has been variously extended and restricted by authors, and several subgeneric and sectional groups have been proposed. In the more extended sense it is scarcely capable of a definition that will distinguish it from *Yoldia*, etc.

We proposed, therefore, to restrict it to the typical species, such as *L. cuspidata* Gould, *L. caudata* (Donovan), *L. pernula* (Müller), *L. tenuisulcata* (Couthouy), and many others closely related. These have a long, tapered, bicarinate rostrum, and well-developed siphon tubes, partially united. The palpal tentacles are long, flat, tapered, and arise external to the bases of the outer palpi, which are broad with slender, acute, posterior tips.

Mr. Harris quotes *rostrata* Linnæus as the type of his *Nuculana*, but no such species occurs until Gmelin's edition, 1790; *rostrata* Chemnitz, 1784, used by Schumacher as the type of *Leda*, is now considered the same as *fluviatilis* Sowerby and also Schrœter, 1779; *rostrata* Lamarck, 1819, is the same as *pernula* Müller, 1774 or 6?, so that in using *rostrata* Montagu, 1808, we avoid confusion of names without leading to any misunderstanding of the form of the shell, for all of the above species have the same rostrated form.

LEDA BUSHIANA Verrill.

(Plates LXXIX, fig. 8; LXXXII, fig. 9.)

Leda bushiana VERRILL, Trans. Conn. Acad., VI, pp. 229, 280, 1884; Expl. *Albatross*, Report U. S. Com. Fish and Fisheries for 1883, p. 576, 1885.—DALL, Bull. U. S. Nat. Mus., No. 37, p. 44, 1889.

A few specimens, off Cape Hatteras, North Carolina, in 516 fathoms, 1883. South to Florida Straits, in 120 to 516 fathoms.—Dall.

[1] *Nuculanidæ* Harris, Australian Ter. Moll., Cat. British Museum, p. 348, 1897.