yard and Buzzard's Bay, 20 to 25 fathoms, rare; Casco Bay, 15 to 95 fathoms, not common; Bay of Fundy, 10 to 100 fathoms, frequent. Saint George's Bank (S. I. Smith, A. S. Packard). Gardiner's Bay, 5 fathoms, one specimen, (S. Smith). Off New London, Connecticut (T. M. Prudden). Gulf of Saint Lawrence (Whiteaves). Murray Bay (Dawson). Nova Scotia (Willis). Labrador (Packard). Arctic Ocean, near Behring's Straits, 30 fathoms, (Stimpson, N. P. Expl. Exp., t. Gould).

Fossil in the Post-Pliocene of Canada (Dawson).

CRENELLA GLANDULA Adams. Plate XXXI, fig. 233. (p. 418.)

H. and A. Adams, Genera, vol. ii, p. 515, 1858; Gould, Invert., ed. ii, p. 194, fig. 492. *Modiola glandula* Totten, American Journal Science, ser. i, vol. xxvi, p. 367, figs. 3, e, f, g, 1834; Gould, Invert., ed. i, p. 131, fig. 87 (*pars*). *Mytilus decussatus* Stimpson, Shells of New England, p. 11, 1851, (*non* Montagu, sp.); Dekay, op. cit., p. 186, Plate 22, fig. 248.

Connecticut to Gulf of Saint Lawrence. Buzzard's Bay and Vineyard Sound, 5 to 15 fathoms, not uncommon; off Gay Head, 19 fathoms, soft mud; off Block Island, 29 fathoms, sandy mud; common in Massachusetts Bay, Casco Bay, and Bay of Fundy, 3 to 60 fathoms. Halifax (Willis). Gulf of Saint Lawrence, at Gaspé (Whiteaves). Gardiner's Bay, Long Island (S. Smith). Stonington (Linsley). Off New London, Connecticut (T. M. Prudden). Sandy Hook, New Jersey (Ferguson). Fossil in the Post-Pliocene at Montreal, Canada (Dawson). A related species, *C. æquilaterata* Conrad (H. C. Lea, sp.) occurs in the Miocene of Virginia.

This species was undoubtedly confounded with *C. decussata* (Montagu, sp.) by both Gould and Stimpson. The genuine *decussata* is quite common in Casco Bay, Bay of Fundy, and Gulf of Saint Lawrence, and is usually associated in those waters with *C. glandula*. It is a northern, and common European species, and is also recorded from the North Pacific coast of America by Dr. P. P. Carpenter. It also occurs in Greenland (Mörch).

MONOMYARIA.

PECTEN IRRADIANS Lamarck. Plate XXXII, fig. 238. (p. 374.)

Anim. sans Vert., ed. i, 1819; ed. ii, vol. vii, p. 143; Gould, Invert., ed. ii, p. 199, fig. 496. *Pecten concentricus* Say, Journ. Acad. Nat. Sci., Philad., vol. ii, p. 259, 1822; Gould, Invert., ed. i, p. 134, fig. 88; Dekay, op. cit., p. 172, Plate 9, fig. 205.

Florida and the northern shores of the Gulf of Mexico to Cape Cod; rare and local farther north in Massachusetts Bay; and Nova Scotia (Willis). Very common in Vineyard Sound, Buzzard's Bay, shores of Long Island and Connecticut, New Jersey, and southward. Tampa Bay, Florida (Conrad, E. Jewett). Texas (Rœmer).

Fossil in the Post-Pliocene of North Carolina and Tampa Bay, Florida; in the Pliocene of South Carolina; and in the Miocene of

Maryland. Dug up from beneath the mud in the harbor of Portland, Maine, in a semi-fossil state by the mud-dredging machines (Fuller).

PECTEN ISLANDICUS Chemnitz.

Conch., vii, p. 304, Plate 65, figs. 615, 616, 1784, (t. Gould); Lamarck, op. cit., ed. ii, vol. vii, p. 145; Gould, Invert., ed. i, p. 133, fig. 87; ed. ii, p. 198, fig. 495. *Ostrea Islandica* Müller, Zoöl. Dan. Prod., No. 2990, 1776; Fabricius, Fauna, Grönl., p. 415, 1780. *Pecten Pealii* Conrad, Amer. Mar. Conch., p. 12, Plate 2, fig. 2, 1831.

Arctic Ocean south to Cape Cod, local and rare farther south; on the northern European coasts, south to Bergen, Norway, and Great Britain. Not uncommon and of good size in Casco Bay, 20 to 70 fathoms; common in the Bay of Fundy, low-water to 100 fathoms. Saint George's Bank, 40 to 65 fathoms, (S. I. Smith). More common farther north. Stonington, Connecticut, in an eel-pot, (Linsley). I am not aware that any one except Linsley has recorded it from the southern coast of New England.

Fossil in the Post-Pliocene of Maine (abundant), New Brunswick, Canada, Labrador, Greenland, Scandinavia, Denmark, Scotland, etc. Naples (Jeffreys). Mr. Sanderson Smith reports fragments from Gardiner's Island.

PECTEN TENUICOSTATUS Mighels. (p. 509.)

Mighels and Adams, Proceedings Boston Soc. Nat. Hist., vol. i, p. 49, 1841; Boston Journal of Natural History, vol. iv, p. 41, Plate 4, fig. 7, 1842 (young); Gould, Invert., ed. ii, p. 196, fig. 494. *Pecten Magellanicus* Lamarck, Anim. sans Vert., ed. ii, vol. vii, p. 134 (? *non* Gmelin, sp.); Hanley, Recent Shells, p. 274; Gould, Invert., ed. i, p. 132. *Pecten fuscus* Linsley, Amer. Jour. Sci., ser. i, vol. xlviii, p. 278, 1845; Gould, ser. ii, vol. vi, p. 235, fig. 6, 1848 (young). *Pecten brunneus* Stimpson, Shells of New England, in errata, 1851.

New Jersey to Labrador. Rare and local south of Cape Cod. Not uncommon in Massachusetts Bay and Casco Bay, 4 to 80 fathoms; abundant in Frenchman's Bay, Mount Desert, Maine, in 3 to 10 fathoms; common in Passamaquoddy Bay and Bay of Fundy, 1 to 109 fathoms. Saint George's Bank, 45 fathoms, (S. I. Smith). Nova Scotia (Willis). Labrador, 2 to 15 fathoms, (Packard). Off Block Island (Gould). Stonington, Connecticut, in cod stomachs, (Linsley, as *P. fuscus*). Coney Island and Sandy Hook, New York (S. Smith).

Fossil in the Post-Pliocene near Saint John, New Brunswick, and Gardiner's Island, New York. A closely related species occurs in the Miocene of Virginia.

ANOMIA GLABRA Verrill. Plate XXXII, figs. 241, 242, 242[a]. (p. 311.)

American Jour. Science, vol. iii, p. 213, 1872. *Anomia ephippium* (*pars*) Linné, Syst. Nat., ed. xii, p. 1150; Gould, Invert., ed. i, p. 138; ed. ii, p. 204, fig. 497. *Anomia electrica* Gould, Invert., ed. i, p. 140; ed. ii, p. 205, fig. 499, adult, (*non* Linné.) *Anomia squamula* Gould, Invert., ed. i, p. 140; ed. ii, p. 206, young, (*non* Linné.)

Florida to Cape Cod; rare and local farther north, in Massachusetts Bay, Casco Bay, and on the southern coast of Nova Scotia, off Cape

Sable, 8 fathoms. Not observed on the eastern part of the coast of Maine, nor in the Bay of Fundy. Very common in Long Island Sound, Buzzard's Bay, Vineyard Sound; along both shores of Long Island; New Jersey, and southward; low-water to 12 fathoms. Southern part of Saint George's Bank, 20 fathoms, (S. I. Smith).

Fossil in the Post-Pliocene of North and South Carolina; and in the Pliocene of South Carolina.

Linné gave "Pennsylvania" as one of the localities for his *A. ephippium*, and, therefore, probably confounded our shell with the European species, as most subsequent writers have done. Gould has well described our species in its different states, under the names quoted above, figures 499 of the second edition (our figures 241, 242), represent the ordinary adult form, which is everywhere abundant on the southern shores of New England. The specimens from Eastport, Maine, referred to *A. ephippium* by Gould, were undoubtedly the smooth or squamose variety of the following species.

ANOMIA ACULEATA Gmelin. Plate XXXII, figs. 239, 240, 240[a]. (p. 495.)

Syst. Nat., p. 3346, 1790; Gould, Invert., ed. i, p. 139, fig. 90; ed. ii, p. 204, fig. 498.

Long Island to Labrador, and northern coasts of Europe. Off Stonington, Connecticut, 4 to 5 fathoms rocky; off Gay Head, 10 fathoms, scarce; very common in Casco Bay, Bay of Fundy, and northward, low-water to 80 fathoms. Greenport and Montauk, Long Island (S. Smith).

Varieties of this species occur frequently in the Bay of Fundy and Casco Bay, in which the aculeate scales are more or less abortive, or even entirely absent, leaving the surface either nearly smooth or irregularly squamose, but such varieties are easily distinguished from the young of the preceding species.

This may possibly be a variety of the true *ephippium* of Europe, as supposed by many writers, but I believe it to be perfectly distinct from *A. glabra*.

OSTREA VIRGINIANA Lister. (pp. 310, 472.)

Favanne, Conch., Plate 41, fig C 2, 1780 (t. Gould); Gould, Invert., ed. i, p. 136; ed. ii, p. 202; Verrill, Amer. Jour. Science, vol. iii, p. 213, 1872. *Ostrea Virginica* Gmelin, Syst. Nat., p. 3336, 1790; Lamarck, Anim. sans Vert., ed. ii, vol. vii, p. 225. *Ostrea borealis* Lamarck, op. cit., p. 220; Gould, Invert., ed. i, p. 137; ed. ii, p. 203; Dekay, op. cit., p. 169, Plate 10, figs. 203, 204. *Ostrea Canadensis* Bruguière, Encycl. Meth., Plate 180, figs. 1–3; Lamarck, op. cit., p. 226; Hanley, Recent Shells, p. 299.

Florida and the northen shores of the Gulf of Mexico to Massachusetts Bay; local farther north, off Damariscotta, Maine, and in the southern part of the Gulf of Saint Lawrence, at Prince Edward Island, in Northumberland Straits, and Bay of Chaleur. Not found along the eastern shores of Maine, nor in the Bay of Fundy. Abundant

in the ancient Indian shell-heaps on the coast of Massachusetts, on the islands in Casco Bay, and at Damariscotta. The shells, in a semi-fossil state, have been dug up from deep beneath the mud in the harbor of Portland, Maine, in large quantities, but native oysters appear to be entirely extinct in Casco Bay. Very abundant in Long Island Sound; in the upper part of Buzzard's Bay; rare and local in Vineyard Sound; very abundant on the shores of Maryland and Virginia. Mouth of Saint John's River, and in Tampa Bay, Florida (Conrad). Texas (Rœmer).

Fossil in the Post-Pliocene at Point Shirley, Massachusetts, Nantucket Island (abundant), Gardiner's Island; in the Pliocene of South Carolina; and in the Miocene of Virginia and South Carolina.

The occurrence of large quantities of oyster-shells beneath the harbor mud at Portland, associated with *Venus mercenaria*, *Pecten irradians*, *Turbonilla interrupta*, and other southern species, now extinct in that locality, and the occurrence of the first two species in the ancient Indian shell-heaps, on some of the islands in Casco Bay, though not now found living among the islands, indicates that the temperature of those waters was higher at a former period than at present. These facts also point to the most satisfactory explanation of the existence of numerous southern shells, associated with the oyster and *Venus mercenaria* in the southern part of the Gulf of Saint Lawrence, though not now found in the intermediate waters, along the coast of Maine, nor in the Bay of Fundy.

All the various forms of this species, upon which the several nominal species, united above, have been based by Lamarck and others, often occur together in the same beds in Long Island Sound, and may easily be connected together by all sorts of intermediate forms. Even the same specimen will often have the form of *borealis* in one stage of its growth, and then will suddenly change to the *Virginiana* style, and, perhaps, later still, will return to the form of *borealis*. Or these different forms may be assumed in reverse order. Great variations in the number and size of the costæ and undulations of the lower valve occur, both in different specimens from the same locality, and even in the same specimen, at different stages of growth. All these variations occur in precisely the same way in the shells taken from the ancient Indian shell-heaps along our entire coast, from Florida to Maine.

TUNICATA.

SACCOBRANCHIA.

CIONA TENELLA Verrill. (p. 419.)

American Journal Science, ser. iii, vol. i, p. 99, figs. 12, 13, 1871. *Ascidia tenella* Stimpson, Proc. Bost. Soc. Nat. Hist., iv, p. 228, 1853; Inv. of Grand Manan, p. 20, 1853; Binney, in Gould, Invert., ed. ii, p. 24, 1870. ?*Ascidia ocellata* Ag., Proc. Amer. Assoc. for Adv. Sci., ii, p. 159, 1850 (description insufficient); Binney, in Gould, Invert., ed. ii, p. 24, Plate 24, fig. 332, 1870.

Cape Cod to Gulf of Saint Lawrence; rare and local south of Cape

Cod. Common in Casco Bay and Bay of Fundy, low-water to 100 fathoms. New Bedford, Massachusetts (L. Agassiz).

MOLGULA MANHATTENSIS Verrill. Plate XXXIII, fig. 250. (pp. 311, 445.)

Amer. Jour. Science, vol. i, p. 54, Jan., 1871; Tellkampf, Annals Lyc. Nat. Hist., New York, vol. x, p. 83, 1872. *Ascidia Manhattensis* Dekay, Report on the Natural History of New York, Mollusca, p. 259, 1843; Binney, in Gould's Invertebrata of Massachusetts, ed. ii, p. 25, 1870 (copied from Dekay). *Ascidia amphora* Ag., MSS.; Binney, op. cit., p. 25, Plate 24, fig. 333.

North Carolina to Casco Bay, Maine. Very common in Great Egg Harbor, New Jersey, Long Island Sound, Buzzard's Bay, Vineyard Sound, and Massachusetts Bay. Less common in Casco Bay. Great South Bay, Long Island, abundant, (S. I. Smith).

MOLGULA PELLUCIDA Verrill. (p. 426.)

Amer. Jour. Science, vol. iii, p. 289, Plate 8, fig. 2, 1872.

Body subglobular with a smooth, thin, pellucid test. Tubes terminal, contiguous, much swollen at base, long, divergent, tapering, reticulated within by longitudinal and circular white lines (muscular fibers). Branchial aperture with six papillæ. Intestine conspicuously visible through the test; stomach covered by deep orange-colored hepatic glands. Ovaries large, whitish. Color of test, pale hyaline bluish; tubes toward the ends, dull neutral tint.

Diameter of the largest specimens about 25^{mm}.

North Carolina to Massachusetts Bay. Massachusetts Bay (L. Agassiz). Long Island (Coll. Peabody Academy of Science). Bird Shoal near Beaufort, North Carolina (Dr. H. C. Yarrow).

Mr. Binney has published (Plate 22, figs. 315, 316) characteristic colored figures of this species under the name of *M. producta* (Stimpson), which is a very different, sand-covered species.

MOLGULA PRODUCTA Stimpson. (p. 502.)

Proc. Boston Society Natural History, vol. iv, p. 229, 1852; Verrill, op. cit., p. 289, Plate 8, fig. 6, 1872; Binney, in Gould, p. 21 (not the figures, which are *M. pellucida*).

Off Buzzard's Bay, 25 fathoms, sandy. Massachusetts Bay, low-water to 6 fathoms, (Stimpson).

MOLGULA ARENATA Stimpson. Plate XXXIII, fig. 251. (p. 419.)

Proc. Boston Soc. Nat. Hist., vol. iv, p. 230, 1852; Binney, in Gould, Invert., ed. ii, p. 21; Verrill, Amer. Jour. Sci., vol. iii, Plate 8, fig. 5, 1872.

Long Island Sound, near New Haven, 3 fathoms, sand; Vineyard Sound and Buzzard's Bay, 5 to 15 fathoms, sand and gravel. Nantucket (Stimpson).

MOLGULA PAPILLOSA Verrill. (p. 495.)

Amer. Jour. Science, vol. i, p. 57, fig. 4, b, 1871; op. cit., vol. iii, p. 211, Plate 8, fig. 4, 1872.

Body free, nearly globular, or transversely suboval, usually slightly

compressed laterally. Integument rather thin, translucent, the surface, both of the tubes and body, entirely covered by particles of sand, broken shells, foraminifera, etc., which adhere firmly. When cleaned the whole surface is thickly covered with prominent granule-like papillæ and numerous slender fibrous processes; the granules are most conspicuous on the tubes, where they usually have a rusty color. The tubes are long, subequal, and their bases are separated by a space usually greater than their diameters; they are quite divergent, both of them curving outward, the anal tube most abruptly. The branchial tube is cylindrical, somewhat longer than the anal, equal to or exceeding the diameter of the body, the orifice surrounded by six rather long and slender, conical, divergent papillæ. The anal tube often bends suddenly outward, tapers slightly, and has a small square aperture, surrounded by a circle of dull reddish brown. In contraction the tubes are not retracted, but are usually shortened to about one-half their length. In life the body, when cleaned, is pale grayish, with an almost transparent integument, through which the convolutions of the dark intestine are conspicuous.

The largest specimens are about 10^{mm} in diameter.

Off Martha's Vineyard, 10 fathoms, stony; Casco Bay and Bay of Fundy, 10 to 20 fathoms.

EUGYRA PILULARIS Verrill. Plate XXXIII, fig. 249. (p. 509.)

Amer. Jour. Science, vol. iii, p. 211, Plate 8, fig. 3, 1872. *Molgula pilularis* Verrill, op. cit., vol. i, p. 56, fig. 4, c, 1871.

Body unattached, globular, covered with a thin layer of mud, and, when the tubes are retracted, looking like a small soft ball. Integument of the body, when cleaned, very thin, soft, nearly transparent, thickly covered with minute granules, and minutely fibrous, usually concealed by the adhering particles of mud and fine sand, but this can be easily removed. The tubes are naked, smooth, nearly transparent, subconical, slender, as long as the diameter of the body, originating close together, and but slightly divergent, both of them nearly straight; they can be wholly retracted, and their bases are surrounded and connected by a narrow, naked, oval or oblong band, which is usually conspicuous when the tubes are withdrawn; in partial contraction, the tubes are conical, subpellucid, reticulated with white lines. The branchial tube is a little shorter than the anal, the aperture surrounded by six acute, conical papillæ, and twelve small, dark, brownish spots. Anal tube a little smaller, slightly longer, a little tapering, with a small square aperture, surrounded by four small lobes and four small, reddish brown eye-spots.

In life the body, when cleaned, is transparent grayish, the dark intestine showing through very distinctly; tubes greenish at base.

Diameter usually about 5^{mm}, seldom more than 6^{mm} or 8^{mm}.

Off Gay Head, Martha's Vineyard, 19 fathoms, soft mud; Casco Bay,

10 to 20 fathoms; Bay of Fundy, off Grand Menan, Eastport Harbor, and South Bay, 6 to 20 fathoms, soft mud. Gulf of Saint Lawrence (Whiteaves).

GLANDULA ARENICOLA Verrill. (p. 502.)

Amer. Jour. Science, ser. iii, vol. iii, pp. 211, 288, 1872.

Body subglobular, rather higher than broad, the whole surface covered with grains of sand, forming a continuous layer. When the sand is removed the surface of the test is reticulately wrinkled and pitted, not furnished with fibers, except at base, where there are a few long, slender, thread-like white ones. Tubes terminal, near together, in the alcoholic specimens short, forming low verrucæ, swollen at base, the ends a little prominent and naked. Apertures square, with four small lobes. The test is tough and opaque. Height, about 12^{mm}; breadth, 10^{mm}; often larger.

Murray Bay, Gulf of Saint Lawrence (Dr. J. W. Dawson). Saint George's Bank, 28 fathoms, sand, abundant, (S. I. Smith). Off Cuttyhunk Island and Buzzard's Bay (T. H. Prudden).

GLANDULA. Species undetermined. (p. 502.)

Vineyard Sound and off Martha's Vineyard, 10 to 20 fathoms, sand.

CYNTHIA PARTITA Stimpson. Plate XXXIII, fig. 246. (p. 311.)

Proc. Bost. Soc. Nat. History, vol. iv, p. 231, 1852; Binney, op. cit., p. 18; Verrill, Amer. Jour. Science, vol. iii, p. 213, 1872. (?) *Cynthia rugosa* Agassiz, Proc. Amer. Assoc., vol. ii, p. 159, 1850 (description inadequate); Binney, op. cit., p. 20 (copied from the preceding). *Cynthia stellifera* Verrill (var.), Amer. Jour. Science, vol. i, p. 93, figs. 5, 6, a, b, 1871.

North Carolina to Massachusetts Bay. Common in Long Island Sound, Vineyard Sound, and Buzzard's Bay, low-water to 15 fathoms. Boston Harbor, 4 fathoms (Stimpson). Off New London, Connecticut (T. M. Prudden).

CYNTHIA CARNEA Verrill. Plate XXXIII, figs. 247, 248. (p. 495.)

American Jour. Science, ser. iii, vol. i, p. 94, figs. 7, 8, 9, 1871. *Ascidia carnea* Agassiz, Proc. American Assoc. for Adv. Sci., ii, p. 159, 1850 (description insufficient); Binney, in Gould's Invertebrata of Mass., ed. ii, p. 25, Plate 24, figs. 334, 335, 1870 (young). (?) *Cynthia gutta* Stimpson, Proc. Boston Soc. Nat. Hist., vol. iv, p. 231, 1852 (young); Binney, op. cit., p. 19, 1870. *Cynthia placenta* (*pars*) Packard, Mem. Boston Soc. Nat. Hist., vol. i, p. 277, 1867; Binney, op. cit., p. 19, Plate 23, figs. 322, 1870; Verrill, Amer. Jour. Sci., vol. xlix, p. 424, 1870.

Martha's Vineyard to Labrador. Off Gay Head, 10 fathoms, stony; common in Eastport Harbor and Bay of Fundy, low-water to 109 fathoms; Casco Bay, less common, 10 to 40 fathoms. Massachusetts Bay (Stimpson). Labrador (Packard).

This species is closely allied to *C. rustica* (Linné, sp.) from Iceland, and may eventually prove to be identical.

CYNTHIA ECHINATA Stimpson. (p. 495.)

Invert. of Grand Menan, p. 20, 1854; Binney, op. cit., p. 18, Plate 23, fig. 326; Verrill, Amer. Jour. Science, vol. i, p. 96, 1871; vol. iii, p. 213, 1872. *Cynthia hirsuta* (young) Agassiz, op. cit., 1850; Binney, in Gould, Invert., ed. ii, p. 20, Plate 24, fig. 336. *Ascidia echinata* Linné, Syst. Nat., ed. xii, p. 1087, 1767. *Ascidia echinata* Fabr., Fauna Grœnl., p. 331, 1780; Rathke, Zoölogica Danica, vol. iv, p. 10, Plate 130, fig. i, 1806; Möller, Index Mollusc. Grœnl., in Kroyer's Nat. Tidsskrift, vol. iv, p. 95.

Martha's Vineyard to Greenland, Iceland, and northern coasts of Europe. Off Martha's Vineyard, 10 fathoms, stony, rare; common in Casco Bay and Bay of Fundy, low-water to 109 fathoms, attached to stones, shells, and other ascidians. Saint George's Bank (S. I. Smith). Banks of Newfoundland (T. M. Coffin). Labrador (Packard).

BOLTENIA. Species undetermined.

Boltenia reniformis Dekay, Nat. Hist. New York, Mollusca, p. 260, Plate 34, fig. 324 (*non* Macleay).

New York Harbor (t. Dekay.)

The description and figure of the single poor specimen seen by Dekay are insufficient for its determination. I have not met with the genus south of Cape Cod, and the locality given may possibly be incorrect.

PEROPHORA VIRIDIS Verrill. (p. 388.)

American Jour. Science, ser. iii, vol. ii, p. 359, 1871.

Colonies composed of numerous nearly sessile individuals, which are small, about 2.5^{mm} to 3^{mm} high, connected by slender stolons, and thickly covering the surfaces over which they creep. Test compressed, seen from the side, scarcely higher than broad, oval, elliptical, or subcircular, often one-sided or distorted, with a short pedicle, or subsessile at base. Branchial orifice large, terminal; anal lateral or subterminal, both a little prominent, with about 16 angular lobes, alternately larger and smaller. Test transparent; mantle beautifully reticulated with bright yellowish green; intestine yellow.

Vineyard Sound, 2 to 12 fathoms, on algæ and ascidians, common; Little Harbor, Wood's Hole, on piles of wharves, at and below low-water mark, very abundant.

BOTRYLLUS GOULDII Verrill. Plate XXXIII, figs. 252, 253. (p. 375.)

Amer. Jour. Science, ser. iii, vol. i, figs. 14, 19, 1871. *Botryllus stellatus* Gould, Rep. on Inv. of Mass., 1st ed., p. 320, 1841 (*non* Pallas). *Botryllus Schlosseri* Binney, in Gould, Inv. Mass., ed. ii, p. 3, Plate 23, fig. 319, 1870 (*non* Pallas); Dall, Proc. Bost. Soc. Nat. Hist., xiii, p. 255, 1870.

This species commonly forms thick, fleshy, translucent incrustations on sea-weeds and zoöphytes, the form which it assumes depending upon the shape of the object. The masses are often several inches in length and half an inch or more in width. The animals are short oval, as seen at the surface, and form circular or elliptical groups, of from five to sixteen or more, surrounding circular or elliptical cloacal orifices. The "marginal tubes" or buds are numerous in all parts of the common

tissue, the enlarged ends appearing as oval or pyriform spots, lighter than the ground-color. The branchial openings are small and circular, surrounded by a light halo. The animals differ considerably in form, according to the state of contraction.

The color is extremely variable; several of the color-varieties have been named and described on pages 375, 376.

Brooklyn, New York, to Boston, Massachusetts. Very abundant at Wood's Hole, Waquoit Pond, and other similar localities along the shores of Vineyard Sound and Buzzard's Bay; abundant at the mouth of Charles River, near Boston. Watch Hill, Rhode Island, and Brooklyn, New York (D. C. Eaton).

AMARŒCIUM PELLUCIDUM Verrill. (p. 401.)

Amouroucium pellucidum Verrill, Amer. Jour. Science, ser. iii, vol. i, p. 290, 1871; vol. iii, p. 211. *Alcyonidium ? pellucidum* Leidy, Jour. Acad. Nat. Science, Philad., ser. ii, vol. iii, 1855, p. 142, Plate 10, fig. 25, (mutilated zooid).

Colonies large, complex, consisting of a large number of small, elongated, clavate colonies, arising from a common base, and more or less separate laterally and at summit, thus forming large aggregated hemispherical or irregular masses, often six inches in diameter, the surface generally covered thickly with adhering sand, but frequently naked over the summits of the colonies, or even over large surfaces of the masses, when, as often happens, the central colonies coalesce; when naked, the tissue is smooth, translucent, gelatinous-looking, and soft. The small side-colonies are long, with a slender stolon-like base, curving outward and ascending, enlarging gradually to the summit, which is more or less convex, usually with a single central cloacal orifice, surrounded by an irregular circle of individual zoöids, varying in number according to the size or age of the colony to which they belong. The zoöids, when mature, are long and slender, varying greatly in length in each colony, according to the state of development of the post-abdomen; the largest are often 20^{mm} to 25^{mm} in length. The stomach is bright orange-red, and quite conspicuous; the slender post-abdomen exceeds in length the rest of the body, but is not more than half the diameter of the thorax, and is slightly constricted at base. In young individuals, not half grown, the post-abdomen forms nearly half the whole length, and is very slender. The branchial aperture has six, short, round papillæ; the anal is situated a short distance from the end of the body, and has short inconspicuous lower lobes, with an elongated, pointed lobe above. The branchial sac is oblong, with numerous longitudinal and transverse vessels and a broad ventral duct. The stomach is about as broad as long, subglobular, with the ends truncated and the surface covered with numerous, interrupted, longitudinal, glandular ridges. The post-abdomen is nearly filled by the large, elongated ovary, which extends nearly to the posterior end on the dorsal or atrial side, and contains numerous closely-packed ovules of comparatively large size, and

the conspicuous male organs, extending through the whole length on the ventral or branchial side, in the form of a slightly-convoluted duct. The posterior end terminates in a small, obtuse papilla. The atrium, or cloacal cavity, often contain eggs in which the embryos are well developed, and, in some cases, the free, tadpole-shaped larvæ. The tunic is specked with numerous, minute, purplish brown pigment-cells.

One of the zoöids measured 7.5^{mm} in length; thorax, 2^{mm}; abdomen, 1.5^{mm}; post-abdomen, 4^{mm}; diameter of thorax, $.8^{mm}$ to $.9^{mm}$; of abdomen, about the same; of post-abdomen, $.375^{mm}$ to $.5^{mm}$.

North Carolina to Vineyard Sound. Very abundant in Vineyard Sound, in 6 to 12 fathoms.

AMARŒCIUM STELLATUM Verrill. (p. 402.)

Amouroucium stellatum Verrill, Amer. Journal of Science, ser. iii, vol. i, p. 291, 1871.

Masses large, variable in form, often in the form of thick vertical plates, or erect crest-like lobes, frequently irregular; surface nearly smooth, naked; tissue firm and cartilage-like externally, somewhat translucent, generally pale yellow or flesh-color by transmitted light. The fronds are often six inches or more in breadth and height, and from half an inch to an inch thick. The zoöids are grouped in more or less regular, and generally simple, circular, stellate clusters, scattered over the whole surface, and usually containing from six to twenty individuals, arranged around a central, sub-circular cloacal orifice; in contraction the position of each individual is indicated by an oval spot, more transparent than the common tissue, with a small flake-white spot around the branchial orifice. The individual zoöids are elongated and slender; the post-abdomen more slender, usually considerably exceeding in length the rest of the body, and but slightly constricted proximally; the thorax and abdomen are shorter and stouter than in the preceding species; branchial sac with about twelve transverse vessels; stomach oblong-oval, with numerous longitudinal glandular folds, which are bright orange-red in life; intestine large, light orange or yellow. Branchial tube elongated, bright orange; the orifice with six prominent rounded lobes. Anal orifice subterminal, with a prominent ligulate process above, and several small lobes below.

North Carolina to Cape Cod. Very abundant in Vineyard Sound, in 5 to 15 fathoms, on gravelly and shelly bottoms. Fort Macon, North Carolina (Dr. Yarrow).

AMARŒCIUM CONSTELLATUM Verrill. (pp. 388, 403.)

American Journal of Science, ser. iii, vol. ii, p. 359, 1871 (*Amouroucium*).

Masses thick, turbinate, often incrusting, surface usually convex, smooth; substance firm, gelatinous, translucent, but softer than in *A. stellatum*. Groups stellate, circular, oval or elliptical, often narrow and elongated, or irregular and complex; zoöids much elongated, slender; the branchial tube short, with six rounded lobes. Branchial sac elong-

ated. Color of the masses usually light orange-red, varying to yellowish and pale flesh-color; the branchial orifices with six radiating white lines. Anal orifices often surrounded by a pale or whitish border; zoöids generally orange-yellow; the orifices and tubes with upper part of the mantle bright orange, or lemon-yellow; branchial sac usually flesh-color or pale yellow, sometimes bright orange; stomach with bright orange-red longitudinal glandular ribs; intestine light orange; mantle with minute opaque white specks. In some specimens the cloacal chamber or "atrium" contained three or four bright purple tadpole-shaped larvæ.

Vineyard Sound, 4 to 12 fathoms, frequent; Wood's Hole, on piles of wharf; off Stonington, Connecticut, 4–5 fathoms.

AMARŒCIUM PALLIDUM Verrill. (p. 496.)

American Journal of Science, ser. iii, vol. i, p. 289, 1871 (*Amouroucium*).

Masses sessile, hemispherical or sub-globular, usually attached by a large base. Surface generally evenly rounded, sometimes irregular in large specimens, smoothish, but thinly covered with minute, firmly adherent particles of fine sand, which are imbedded in the surface of the common tissue and scattered throughout its substance. The cloacal openings are few in number and irregularly placed, except in small specimens, which usually have but one large central opening. The animals are much smaller and more numerous than in the preceding species, often forming somewhat circular groups of six or eight individuals around the cloacal openings; outside of the circular groups they are usually irregularly scattered, but sometimes form linear series of eight or ten, and in young specimens with but one central opening they often form a larger outer circle, which is near the margin, more or less irregular, and composed of numerous individuals. The post-abdomen, in all the numerous examples examined, was small, thick, obtuse, and decidedly shorter than the abdomen and thorax taken together; it often terminates in two slender papillæ. Color of the masses pale yellowish or grayish; stomach dull orange-yellow; ovaries yellowish white.

The larger specimens of this species are 15^{mm} to 25^{mm} in diameter; the largest zoöids are 3^{mm} to 4^{mm} long, by $.75^{mm}$ to 1.25^{mm} in diameter; but many are much smaller.

Martha's Vineyard to Gulf of Saint Lawrence. Off Buzzard's Bay, 25 fathoms, gravel; south of Gay Head, 10 fathoms, stony; Casco Bay, 8 to 40 fathoms; Eastport Harbor and Bay of Fundy, low-water to 80 fathoms.

LEPTOCLINUM ALBIDUM Verrill. (p. 403.)

American Journal of Science, ser. iii, vol. i, p. 446, 1872.

Colonies incrusting stones, dead shells, ascidians, etc., forming broad, thin, irregular, coriaceous crusts, with an uneven surface, filled with minute, white, spherical, calcareous grains or corpuscles, which, under

the miscroscope, have the surface covered with projecting points. Surface of the crusts covered with small, irregular, scattered prominences, in which the branchial orifices are situated. Cloacal orifices few and distantly scattered. Systems irregular, the zoöids scattered, but often arranged in rather indistinct concentric groups around the cloacal openings, and connected with them by cloacal ducts, which are variously branched, often showing through the integument as dark dendritic lines, converging toward the cloacal orifices from different directions.

Color white, the zoöids light yellowish.

The colonies often become 200^{mm} to 300$_{mm}$ across; thickness seldom more than 2.5^{mm}, commonly about 1.25 ^{mm}; zoöids .5^{mm} to .75^{mm} long; diameter .25^{mm} to .30^{mm}.

Long Island Sound to Labrador. Thimble Islands, near New Haven, 4 to 6 fathoms, rocky; off Stonington, 4 fathoms, rocky; common in Vineyard Sound, 8 to 15 fathoms; abundant in Casco Bay, 6 to 40 fathoms; abundant in the Bay of Fundy, low-water to 80 fathoms. Banks of Newfoundland (T. M. Coffin). Mingan Islands, 10 fathoms (A. E. V.). Saint George's Bank (S. I. Smith).

LEPTÒCLINUM LUTEOLUM Verrill. (p. 403.)

American Jour. Science, loc. cit., p. 446, 1872.

This species forms thin, coriaceous crusts, like the preceding, filled in the same way with similar spherical corpuscles. The branchial orifices opén at the summits of low verrucæ. The cloacal orifices are small, with four to six lobes, and distantly scattered. Color deep salmon, or somewhat rosy.

The crusts are of all sizes up to 300^{mm} or more in diameter, and are usually somewhat thicker than in the preceding species, with larger and darker colored zoöids.

Connecticut to Bay of Fundy; off Stonington, Connecticut, 4 fathoms, rocky; Vineyard Sound, 6 to 14 fathoms, common; Casco Bay, 10 to 40 fathoms, common; Bay of Fundy, low-water to 80 fathoms, common.

TÆNIOBRANCHIA.

SALPA CABOTI Desor. Plate XXXIII, figs. 254, 255. (p. 445.)

Proc. Boston Soc. Nat. History, vol. iii, p. 75, 1848 (not described); A. Agassiz, op. cit., vol. xi, p. 17, figs. 1 to 5, 1866; Binney, in Gould, Invert., ed. ii, p. 6, figs. 350 to 354, 1870 (description and figures copied from A. Agassiz).

In the typical variety, as described by Mr. Agassiz, the color is pale pink or rosy; the nucleus deep chestnut. Long Island Sound to Saint George's Bank. Common in Buzzard's Bay and Vineyard Sound. Off Saint George's Bank (S. I. Smith).

Var. *cyanea*. (p. 446.)

Nucleus and the borders of the mantle are bright Prussian-blue; surface of the latter delicately reticulated with fine blue lines.

Vineyard Sound, especially off Gay Head, in September.

DOLIOLUM (species undetermined). (p. 446.)

Vineyard Sound (A. Agassiz).

LARVALIA.

APPENDICULARIA (species undetermined, [a]). (p. 446.)

Allied to *A. longicauda* (t. A. Agassiz), op. cit., p. 23, 1866; Binney, op. cit., p. 13 (copied from A. Agassiz).

Long Island Sound to Massachusetts Bay (A. Agassiz).

APPENDICULARIA (species undetermined, [b]). (p. 446.)

Allied to *A. furcata* (t. A. Agassiz), op. cit., p. 23, 1866; Binney, op. cit., p. 13 (copied).

Long Island Sound to Massachusetts Bay (A. Agassiz).

BRYOZOA OR POLYZOA.

PHYLACTOLÆMATA.

PEDICELLINA AMERICANA Leidy. (p. 405.)

Journal Acad. Nat. Sciences, Philadelphia, ser. ii, vol. iii, p. 143, Plate X, fig. 25, 1855.

New Haven, Connecticut, to Vineyard Sound. Point Judith, Rhode Island (Leidy).

GYMNOLÆMATA.

CYCLOSTOMATA.

CRISIA EBURNEA Lamouroux. Plate XXXIV, figs. 260, 261. (p. 311,)

Polyp. flex., p. 138, 1816; Exp. methodique, p. 6; Johnston, British Zoophytes, ed. i, p. 262, Plate 30, figs. 3, 4; ed. ii, p. 283, fig. 62, and Plate 50, figs. 3, 4; Smitt, Kritisk fört. öfver Skandinaviens Hafs-Bryozoer, in Öfvers. af Kongl. Vet.-Akad. Förhandl., 1865, p. 117, Plate 16, figs. 7 to 19. *Sertularia eburnea* Linné, Syst. Nat., ed. x, p. 810; ed. xii, p. 1316.

Long Island Sound to the Arctic Ocean; Spitzbergen to the Mediterranean (t. Smitt); California (t. Johnston). Common near New Haven, and at Thimble Islands, 1 to 6 fathoms, rocky, and in tide-pools; off Watch Hill, Rhode Island, 4 to 5 fathoms, on algæ; common in Vineyard Sound, 4 to 15 fathoms; very common in Casco Bay and Bay of Fundy, low-water to 80 fathoms.

DIASTOPORA PATINA Smitt. (p. 405.)

Smitt, op. cit., p. 397, Plate 8, figs. 13 to 15. *Tubulipora patina* Lamarck, Animaux sans Vert., ed. i, vol. ii, p. 163; ed. ii, vol. ii, p. 244; Johnston, Brit. Zoöph., ed ii, p. 266, Plate 47, figs. 1 to 3.

Long Island Sound to the Arctic Ocean; northern coast of Europe, from Finmark to Great Britain. Near New Haven, at Thimble Islands, 1 to 5 fathoms; Watch Hill, Rhode Island, 4 to 5 fathoms; Vineyard Sound, off Holmes' Hole, 3 to 4 fathoms; very common in Casco Bay, Bay of Fundy, and northward.

TUBULIPORA FLABELLARIS Smitt. (p. 405.)

Op. cit., p. 401, Plate 9, figs. 6 to 8. *Tubipora flabellaris* Fabricius, Fauna Grœnl., p. 430, 1780 (*non* Johnston, sp.). *Tubulipora phalangea* Johnston, Brit. Zoöph., ed. ii, p. 273, Plate 46, figs. 1, 2.

Long Island Sound to Greenland; northern coasts of Europe to Great Britain. Common at Thimble Islands, 1 to 5 fathoms, on algæ, hydroids, etc.; Watch Hill, Rhode Island; Vineyard Sound; Casco Bay; Bay of Fundy, and northward.

CTENOSTOMATA.

ALCYONIDIUM RAMOSUM Verrill. Plate XXXIV, fig. 257. (p. 404.)

American Journal of Science, vol. iii, p. 289, Plate 8, fig. 10, 1872.

Much branched, when full-grown; the branches round, irregularly dichotomus, usually crooked. Surface glabrous, smooth, or nearly so, the cells rather small and crowded, their margins not elevated; zoöids with sixteen slender tentacles. Color ashy brown, or dull rusty brown.

Diameter of branches, mostly 5^{mm} to 6.5^{mm}. Height, $.250^{mm}$ to $.375^{mm}$.

Great Egg Harbor, New Jersey, to Vineyard Sound; common in Long Island Sound, near New Haven, in 1 to 5 fathoms; Thimble Islands; Watch Hill, Rhode Island, etc.

ALCYONIDIUM HIRSUTUM Johnston. (p. 404.)

British Zoöph., ed. i, p. 303, Plate 42, figs. 1, 2; ed. ii, p. 360, Plate 69, figs. 1, 2; Smitt, op. cit., p. 496, Plate 12, figs. 3 to 8. *Alcyonium hirsutum* Fleming, Brit. Anim., p. 517.

Long Island Sound to the Arctic Ocean; Spitzbergen; northern coasts of Europe to Great Britain. Savin Rock, near New Haven, low-water; Thimble Islands, in tide-pools, on *Fucus*, *Phyllophora*, etc.; Vineyard Sound; and Casco Bay.

ALCYONIDIUM HISPIDUM Smitt. (p. 404.)

Op. cit., p. 499, Plate 12, figs. 22 to 27, 1866. *Flustra hispida* Fabricius, Fauna Grœnl., p. 438, 1780; Johnston, Brit. Zoöph., ed. ii., p. 363, Plate 66, fig. 5. *Flustrella hispida* Gray, Brit. Mus. Catal., part i, p. 108.

Long Island Sound to Greenland; Finmark to Great Britain. Very common at Savin Rock, near New Haven, at low water, encrusting stones, *Fucus*, etc.; Thimble Islands; Watch Hill, Rhode Island; Vineyard Sound; Casco Bay; Bay of Fundy, etc.

ALCYONIDIUM PARASITICUM Johnston. (p. 404.)

British Zoöph., ed. i, p. 304, Plate 41, figs. 4, 5; ed. ii, p. 362, Plate 68, figs. 4, 5; Smitt, op. cit., p. 499, Plate 12, figs. 14–19. *Alcyonium parasiticum* Fleming, Brit. Anim., p. 518.

Rhode Island to Arctic Ocean; northern coasts of Europe to Great Britain. Vineyard Sound, on *Phyllophora*.

(?) ALCYONIDIUM GELATINOSUM Johnston. (p. 496.)

Brit. Zoöph., ed. i, p. 300, Plate 41, figs. 1–3; ed. ii, p. 358, Plate 68, figs. 1–3; Smitt, op. cit., p. 497, Plate 12, figs. 9–13. *Alcyonium gelatinosum* Linné, Fauna Suec., ed. ii, p. 538; Syst. Nat., ed. xii, p. 1295.

Gulf of Saint Lawrence; Spitzbergen to Great Britain. A few small specimens, apparently belonging to this species, were dredged in the deeper parts of Vineyard Sound.

VESICULARIA CUSCUTA Thompson. (p. 404.)

Zoöl. Res., mem. v, p. 97, Plate 2, figs. 1–4; Smitt, op. cit., p. 501, Plate 13, figs. 28, 34, 35. *Sertularia cuscuta* Linné, ed. xii, p. 1311. *Valkeria cuscuta* Fleming, Brit. Anim., p. 550; Johnston, Brit. Zoöph., ed. i, p. 252; ed. ii, p. 374.

New Jersey, northward; northern coasts of Europe to Great Britain. In Vineyard Sound it was found on hydroids attached to floating eel-grass, and was also dredged in 6 to 8 fathoms, on algæ, *Sertularia argentea*, and other hydroids; Great Egg Harbor, New Jersey, low water, on *Sertularia pumila;* Casco Bay, on piles of wharf.

VESICULARIA GRACILIS Verrill. (p. 389.)

Bowerbankia gracilis Leidy, Journal Acad. Nat. Sciences, Philad., ser. ii, vol. iii, p. 142, Plate 11, fig. 38, 1855.

Great Egg Harbor, New Jersey, to Vineyard Sound. Point Judith, Rhode Island (Leidy). Vineyard Sound, 6 to 8 fathoms, on hydroids.

VESICULARIA DICHOTOMA Verrill, new sp. (p. 404.)

Stems clustered, cæspitose, usually one or two inches high, slender, flexible, white, and repeatedly forking. The branches stand in different planes, so as often to produce miniature tree-like or shrub-like forms, many of which generally arise close together, forming crowded tufts upon rocks, oyster-shells, or algæ. When the stem or a branch divides, there is a joint formed at the base of each of the forks, by the interposition of a very short segment of a dark brownish, opaque substance, which contrasts strongly with the white translucent substance of the rest of the stem. Zoöids arranged closely in two subspiral rows of six to twelve each, just below each fork of the stem and branches, and not occupying half the length of the internodes, which are naked and smooth below the crowded clusters of the zoöids; these are smooth, greenish brown, broad oval or obovate in contraction, subcylindrical or elliptical in expansion, entirely sessile, and but little narrowed at the base, and so crowded as to appear imbricated. The tentacles are eight, long and slender, in expansion usually more than half the length of the cell.

Great Egg Harbor, New Jersey, on oysters; Savin Rock, at low-water; off New Haven Light, 4 to 6 fathoms, shelly and rocky; Thimble Islands, in rocky tide-pools; Norwalk, Connecticut, on oysters. This is probably the species recorded by Dr. Leidy from Great Egg Harbor under the name of *Valkeria pustulosa*, which is an allied European species.

VESICULARIA ARMATA Verrill, new sp. (p. 405.)

Cells stout, oval, broad at base, with a short and narrow pedicel, attached either singly or in pairs along slender, filiform, creeping stems, which often anastomose, the branches being mostly opposite. Distal end of cells prolonged into four conical processes, each of which, when perfect, supports a long slender spinule, nearly half as long as the cell. Tentacles not seen. Cells yellowish horn-color, with an oval, dark brown internal organ, visible in most of the cells.

Vineyard Sound, on floating sea-weeds attached to *Sertulariæ*, *Halecium gracile*, etc.; also in 6 to 10 fathoms, rocky, on *Sertularia argentea*.

VESICULARIA FUSCA Smitt. (p. 420.)

Op. cit., p. 502, Plate 13, figs. 37–39, 1866. *Avenella fusca* (?) Dalyell, Rare and Rem. Anim. of Scotland, vol. ii, p. 65; vol. i, Plate 12, fig. 11, (t. Smitt).

Long Island Sound northward; northern coasts of Europe to Great Britain. Off South End, near New Haven, 3 to 5 fathoms, on *Alcyonidium ramosum*.

FARRELLA FAMILIARIS. (p. 487.)

Vesicularia (*Farrella*) *familiaris* Smitt, op. cit., p. 502, Plate 13, fig. 36, 1866. *Plumatella familiaris* Gros, Bulletin Soc. Imp. Mascou, vol. xxii, p. 567, Plate 6, G. figs. 1–10 (t. Smitt). *Farrella pedicellata* Alder, Catal., p. 68, Plate 6, figs. 1–3; Quart. Jour. Miscrosc. Soc., vol. v, p. 24, Plate 14, figs. 1–3.

Long Island Sound to Vineyard Sound and northward; coasts of Scandinavia and Great Britain. Thimble Islands, near New Haven, in tide-pools, on algæ; Casco Bay. Saint George's Bank (S. I. Smith).

CHILOSTOMATA.

Cellularina.

ÆTEA ANGUINA Lamouroux. (p. 405.)

Soc. Phil., 1812, p. 184 (t. Smitt); Polyp. flex., p. 153, Plate 3, fig. 6; Expos. Methodique, p. 9, Plate 65, fig. 15; Smitt, op. cit., p. 280, Plate 16, figs. 2–4, 1867. *Sertularia anguina* Linné, Syst. Nat., ed. xii, p. 1317. *Anguinaria spatulata* Johnston, Brit. Zoöph., ed. ii, p. 290, Plate 50, figs. 7, 8.

Long Island Sound, northward; coasts of Scandinavia and Great Britain. In Vineyard Sound it was common at low-water mark and in 6 to 14 fathoms, on *Phyllophora* and hydroids. Off New Haven, 4 to 6 fathoms, on *Halecium gracile*.

EUCRATEA CHELATA Lamouroux. (p. 405.)

Polyp. Corall. flex., p. 149, Plate 3, fig. 5, 1816; Expos. Meth., p. 8, Plate, 65, fig. 10; Smitt, op. cit., 1865, Plate 5, fig. 3; 1867, p. 281, Plate 16, figs. 7–9; Johnston, Brit. Zoöph., ed. ii, p. 288, fig. 64. *Sertularia chelata* Linné, Systema Nat., ed. x, p. 816. *Cellularia chelata* Pallas, Elench. Zoöph., p. 25, 1766.

Martha's Vineyard northward; northern coasts of Europe to Great Britain. Off Gay Head, 10 fathoms, on hydroids and ascidians. Our specimens differ somewhat from the figures of the European form; the

cells are simple, more slender, and more elongated; aperture of primary cells somewhat bilabiate; of lateral cells simple and scarcely raised; no processes were observed on the front of any of the cells; the primary cells taper below into a slender, often crooked pedicel, which is about one-third as long as the cell.

(?) CELLULARIA TERNATA Johnston. (p. 496.)

British Zoöph., ed. ii, p. 335, Plate 59, 1848; Smitt, op. cit., 1867, p. 282, Plate 16, figs. 10 to 26. *Cellaria ternata* Ellis and Solander, Zoöph., p. 30. *Menipea ternata* Busk, op. cit., p. 21, Plate 20, figs. 3 to 5. (?) *Cellularia densa* Desor, Proc. Boston Soc. Nat. Hist., vol. iii, p. 66, 1848 (description inadequate).

Cape Cod to the Arctic Ocean; northern coasts of Europe to Great Britain. Off Gay Head, 10 to 20 fathoms; common in Casco Bay, Bay of Fundy, and at Saint George's Bank, 6 to 100 fathoms. South Shoals, 22 fathoms, (Desor).

CABEREA ELLISII Smitt. (p. 420.)

Op. cit., 1867, p. 287, Plate 17, figs. 55, 56. *Flustra Ellisii* Fleming, Mem. Wern. Soc., vol. ii, p. 251, Plate 17, figs. 1 to 3 (t. Smitt). *Flustra setacea* Fleming, Brit. Anim., p. 536; Johnston, Brit. Zoöph., ed. ii, p. 346. *Cellularia Hookeri* Johnston, Brit. Zoöph., ed. ii, p. 338, Plate 60, figs. 1, 2. *Caberea Hookeri* Busk, op. cit., p. 39, Plate 37, fig. 2.

Martha's Vineyard, northward to the Arctic Ocean; northern coasts of Europe, from Finmark to Great Britain. Mouth of Vineyard Sound, off Gay Head, 8 to 12 fathoms; off Buzzard's Bay, 25 fathoms; very common in Casco Bay, Bay of Fundy, and Saint George's Bank, 6 to 100 fathoms. Labrador (Packard).

BUGULA MURRAYANA Busk. (p. 496.)

Catal. Mar. Polyzoa, Brit. Mus., part i, p. 46, Plate 59; Smitt, op. cit., 1867, p. 292, Plate 18, figs. 19 to 27. *Flustra Murrayana* Bean Mss., Johnston, Brit. Zoöph., ed. i, p. 347, Plate 63, figs. 5, 6. *Flustra truncata* Desor, Proc. Boston Soc. Nat. Hist., vol. iii, p. 66 (*non* Linné).

Martha's Vineyard to Spitzbergen; northern coasts of Europe to Great Britain. Off Gay Head, 10 to 20 fathoms; very common in Casco Bay, Bay of Fundy, and Gulf of Saint Lawrence, 1 to 100 fathoms. Saint George's Bank, 20 to 65 fathoms, (S. I Smith). Labrador (Packard).

BUGULA FLABELLATA Busk. (p. 389.)

Catal. Marine Polyzoa, Brit. Mus., part i, p. 43, Plates 51, 52. *Bugula avicularia*, forma *flabellata*, Smitt, op. cit., 1867, p. 290, Plate 18, fig. 11. *Flustra avicularia* Johnston, Brit. Zoöph., ed. i, p. 286, Plate 36, figs. 3, 4; ed. ii, p. 346, Plate 63, figs. 3, 4.

Vineyard Sound, 6 to 8 fathoms; Wood's Hole, abundant on the piles of wharves. Coasts of Great Britain and Belgium.

BUGULA TURRITA Verrill. Plate XXXIV, figs. 258, 259. (p. 311.)

Cellularia turrita Desor, Proc. Boston Soc. Nat. Hist., vol. iii, p. 66, 1848. *Cellularia fastigiata* Leidy, op. cit., p. 142 (*non* Linné, sp.).

North Carolina to Casco Bay. Very abundant in Great Egg Harbor, New Jersey; Long Island Sound; Buzzard's Bay; and Vineyard Sound, low-water to 15 fathoms; Portland, Maine, on piles of wharf.

Flustrina.

MEMBRANIPORA PILOSA Farre. Plate XXXIV, figs. 262, 263. (p. 496.)

Phil. Trans., 1837, p. 412, Plate 27, figs. 1 to 5; Johnston, Brit. Zoöph., ed. i, p. 280, Plate 34, figs. 10, 12, 1838; ed. ii, p. 327, Plate 56, fig. 6, 1847; Smitt, op. cit., 1867, p. 368, Plate 20, fig. 49. *Flustra pilosa* Linné, Fauna Suec., ed. ii, p. 539 (t. Smitt). *Eschara pilosa* Pallas, Elench, Zoöph., p. 50, 1766. *Hippothoa rugosa* Stimpson, Invert. Grand Manan p. 18 (variety *catenularia*). *Tubipora catenularia* Jameson, Wern. Mem., vol. i, p. 561 (t. Smitt).

Long Island Sound to the Arctic Ocean; Finmark to the Mediterranean. Very abundant near New Haven, at Savin Rock, Thimble Islands, etc., in 1 to 6 fathoms, and in tide-pools, on *Chondrus crispus*, *Phyllophora* and other algæ, stones, etc.; Watch Hill, Rhode Island, 4 to 5 fathoms, on algæ, abundant; Vineyard Sound; Massachusetts Bay; Casco Bay; Bay of Fundy, and northward. The variety *catenularia* is common in Casco Bay and Bay of Fundy, from above low-water mark to 50 fathoms. It occurs on the coasts of Northern Europe at various depths down to 300 fathoms. Fossil in the Post-Pliocene of Canada and Labrador (Dawson).

MEMBRANIPORA LINEATA Busk. (p. 406.)

Catal. Mar. Polyzoa, part ii, p. 58, Plate 61, fig. 1; Smitt, op. cit., 1867, p. 363, Plate 20, figs. 23 to 31. *Flustra lineata* Linné, Systema Nat., ed. xii, p. 1301; Johnston, Brit. Zoöph., ed. ii, p. 349, Plate 66, fig. 4. *Escharina lineata* Leidy, Journ. Acad. Nat. Sciences, Philad., ser. ii, vol. iii, p. 141, Plate 10, fig. 22, 1855.

Great Egg Harbor, New Jersey, to the Arctic Ocean; Spitzbergen to Great Britain, low-water mark to 50 fathoms. Common near New Haven, from low-water mark to 6 fathoms, on stones, oysters, algæ, etc.; Watch Hill; Rhode Island; Vineyard Sound; Casco Bay; Bay of Fundy, and northward.

Fossil in the Post-Pliocene of Canada.

MEMBRANIPORA TENUIS Desor. (p. 420.)

Proc. Boston Soc. Nat. Hist., vol. iii, p. 66, 1848.

Long Island Sound to Cape Cod. Common near New Haven and in Vineyard Sound, low-water to 10 fathoms. Muskeget Channel, in 5 fathoms, (Desor).

Escharina.

ESCHARIPORA PUNCTATA Smitt. (p. 424.)

Op. cit., for 1867, Appendix, p. 4, (separate copies, p. 4), Plate 24, figs. 4–7, 1868. *Lepralia punctata* Hassal, Mag. Nat. Hist., vol. vii, p. 368, Plate 9, fig. 7; vol. ix, p. 407; Johnston, Brit. Zoöph., ed. ii, pp. 312 and 478, Plate 55, fig. 1.

Vineyard Sound, northward; northern coasts of Europe to Southern Norway and Great Britain. Vineyard Sound, 6 to 12 fathoms, on shells, etc., common. Saint George's Bank (S. I. Smith). (?) Fossil in the Post-Pliocene of Canada (Dawson).

ESCHARELLA VARIABILIS Verrill. Plate XXXIII, fig. 256. (p. 419.)

Escharina variabilis Leidy, Jour. Acad. Nat. Sci., Philadelphia, ser. ii, vol. iii, p. 142, Plate 11, fig. 37. *Lepralia variolosa* Desor, op. cit., p. 66, 1848 (*not* of Johnston).

South Carolina to Cape Cod and Massachusetts Bay. Very abundant in Great Egg Harbor; Long Island Sound; Buzzard's Bay; Vineyard Sound; Nantucket Harbor; low-water to 25 fathoms. Saint George's Bank, 20 fathoms, (S. I. Smith). Fort Macon, North Carolina (coll. Dr. Yarrow).

MOLLIA HYALINA Smitt. Plate XXXIV, fig. 264. (p. 420.)

Op. cit., for 1867, Ap., p. 16, (separate copies, p. 16), Plate 25, figs. 84–87, 1868. *Cellepora hyalina* Linné, Syst. Nat., ed. xii, p. 1286. *Lepralia hyalina* Johnston, Brit. Zoöph., ed. ii, p. 301, Plate 54, fig. 1. *Cellepora nitida* Fabricius, Fauna Grœnl., p. 435, 1780.

Long Island Sound to Greenland; Spitzbergen to Great Britain. Common near New Haven and at Thimble Island, in tide-pools and from 1 to 6 fathoms, on algæ; Watch Hill, Rhode Island, 4 to 5 fathoms; Buzzard's Bay and Vineyard Sound, abundant; Casco Bay; Bay of Fundy, and northward. Fossil in the Post-Pliocene of Canada (Dawson).

(?) LEPRALIA PALLASIANA Busk. (p. 496.)

Catal. Mar. Polyzoa, Brit. Mus., part ii, p. 81, Plate 83, figs. 1, 2; Smitt, op. cit., for 1867, Ap., p. 19, (separate copies, p. 19), Plate 26, fig. 93, 1868. *Eschara Pallasiana* Moll, die Seerinde, p. 64, Plate 3, fig. 13 (t. Smitt). *Lepralia pediostoma* Hassal, Ann. and Mag. Nat. Hist., vol. vii, p. 368, Plate 9, fig. 4; vol. ix, p. 407; Johnston, Brit. Zoöph., ed. ii, p. 315, Plate 55, fig. 7. *Escharina pediostoma* Leidy, op. cit., p. 141, Plate 10, fig. 23, 1855.

Rhode Island, northward; northern coasts of Europe to Southern Norway and Great Britain. Watch Hill, Rhode Island, 4 to 5 fathoms, on algæ; Vineyard Sound, 6 to 14 fathoms, on *Phyllophora* and other algæ, shells, etc.

Our specimens do not agree perfectly with the European form. Close to the proximal border of the aperture there is a large, but not very prominent, broad-based spine, or subconical process, which is not conspicuous in a view from above, but is prominent in a side-view. In

some specimens a few of the cells have several slender spines around the margin of the aperture.

This may prove to be a species distinct from *S. Pallasiana*, but at present I regard it as a variety.

(?) DISCOPORA COCCINEA Smitt. (p. 496.)

Op. cit., for 1867, Ap., p. 26, (separate copies, p. 26), Plate 27, figs. 162–176. (?) *Cellepora coccinea* Abildgard, Zoöl. Dan., vol. iv, p. 30, Plate 146, figs. 1, 2 (t. Smitt). *Lepralia Peachii* Johnston, Brit. Zoöph., ed. ii, p. 315, Plate 55, figs. 5, 6.

Long Island Sound, northward; northern coasts of Europe to Great Britain. Watch Hill, Rhode Island, 4 to 5 fathoms, on red algæ; Vineyard Sound and Quick's Hole, on algæ, etc., in 4 to 12 fathoms.

Fossil in the Post-Pliocene of Canada (Dawson as *L. Peachii*).

The specimens from our coast, referred to the above species, differ considerably from the typical European forms, and may eventually prove to be a distinct species when a careful direct comparison with a large series of European specimens can be made.

The aperture is usually surrounded by a circle of stout, conical or elongated spinules, variable in number, the one nearest the angle of the aperture, on each side, often stouter; but the spines are often absent. A small semicircular avicularium is often seen near one side of the cell, and distant from the aperture. The tooth or spine at the proximal edge of the cell is elongated and more or less bifid at the end.

Celleporina.

CELLEPORA SCABRA Smitt. (p. 419.)

Op. cit., for 1867, Ap., p. 30, (separate copies, p. 30), Plate 28, figs. 183 to 197, 1868. *Eschara scabra* Fabricius, Nye Zoöl. Bidr., Vid. Selsk. Phys. Skr., Hauniæ, vol. i, p. 29 (t. Smitt). *Millepora reticulata* Fabricius, Fauna Grœnl., p. 433, 1780 (*non* Linné).

Vineyard Sound to Greenland; Spitzbergen; northern coasts of Europe. Vineyard Sound and Quick's Hole, 5 to 10 fathoms, on *Phyllophora*, etc., not uncommon.

CELLEPORA RAMULOSA Linné. (p. 312.)

Syst. Naturæ, ed. xii, p. 1285, 1767; Johnston, Brit. Zoöph., ed. ii, p. 296, Plate 52, figs. 4, 5; Smitt, op. cit., for 1867, Ap., p. 31, (separate copies, p. 31), Plate 28, figs. 198–210. *Cellepora verrucosa* Fabricius, Fauna Grœnl., p. 434 (variety) *Cellepora pumicosa* (*pars*) Linné, Syst. Nat., ed. xii, p. 1286; (?) Johnston, Brit. Zoöph., ed. ii, p. 295, Plate 52, figs. 1–3 (variety).

Long Island Sound to Greenland; Spitzbergen; northern coasts of Europe to Great Britain. Very common near New Haven, off South End, at Thimble Islands, and Faulkner's Island, in large tide-pools, low-water to 8 fathoms, chiefly on *Sertulariæ* and other hydroids, and slender red algæ, (mostly the variety *tuberosa*, or *verrucosa*); Watch Hill, Rhode Island, 4 to 5 fathoms; Buzzard's Bay and Vineyard Sound, 1 to 15 fathoms, on hydroids, common; abundant in Casco Bay; Bay of Fundy; and at Saint George's Bank; low-water to 145 fathoms.