

ART. XX. — *Notice of recent additions to the Marine Fauna of the eastern coast of North America*; by A. E. VERRILL. *Brief Contributions from the Museum of Yale College.* No. XXXVIII.

DURING the summer of 1877, extensive explorations were made by the U. S. Fish Commission in the U. S. Steamer "Speedwell," Commander Kellogg, in Massachusetts Bay; in the Gulf of Maine; off Nova Scotia; and in the vicinity of Halifax. The dredging and trawling were very successful, and a large and valuable collection was secured, both of fishes and invertebrata, including, in all classes, many European and Greenlandic forms not before obtained on the American coast. As in previous years the invertebrate collections and the direction of the dredging were in charge of the writer, who was specially assisted by Mr. E. B. Wilson, while Messrs. G. Brown Goode and T. H. Bean were in charge of the fishes. Having hitherto been unable to publish any account of these explorations, a few of the more interesting species are noticed below, together with others from different sources.

MOLLUSCA.

Architeuthis megaptera Verrill, sp. nov.

Much smaller than the previously known species, the total length of the body and head being but nineteen inches. Body relatively short and thick. Caudal fin more than twice as broad as long, the length about half that of the body. Its form is nearly rhombic, with the lateral angles produced and rounded, and the posterior angle very obtuse, the posterior edge, as preserved, being slightly concave. The ventral anterior edge of the mantle is concave centrally, with a slight angle to either side, about .75 inch from the center; from these angles it is again concave to the sides; on the dorsal side the edge advances farther forward than beneath, terminating in a slightly prominent obtuse angle in the middle of the dorsal edge. The eye-sockets are large, oblong, and furnished with distinct lid-like margins; the eyes are large, oblong, and naked. The short arms are triquetral, the upper ones somewhat shorter and smaller than the others, which are nearly equal in length, the second pair being stouter than the rest, and a little longer. The tentacular arms are slender, elongated, expanded toward the tip, and have suckers arranged much as in the gigantic species, even to the smooth-edged suckers and opposing tubercles, proximal to the large suckers, as I have formerly described them in *A. monachus*. The sucker-bearing portion is margined by a membrane on each side.

Larger suckers of sessile arms, very oblique, with the rim strong, dark brown, bearing large, strong, sharp, much incurved, unequal teeth on the outer side of the rim; the inner margin is entire. On the middle or larger suckers of the ventral arms, there are seven large teeth, the middle one longest, while to either side there is one nearly as large, with a smaller one each side of it.

Total length, 43 inches; length of body and head, 19; length of body from dorsal edge of mantle, 14; from ventral edge, 13; of head from edge of mantle to base of arms, 5; length of long tentacular arms, 22 and 24 inches respectively; of first (dorsal) pair of arms, 6·5; of second pair, 8; of third pair, 8·5; of fourth pair, 8; length of caudal fin, 6; breadth, 13·5; breadth across body, 5; circumference of body, 12·5; length of eye-socket, 1·25; its breadth, ·75; length of sucker-bearing portion of tentacular arms, 6·5; of portion bearing large suckers, 3·25; breadth, ·75; length of terminal portion, 1·5; diameter of naked or peduncular portion, ·33 to ·50; breadth of dorsal arms at base, ·75; of second pair, 1·12; of third pair, 1; of fourth pair, 1; diameter of largest tentacular suckers, ·36 to ·40; of their rims, ·28 to ·32; diameter of largest suckers of ventral arms, ·40; of their rims, ·28 to ·32 of an inch.

Color, reddish brown speckled with darker brown, much as in the common small squids.

This unique specimen was cast ashore, during a severe gale, near Cape Sable, N. S., several years ago, and was secured for the Provincial Museum at Halifax by J. Matthew Jones, Esq. It is preserved entire, in alcohol, and is still in good condition.

Rossia Hyatti Verrill, sp. nov.

Body subcylindrical, usually broader posteriorly, in preserved specimens, variable in form according to contraction, its dorsal surface covered with small, conical, scattered, whitish papillæ, which are also found on the upper and lateral surfaces of the head and base of arms; those around the eyes largest; one on the mantle, in the median line, near the front edge, is elongated. Front border of mantle sinuous, slightly advancing in the middle, above. Fins moderately large, nearly semi-circular, attached from the posterior end for about four-fifths the whole length, the front end having a small, rounded, free lobe. The distance from posterior junction of fin to end of body is less than that from anterior junction to edge of mantle, the center of the fin being at about the middle of the body. Siphon elongated, conical, with small opening. Head depressed, more than half the length of the body. Eyes large, the lower eyelid more prominent but not much thickened. Sessile arms short, united at their bases by a short web, which is absent between the ventral arms; the dorsals are shortest; the third pair the longest and

largest; the second pair and ventrals about equal in length. Suckers numerous, subglobular, not very small; near the base of the arms they are biserial, there being usually four to six thus arranged in each row; then along the rest of the length of the arms they become more crowded and form about four rows, those in the two middle rows alternating with those in the marginal rows; toward the tip they become very small and crowded, especially on the dorsal and ventral arms. The number of suckers varies with age, but on one of the larger specimens they were as follows: on each dorsal arm, sixty; on one of second pair, fifty-five; of third pair, fifty-three; of ventral, sixty-five. In this specimen the third arm of the right side and ventral arm of left side were abruptly terminated (perhaps accidentally), while the others were tapered to acute points. Tentacular arms, in preserved specimens, will extend back to posterior end of body, the naked portion smooth, somewhat triquetral, with the outer side convex and the angles rounded; terminal portion rather abruptly widening, long ovate-lanceolate, curved and gradually tapering to the tip, the sucker-bearing portion bordered by a wide membrane on the upper and a narrow one on the lower margin; the suckers are very small, subglobular, crowded in about eight to ten rows in the widest portion.

Color, pinkish, thickly spotted with purplish brown above, paler and more sparsely spotted beneath and on outside of long arms; inner surface of arms and front edge of mantle pale.

Length from base of arms to posterior end, 40^{mm}; of body, 25; of head, 15; breadth of body, 17; of head, 17; length of fins, 15; of insertion, 11; breadth of fin, 8; front of fin to edge of mantle, 5; length of free portion of dorsal arms, 12.5; of second pair, 15; of third pair, 18; of ventrals, 13; of tentacular arms, 40; breadth of dorsal arms, at base, 3.5; of second pair, 3.5; of third pair, 4; of ventrals, 3.5; of tentacular arms, at base, 2; at expanded portion, 3.5; length of latter, 10.5; diameter of largest suckers of sessile arms, 0.9; length of free portion of siphon, 7^{mm}.

Massachusetts Bay, in fifty fathoms, mud; off Cape Sable, N. S., eighty-eight to ninety-two fathoms, on hard sandy bottom; off Halifax, fifty-seven to one hundred fathoms, on compact sandy mud, in September, with eggs. Frequently associated with *Octopus Bairdii* V., and the following species.

Rossia sublævis Verrill, sp. nov.

Larger and relatively stouter than the preceding species, with the fins larger and placed farther forward, the front edge of the large free lobe reaching nearly to the edge of the mantle. Head large and broad. Sessile arms more slender and less unequal in size than in the preceding, and with the suckers arranged in

two regular rows throughout the whole length. Anterior edge of mantle scarcely sinuous, advancing but little dorsally. Upper surface of the body and head nearly smooth, but in the larger specimens usually with a few very small whitish papillæ, most numerous near the front edge of the mantle. Color nearly as in the preceding species.

One of the largest specimens measures, from base of arms to end of body, 46^{mm}; length of body, 31; of head, 15; breadth of body, 22; of head, 23; length of fins, 20; of their insertion, 16; breadth of fins, 10; front edge of fin to edge of mantle, 2.5; length of free portion of dorsal arms, 16; of second pair, 17; of third pair, 20; of ventrals, 15; of tentacular arms, 25; breadth of dorsal arms at base, 3; of second pair, 3; of third, 3.5; of ventrals, 3.5; of tentacular arms, 3.5; of their terminal portion, 3.75; its length, 10; diameter of largest suckers of sessile arms, .8; length of free portion of siphon, 7^{mm}.

Taken with the preceding species, and is the more common of the two, in Massachusetts Bay. The differences may prove to be only sexual, but this cannot be determined without a larger number of specimens.

Octopus granulatus Lamarck; D'Orbigny.

A specimen, believed to belong to this species, and similar to those taken at Cape Hatteras, was collected in the spring of 1877, in Vineyard Sound, Mass., by Mr. Vinal N. Edwards.

Buccinum tenue Gray; Stimpson, Review of Northern Buccinums, Can. Naturalist, auth. copy, p. 14.

Buccinum scalariforme Beck; Dawson; Packard.

Dredged alive, in considerable numbers, in 1877, off Cape Sable, N. S., in 88 to 92 fathoms, on a bottom of fine compact sand. The specimens all belong to a small form of the species. It had not been found so far south previously.

Buccinum cyaneum Brug.; Stimpson, loc. cit., p. 19.

Buccinum hydrophanum Hancock; Reeve.

The smaller form of this species was taken with the last, living, and in about equal abundance. It has hitherto been regarded as eminently arctic. We have recently received additional specimens, taken in 200 fathoms, off Sable I., by the schooner Lizzie K. Clark.

Neptunea propinqua (*Fusus propinquus* Alder).

A number of fine living specimens of this were taken with the two preceding species. They have been identified by Mr. W. H. Dall, by direct comparison with European specimens, with which they agree perfectly. This species can be distinguished at once from the far more common *N. Stimpsoni* (Mörch, sp., 1868, teste Dall = *Fusus Islandicus* Gould, and *F. curtus* Jereys) by its shorter form and hairy epidermis.

Triopla lacer Lovén.

This interesting addition to the North American fauna was dredged in 1877, at several localities, in Massachusetts Bay, in 40 to 50 fathoms; and off Nova Scotia, in 80 to 100 fathoms.

Scyllcea Edwardsii Verrill, sp. nov.

A large species, the body in extension nearly three inches long and half an inch high, with the four dorsal branchiferous lobes about equaling in height, or exceeding, the elevation of the body. Foot very narrow. Tentacular sheaths stout, expanding at the end into a large, flat, rounded lobe, most prominent posteriorly; the small, plicated tentacle projecting from a funnel-shaped orifice in its outer anterior margin. Branchiferous lobes expanding into a broad, thin, spatulate, or paddle-shaped, terminal portion, narrower and thicker toward the base, the margins of the thin portions sinuous; the two pairs far apart; their inner surfaces covered with small, translucent, whitish, arborescently branched gills, which project beyond their margins; similar gills are situated along the back in front of and behind the posterior pair of lobes, and also on the sides of the caudal lobe, which is broad, elongated, curved, upward and backward in extension, or concave in outline posteriorly, rounded at summit, and not so high as the dorsal lobes.

Color of living specimen, sent by Mr. Edwards, rich brownish yellow or orange, irregularly more or less spotted with deeper orange-brown blotches, and with opaque white specks, blotches and streaks. A band of deep yellowish brown runs along each side of the back, interrupted by the dorsal lobes, and extending up their outer edges; edges of the dorsal lobes, tentacular sheaths, and caudal lobe flake-white, which color also borders the brown band. Along each side of the body is a row of six or seven small, round, iridescent, purplish blue spots, and some smaller ones occur on the middle of the back. Anterior surface of tentacular sheath iridescent bluish. Along the sides is a row of small white papillæ, and similar ones extend along the white line of the back. Tentacles orange, the plications edged with orange-brown, the tips white.

Taken in the autumn of 1877 by Mr. Vinal N. Edwards, at Wood's Holl, Mass., on eel-grass (*Zostera*) in the harbor, and in Vineyard Sound on floating *Sargassum*. I am also indebted to Mr. Edwards for a colored drawing of this species, made by Mr. C. N. Webster, and accompanied by notes describing the appearance of the specimen when first captured. The specimen described above was not very active, though in pretty good condition, when received.

ANTHOZOA.

Keratoisis ornata Verrill, sp. nov.

Corallum tall (over two feet high), spreading, arborescently, but distantly and irregularly, branched, the branches spreading, often nearly at right angles, elongated, rather slender, gradually tapering, giving off, in the same manner, elongated branchlets. The branches and branchlets mostly arise from near the proximal end of the calcareous joints, but sometimes from the middle. The calcareous joints are ivory-white, elongated, round, slightly enlarged at the ends, faintly and often indistinctly striated longitudinally, appearing smooth to the naked eye, but finely granulous under a lens. Chitinous joints golden yellow or bronze-color, short, scarcely longer than thick in the larger branches, about twice as long as thick in the smaller ones, where they become translucent and brownish or amber-color, without the metallic luster seen in those of the larger branches. The cœnenchyma and polyp-cells are mostly absent, but so far as can be ascertained from the small patches remaining, the cœnenchyma is thin, pale yellowish, and filled with rather large fusiform spicula; and the polyp-cells are rather distant, in the form of somewhat prominent verrucæ, strengthened by rather large projecting spicula.

Height of tallest specimen, 26 inches; breadth, 18 inches; length of longest undivided branchlets, 12 to 16 inches; diameter of calcareous joints of main stem (base absent), .35 inch (9^{mm}); of the larger branches, .20 inch (5^{mm}); length of the calcareous joints in the larger branches, 1.25 to 1.95 inches (30 to 48^{mm}, but mostly about 40^{mm}); diameter in smaller branchlets, about .06 inch (1.5^{mm}); length, .75 to 1.25 inches (19 to 32^{mm}); length of chitinous joints of larger branches, .10 to .20 inch (2.5 to 5^{mm}).

Two specimens were taken by Mr. Philip Merchant, of the schooner Marion, off Sable Island, N. S., in about 250 fathoms, on a trawl line.

This is a large and beautiful species of a group formerly considered chiefly tropical in habitat. The golden or bronzy chitinous joints contrast finely with the clear ivory-white calcareous joints. The genus was founded by Professor E. Perceval Wright, in 1869, for a species taken in deep water, off the coast of Portugal.

Acanella Normani Verrill.

Mopsea arbuscula Norman, Proc. Royal Soc., p. 210, 1876 (*non* Johnson, 1862).

Two fine specimens of this elegant species were obtained by Mr. Merchant, with the preceding species. A third specimen was brought in by Mr. M. J. Murphy, from Banquereau, in the same region. The species was first described by Norman

from a specimen collected off the coast of Greenland, in 410 fathoms, by the Valorous Expedition, in 1875.

Our specimens are nearly perfect, with the cells and cœnenchyma well preserved. They are from seven to eleven inches high; and from six to ten broad. They are much branched, in the form of a dense bush or small shrub, the branches arising mostly in whorls of three or four, from the chitinous joints, and spreading nearly at right angles; the secondary branches arise in the same way, but the final branchlets mostly arise singly, or in pairs. The cœnenchyma is very thin, yellow or brown, and filled with fusiform spicula, arranged in lines; the polyp-cells are scattered, very large and prominent, with the base and distal half expanded, somewhat hour-glass shaped, largest toward the tips of the branches, and covered with large acute spicula, which project as spines beyond the margin.

The *Mopsea arbusculum* Johnson, from Madeira, is a closely allied species, for which Dr. J. E. Gray, in 1870, constituted the genus *Acanella*. It appears, from the figures, to have more slender branchlets, and polyp-cells of a different form. The coincidence in the names was, however, entirely accidental.

Fine specimens of *Primnoa reseda* and *Paragorgia arborea* are often taken in the same region from which the preceding species were obtained, as well as from the depression between St. George's and Le Have Banks, in 200 to 250 fathoms. One of the specimens of *Paragorgia* presented to us is over three feet high, and some of *Primnoa* are nearly as tall.

Paramuricea borealis Verrill, sp. nov.

Slender, arborescently much branched, four inches (or more) in height. Cells scattered, short cylindrical, or verrucose, with a series of small spicula projecting around the edge, surmounted by eight convergent groups of long, acute spicula. Cœnenchyma thin, rudely granulous, with irregular rough spicula. Color, when dried, brownish gray; axis slender, yellowish.

Grand Banks of Newfoundland, on stone, with *Primnoa reseda*. The only specimen seen was sent to me for examination by Professor A. Hyatt, from the Museum of the Boston Society of Natural History. It is near *P. placomus*, but is more slender, with longer cells.

ECHINODERMATA.

Asterina borealis Verrill, sp. nov.

Pentagonal, with a thick swollen body and short thick rays. Upper surface closely covered with short minute spinules, of nearly uniform size, arranged in groups of unequal size. Scattered over the surface are many papulæ of rather large size,

and dark purplish brown color, when contracted giving a spotted appearance to the dorsal surface. Madreporic plate small, about half way between center and margin. Margin thickened, with an upper row of slightly prominent plates spinulated like the back; below, and forming the edge, is a row of more prominent plates, their upper and inner portion spinulated like the back, the spinules increasing in length to the outer edge, where they are slender, elongated, crowded and divergent. Ventral plates, covering the triangular interbrachial area, prominent, with unequal, slender, acute, divergent spinules, those on the distal edge longest. Adambulacral plates with two internal acute spines, forming a longitudinal row, and four or five others in a transverse row on each plate. Color, in alcohol, dull yellow or buff, with dark brown spots, due to the papulæ.

Greater radius, 12^{mm}; lesser, 7^{mm}; elevation at center, 7^{mm}.

Muddy near Cashe's Ledge, Gulf of Maine, in 110 fathoms, dredged bottom, in 1874, by Dr. A. S. Packard and Mr. Richard Rathbun, on the steamer "Bache," (Coll. U. S. Fish Commission).

Lophaster furcifer Verrill.

Solaster furcifer Duben and Koren.

Taken in the Gulf of Maine, north of George's Banks, in 150 fathoms, by Dr. Packard and Mr. Caleb Cooke, on the "Bache," in 1872. This species differs so widely from *Solaster* in the structure of the skeleton, and the small development of the disk, as to require the establishment of a new genus for this type. It is specially distinguished by the highly developed skeleton of the under side; differentiated marginal plates; and prominently reticulated dorsal plates.

Pedicellaster typicus Sars.

This species was dredged in the Gulf of St. Lawrence, in 1872, by Mr. J. F. Whiteaves, who sent me specimens for examination.

Asterias stellionura Perrier.

This large and remarkable species, previously known only from Iceland and Greenland, was dredged by our party, on the steamer Speedwell, in 1877, at several localities off Nova Scotia, in large numbers. It was especially abundant off Cape Sable, in eighty-eight to ninety-two fathoms, fine compact sand; and off Halifax in one hundred fathoms, sandy mud, where it was associated with *Astrogonium granulare*, *Hippasteria phrygiana*, *Archaster Parelii*, *Archaster arcticus*, *Antedon Sarsii*, and many other arctic species.

This species can be distinguished from all others of our coast by the five, very long, angular arms, with long slender spines, which are surrounded at base by large dense wreaths of crossed

pedicellariæ. In life these clusters of pedicellariæ are supported on soft extensible processes, which project beyond the ends of the spines of the lower surface, giving it a very peculiar appearance. Some of the specimens were two feet in diameter. The color was usually bright red above, yellowish below; some specimens varied to orange-red, and others to purplish or brownish red, above.

Ophiacantha anomala G. O. Sars, Vidensk.-Selsk. Forhandl., 1871.

A handsome species, having six arms, and of a bright salmon-color when living. A single specimen was dredged by us in the Gulf of Maine, 140 miles east of Cape Ann, in 112 fathoms, sand and gravel, in 1877.

With this was associated another beautiful salmon-colored species (? *Amphiura Otteri* Ljung.) with five long slender arms. *Ophioscolex glacialis* also occurred at the same locality. Both the latter had, however, been taken by our parties in previous years.