

LIST OF ECHINODERMATA DREDGED BY THE "ALBATROSS" IN 1883.\*

In this list a few northern species are included that were taken in comparatively shallow water, on George's Bank and Brown's Bank, off Cape Sable, Nova Scotia, and are not yet known from the deep water farther south.

HOLOTHURIOIDEA.

*Benthodytes gigantea* Verrill. 1884. Figs. 31, 31a, 31b.

B. range, 938 to 2,033 fathoms, 1883. Locally very abundant.

*Euphronides cornuta* Verrill. 1884. Figs. 32, 33, 33a.

B. range, 855 to 1,735 fathoms, 1883. Locally abundant.

*Lophothuria Fabricii* Verrill. Figs. 34, a, young.

B. range, 16 to 1,168 fathoms (75 to 858 fathoms, 1883, George's Bank and off Nova Scotia). Scarce and small, except northward.

*Lophothuria squamata* (Müll.) Verrill (?)

B. range, 80 fathoms, 1883, off Nova Scotia. Rare.

*Psolus phantapus* (Fabr.) Oken.

B. range, 86 fathoms, 1883, near George's Bank. Northern.

*Pentacta frondosa* Jæger.

B. range, 20 to 141 fathoms (86 to 141 fathoms, 1883, near George's Bank). Not common south of Cape Cod; abundant from Maine northward.

*Pentacta minuta* (Fabr.) Verrill.

B. range, 60 to 101 fathoms, 1883, off Nova Scotia. Common from Maine northward in shallow water.

*Thyone scabra* Verrill. 1873.

B. range, 51 to 640 fathoms (105 to 547 fathoms, 1883). Common.

*Trochostoma turgida* Verrill, = *Molpadia turgida* Verrill. 1879.

B. range, 45 to 858 fathoms, 1883. Not uncommon.

*Trochostoma Ayresii* Verrill. 1885.

B. range, 1,467 to 2,033 fathoms, 1883. Not uncommon.

*Trochostoma abyssicola* Verrill. 1885.

B. range, 1,200 to 2,000 fathoms. Not uncommon.

*Echinostoma abyssicola* Verrill, sp. nov. 1885.

B. range, 2,033 fathoms, 1883. More frequent in 1884.

A small, white, fusiform species, 15 to 20<sup>mm</sup> long, entirely covered with large, strong plates, each of which bears a conical spinule.

\*Many of the Echinoderms of this region have been described by the writer in "Brief Contributions to Zoology" in the American Journal of Science, 1878 to 1885. See also Proc. U. S. Nat. Mus., vol. ii, 1879.

A general catalogue of the Echinoderms dredged from 1880 to 1882 is contained in Part x, of this report, p. 658, 1884.

*Synapta brychia* Verrill, sp. nov.

B. range, 938 fathoms, station 2111, off Cape Hatteras, 1883.

A large species, with a strong, thick, opaque purplish brown skin, as preserved in alcohol. The strong longitudinal muscles are lighter colored. The skin contains rather large, scattered, ovate plates, easily visible to the naked eye. They are perforated by numerous (seventy to eighty or more) small rounded openings, and have a central eminence, composed of several slender processes. Each plate bears a large anchor, its length equal to that of the plate. The shaft of the anchor is round and smooth, narrowed next the expanded end, which is surmounted by several rough or lacerate denticles; the flukes are long, sharp, smooth, strongly recurved, more than a third as long as the shaft. Many of the anchors project from the skin, and are large enough to be visible to the naked eye. Length, in alcohol, 160<sup>mm</sup>; diameter, 10<sup>mm</sup>.

#### ECHINOIDEA.

*Pourtalesia Jeffreysii* W. Thomson.

B. range, 843 to 1,555 fathoms, 1883. Not uncommon.

*Äerope rostrata* W. Thomson.

B. range, 1,395 to 1,608 fathoms, 1883. Local and not common.

*Acete bellidifera* W. Thomson.

B. range, 1,395 to 1,497 fathoms, 1883. Not common.

*Schizaster fragilis* (Düben & Koren) L. Agassiz.

B. range, 37½ to 321 fathoms (99 to 239 fathoms, 1883). Common; locally abundant.

*Schizaster Orbygnianus* A. Ag.

*Schizaster canaliferus*, variety, Verrill, this report for 1882, part x, p. 658.

B. range, 65 to 179 fathoms (117 to 179 fathoms, 1883). Not uncommon; local.

*Brissoopsis lyrifera* (Forbes) L. Agassiz.

B. range, 65 to 1,555 fathoms (938 to 1,555 fathoms, 1883). Common.

*Urechinus Naresianus* A. Ag.

B. range, 1,309 fathoms, 1883. Local; gregarious.

*Echinarachnius parma* Gray.

B. range, 6 to 888 fathoms (35 to 888 fathoms, 1883). Common; often very abundant in shoal water.

*Phormosoma placenta* W. Thomson.

B. range, 458 to 1,309 fathoms (499 to 1,309 fathoms, 1883). Common.

*Phormosoma uranus* W. Thomson.

B. range, 843 to 938 fathoms, 1883; 568 to 1,080 fathoms, 1884. Not common; local and gregarious.

*Echinus gracilis* A. Agassiz.

B. range, 73 to 202 fathoms (73 fathoms, 1883). Not uncommon; local.

*Echinus Norvegicus* Düben & Koren.

B. range, 888 to 1,497 fathoms, 1883. Common; often extremely abundant.

*Echinus elegans* Düben & Koren (?).

B. range, 858 to 888 fathoms, 1883.

*Strongylocentrotus Dröbachiensis* A. Ag.

B. range, 1 to 640 fathoms (35 to 141 fathoms, 1883, George's Bank and Brown's Bank). Common as far south as off Chesapeake Bay at moderate depths.

*Salenia varispina* A. Agassiz.

B. range, 547 fathoms, 1883. One specimen only.

*Arbacia punctulata* Gray.

B. range, shore to 20 fathoms (19 fathoms, 1883). Common in shallow water from Vineyard Sound southward.

#### ASTERIOIDEA.

*Asterias Forbesii* Desor.

B. range, shore to 20 fathoms (19 fathoms, 1883). Abundant from Massachusetts Bay southward.

*Asterias vulgaris* St. = *A. rubens* L. (?)

B. range, shore to 208 fathoms (41 to 86 fathoms, 1883, George's Bank and Brown's Bank). Abundant from off Long Island northward, in moderate depths. Ranges as far south as off Cape Hatteras.

*Asterias Tanneri* Verrill. 1880. Fig. 42, a.

B. range, 69 to 373 fathoms (78 to 373 fathoms, 1883). Common.

*Asterias briareus* Verrill. 1882.

B. range, 31 to 373 fathoms (78 to 373 fathoms, 1883). Rare.

*Leptasterias compta* (Stimp.) Verrill.

B. range, 18 to 150 fathoms (38 to 150 fathoms, 1883). Common and widely diffused; often very abundant in moderate depths.

*Stephanasterias albula* (Stimp.) Verrill.

*Stichaster albulus* Verrill, formerly.

B. range, 64 to 192 fathoms (69 to 117 fathoms, 1883). Common and widely diffused; locally abundant. Ranges from the Arctic Ocean and Northern Europe to Cape Hatteras.

*Zoroaster Diomedæ* Verrill. 1884.

B. range, 98 to 1,555 fathoms, 1883. Common; sometimes abundant locally.

*Brisinga elegans* Verrill. 1884.

B. range, 906 to 1,395 fathoms, 1883. Local; not uncommon; gregarious.

*Brisinga costata* Verrill. 1884.

B. range, 888 to 1,255 fathoms, 1883. Not common.

One of the larger examples, from station 2116, but not the largest, measured 37 inches in diameter; disk, 2.75 inches; greatest breadth of arms, .75; length of longest spines, .62 of an inch.

*Cribrella sanguinolenta* (Müller) Lütken.

B. range, shore to 194 fathoms (69 to 122 fathoms, 1883). Common as far south as Cape Hatteras at moderate depths; abundant northward.

*Solaster abyssicola* Verrill. 1885.

*Solaster Earllii* Verrill, this Report for 1882, p. 659 (not of 1879).

B. range, 843 to 1,537 fathoms (843 to 1,395 fathoms, 1883). Not uncommon.

A large species, often a foot in diameter, somewhat resembling *S. Earllii*, but with very different spinulation on the actinal side. Rays usually eight or nine, varying to seven and ten. Abactinal side covered with rather small, not very close, rounded paxillæ, bearing small and short spinules. The brauchial papulæ are large and numerous, thickly scattered on the disk and base of arms. Marginal plates prominent, bearing a transverse, oblong group of small rough spinules in two or three rows. Interbrachial ventral areas of moderate size, covered with rounded paxillæ similar to those of the back, but arranged in regular rows, and bearing a divergent group of five to eight small rough spinules. The adambulacral plates bear an outer transverse row of five to seven, rather short, moderately thick spines, united at base and covered by a thick skin; and an inner group of three or four nearly equal and rather short spines, united together by a web for about half their length. Color, while living, uniform orange or deep red. Greater radius of a medium sized example, 113<sup>mm</sup>; lesser radius, 40<sup>mm</sup>.

*Solaster endeca* Forbes.

B. range, shore to 150 fathoms, north of Cape Cod (122 fathoms, 1883, George's Bank). Common northward from Cape Cod in moderate depths.

*Crossaster papposus* M. and Tr.

B. range, shore to 150 fathoms, north of Cape Cod (49 to 75 fathoms, 1883, George's and Brown's Banks). Northern; common from the Bay of Fundy northward, in shallow water.

*Lophaster furcifer* (Dub. & Kor.) Verrill = *Solaster furcifer* auth. Figs. 49, 49a.

B. range, 234 to 640 fathoms (150 fathoms, 1883, George's Bank). Rare; chiefly northern; it occurs in moderate depths in the Gulf of Maine and off the Nova Scotia coast.

*Pteraster militaris* M. & Tr. Fig. 35.

B. range, 10 to 150 fathoms, north of Cape Cod (101 to 130 fathoms, in 1883, off Nova Scotia). Common on the coast of Maine and northward, in shallow water.

*Diplopteraster multipes* (Sars) Verrill. Fig. 43.

B. range, 124 to 640 fathoms (197 to 239 fathoms, 1883). Common and widely diffused as far south as off Cape Hatteras.

*Hymenaster modestus* Verrill. 1885.

B. range, 1,098 to 1,451 fathoms, 1883. Rare.

*Porania grandis* Verrill. 1879. Figs. 44, 44a, 45, 45a.

B. range, 66 to 373 fathoms, 1883. Not uncommon.

*Poraniomorpha spinulosa* Verrill.

*Porania spinulosa* Verrill, Proc. Nat. Mus., 1879, p. 202.

B. range, 86 to 640 fathoms (122 to 250 fathoms, 1883). Not uncommon.

*Astrogonium granulare* M. & Tr. Figs. 48, 48a.

B. range, 122 to 640 fathoms (122 fathoms, 1883, George's Bank). Rare south of Cape Cod; more common off Nova Scotia and northward.

*Hippasteria phrygiana* Gray=*H. plana* auth. Fig. 47, variety.

B. range, 30 to 150 fathoms, north of Cape Cod (50 to 150 fathoms, 1883, George's and Brown's Banks). Northern; common off Cape Cod, in the Gulf of Maine, off Nova Scotia, and northward.

*Odontaster hispidus* Verrill. 1880.

B. range, 56 to 487 fathoms (65 to 239 fathoms, 1883). Common; locally abundant.

*Astropecten articulatus* Say.

B. range, shore to 25 fathoms, south of Cape Hatteras (15 to 20 fathoms, 1883).

*Archaster arcticus* M. Sars.

B. range, 113 to 547 fathoms, 1883. Frequent, but only in small numbers.

*Archaster Americanus* Verrill. 1880.

B. range, 45 to 225 fathoms (65 to 197 fathoms, 1883). Common, widely diffused, and often very abundant.

*Archaster Floræ* Verrill. 1879. Fig. 36.

B. range, 86 to 410 fathoms (197 to 239 fathoms, 1883). Common, and widely diffused; locally abundant.

*Archaster robustus* Verrill. 1884.

B. range, 938 to 1,467 fathoms, 1883. Not rare in the deeper dredgings.

*Archaster grandis* Verrill. 1884.

B. range, 1,106 to 2,033 fathoms, 1883. Common; very abundant locally.

*Archaster Agassizii* Verrill. 1880.

B. range, 182 to 1,342 fathoms (499 to 1,342 fathoms, 1883). Common and widely diffused; locally sometimes very abundant.

*Archaster Parelii* Düben & Koren. Fig. 37.

B. range, 225 to 1,608 fathoms (547 to 1,608 fathoms, 1883). Not rare, but always in small numbers.

*Archaster formosus* Verrill. 1884.

B. range, 1,467 to 1,608 fathoms, 1883. Not common.

*Archaster tenuispinus* Düben & Koren. Fig. 38.

B. range, 368 to 1,731 fathoms (888 to 1,731 fathoms, 1883). Common; often abundant locally.

*Archaster sepius* Verrill. 1885.

B. range, 368 to 858 fathoms (858 fathoms, 1883). Rare.

*Benthopecten spinosus* Verrill. 1884.

B. range, 855 to 1,917 fathoms, 1883. Common; locally abundant.

*Luidia elegans* Perrier. 1876 (Verrill, 1880). Figs. 39, a.

B. range, 53 to 192 fathoms (65 to 70 fathoms, 1883). Common; sometimes abundant locally.

*Luidia clathrata* (Say):

B. range, shore to 25 fathoms, south of Cape Hatteras (15 to 19 fathoms, 1883). Southern; common in shallow water.

*Porcellanaster cæruleus* W. Thomson. Figs. 40, 41.

B. range, 906 to 1,917 fathoms, 1883. Frequent; sometimes abundant.

#### OPHIUROIDEA.

*Ophioglypha Sarsii* (Lützk.) Lyman.

B. range, 30 to 1,608 fathoms (65 to 1,608 fathoms, 1883). Common, widely diffused; large and often very abundant at moderate depths in the course of the Arctic current, off Martha's Vineyard.

*Ophioglypha signata* Verrill. 1882.

B. range, 65 to 640 fathoms, 1883. Common in moderate depths.

*Ophioglypha confragosa* Lyman. 1878.

B. range, 238 to 2,033 fathoms (2,033 fathoms, 1883). Not common.

*Ophioglypha bullata* W. Thomson.

B. range, 1,608 to 2,221 fathoms, 1883. Not rare; local.

In respect to the large rounded scales of the disk, our larger specimens agree closely with the description of *O. convexa*, to which I at first referred them. Other characters agree better with *O. bullata*.

*Ophioglypha lepida* Lyman. 1878. Var. *spinulosa* Verrill. 1884.

B. range, 888 to 1,497 fathoms, 1883. Extremely abundant in several localities.

The disk is flat and thin; the scales thin, unequal, rather irregular in size, with curved margins; and there are small sharp spinules scattered over the disk. The arms are slender, and there is a single, longer, upper spine rather widely separated from the two lower and much smaller ones, close to the tentacle-scales.

*Ophioglypha Ljungmani* Lyman. 1878 (†).

B. range, 843 to 1,467 fathoms. Common.

This species is very closely allied to the preceding, and, like it, usually has, when perfect, a few small spines scattered on the disk; but the disk is much thicker, and the arms higher at base. The mouth-shields are larger and longer, emarginate laterally; disk scales coarser; the jaws more acute; mouth-papillæ, four or five, short, flat rounded, except the inner one.

*Ophiomusium Lymani* W. Thomson.

B. range, 238 to 2,033 fathoms (640 to 2,033 fathoms, 1883). Abundant and large in many localities.

*Ophiomusium armigerum* Lyman. 1878.

B. range, 1,731 to 2,369 fathoms, 1883. Abundant locally.

*Ophiochiton grandis* Verrill. 1884.

B. range, 888 fathoms, 1883. Rare.

*Ophiomitra spinea* Verrill. 1885.

B. range, 2,038 fathoms, station 2,035, 1883. Two specimens.

A large species resembling *O. valida*. Arms five, long and stout; disk five-lobed, indented between the arms; radial shields moderately large, irregularly ovate, with a small notch in the broad outer end; their inner ends are separated by a wedge of small scales, but the outer ends are in contact, or nearly so; disk-scales rather small, unequal, bearing small, low, conical spinules or granules; a few granules on the outer end of radial shields and bases of the arms. Arm-spines, eight or nine at base of arms, long, slender, acute, sharply thorny, arising from prominent side plates; the middle spines are the largest and roughest; the rows do not meet above at base of arms. Mouth-shields rhombic, with incurved lateral margins; the inner angle acute, the outer one obtuse or rounded; side mouth-shields thickened, crescent-shaped; tentacle-scale rather large, those at base of arm wide, flat, and obtuse; farther out lanceolate and rather acute. Mouth-papillæ numerous, unequal, rather irregular and crowded at the outer mouth-angles, where they form two or more rows; in the largest example there are eighteen to twenty, or more, in each angle; in the smaller one about twelve; they are mostly rather slender, spiniform, or papilliform, the outermost one wider and more flattened. The larger specimen has the disk 14<sup>mm</sup> in diameter; the smaller one, 11<sup>mm</sup>.

*Ophiacantha bidentata* (Retz.) Ljung; Lyman (*pars*) "Challenger" Ophiuroidea.

*Ophiacantha spinulosa* (M. and Tr.) Lyman, Illus. Catalogue Mus. Comp. Zoology.

B. range, 40 to 351 fathoms (101 to 351 fathoms, 1883). Common northward, in moderate depths, from Massachusetts Bay to Greenland.

The form here intended is the same as that described and figured by

Lyman, Lütken, Duncan and Sladen, and others as *O. spinulosa*, from northern waters. Lyman's deep-water specimens, some of which I have examined, belong in part at least, to the following species.

*Ophiacantha fraterna* Verrill, sp. nov.

B. range, 908 to 1,608 fathoms. Common.

Disk rounded, rather swollen, with ten slightly raised radial ridges made by the radial shields, which have the outer ends small, a little prominent and naked. The surface of the disk is covered with very small, short, obtuse, rough spinules, terminated by several minute sharp thorns; usually mixed with these there are many small, rather rough conical granules, of about the same size. Arm-spines at base of arms about eight, longest on the second and third joints beyond the disk, but the rows are not closely approximated dorsally. The upper spines are long, very slender, acute, and but slightly roughened; the middle ones are a little thorny; the lower ones comparatively short. Tentacle-scale flattened, small, tapered, subacute. Ventral arm-plates narrow, about as long as broad, strongly convex on the outer margin, and with a distinct angle on the inner. Mouth-shields small, transversely cross-shaped, with a small outer lobe extending a little on the interbrachial spaces, and with a small, very obtuse angle on the inner margin, the side lobes much larger and more prominent. Side mouth-shields rather wide, somewhat crescent-shaped, strongly curved. Mouth-papillæ about three on each side, besides a larger one below the teeth; they are rather long, spiniform, and acute, the outer one not differing from the rest. Color in alcohol dull brownish yellow, usually with darker brown blotches on the arms and disk. Diameter of disk, usually 9 to 12<sup>mm</sup>.

This species has hitherto been confounded with *O. bidentata*, which it resembles. It differs in the smaller size and different character of its disk-spinules, in the rougher spines, smaller and more acute tentacle-scales, and in the sharp, spiniform, outer mouth-papillæ. The mouth-shields have an outer lobe extending somewhat on the interbrachial spaces, though less so than in *O. millespina* and several other species.

*Ophiacantha varispina* Verrill, sp. nov.

B. range, 101 fathoms, off Nova Scotia.

Disk slightly five-lobed, covered on the central part with small, elongated, tapered, acute, rough spines, which are gradually replaced toward the margins by shorter and stouter, very rough, obtuse stumps, surmounted by a group of sharp, rough spinules; radial shields slightly exposed at the prominent outer end. Arms slender; the spines about eight, somewhat rough, glassy; the upper ones long, slender, acute, the rows nearly meeting on the second joint beyond disk; the lower ones are shorter and very slender; tentacle-scale flat, subspatulate, broadly rounded at the end. Ventral arm-plates near base of arms not much broader than long, rather pentagonal, the outer edge curved, or



subtruncate in the middle, the inner edge nearly straight or slightly angulated centrally. Mouth-shields strongly four-lobed, the inner angle acute, with concave sides, the lateral lobes prominent, subacute, the outer lobe smaller, obtuse, extending somewhat on the interbrachial area; side mouth-shields wide, not very long, somewhat crescent-shaped, the outer margin convexly arched to fit the concave sides of the mouth shield. Mouth-papillæ mostly flat and broad, lanceolate or obtuse, three or four on each side besides the infradental; a slender, smaller one often stands out of line, back of the outermost, which is flatter and more obtuse than the others. Color yellowish brown, with darker blotches on disk and arms. Diameter of disk, 9<sup>mm</sup>; length of arms, 35<sup>mm</sup>. Station 2069, in 101 fathoms, off Nova Scotia. Peculiar in the mixture of sharp spines and obtuse thorny stumps on the disk. General appearance much as in *O. bidentata*.

*Ophiacantha granulifera* Verrill. 1885.

B. range, 101 to 200 fathoms, off Nova Scotia.

Disk five-lobed, covered with small rounded and conical, slightly rough granules; radial shields form ten rather prominent ridges, naked only at the rounded and prominent outer end; interbrachial spaces beneath scaly, with few granules. Arms rather broad. Arm-spines eight to nine at base of arms, the rows not approximating dorsally; the upper ones are long, very slender, acute, slightly roughened; the middle ones are stouter and distinctly thorny; the lower ones much shorter; tentacle-scale small, lanceolate, subacute, except on the two first joints, where they are obtuse and flattened, and sometimes two together; side arm-plates broadly united ventrally; ventral arm-plates unusually broad and short, especially on the second to seventh joints, where they are transversely oblong, the outer margin nearly straight or slightly emarginate, the inner edge with a slight median angle; farther out they become longer, narrower, and somewhat trapezoidal. Mouth-shields small, somewhat cruciform, with a small outer lobe, an obtuse inner angle, and with acute lateral lobes. Side mouth-shields larger, broad, strongly curved, thickened, and minutely granulose. Mouth-papillæ all spiniform, three or four on each side, besides a larger one below the teeth. Color light brownish yellow, with darker blotches on the arms. Diameter of disk, 9<sup>mm</sup> to 11<sup>mm</sup>. Easily distinguished by the short, wide, ventral arm-plates and the small, close, granules on the disk.

*Ophiacantha enopla* Verrill. 1885.

B. range, 351 to 640 fathoms, 1882, 1883.

Easily distinguished by having numerous mouth-papillæ, the outer ones forming a crowded group at the end of the mouth-angles. The disk is covered with small obtuse or rounded granule-like stumps, slightly spinulated at the end. The arm-spines are long and slender, glassy, seven or eight near the base of the arms, forming a nearly continuous band on the dorsal side. Color in life, orange.

*Ophiacantha abyssicola* G. O. Sars.

B. range, 1,000 to 1,608 fathoms, 1883. Not uncommon. Very closely allied to the next, and perhaps identical.

*Ophiacantha millespina* Verrill. 1879.

B. range, 100 to 1,917 fathoms, 1883. Abundant and widely diffused.

*Ophiacantha aculeata* Verrill. 1885.

B. range, 1,346 to 1,395 fathoms, 1883.

A large species, with five unusually long, gradually tapering arms. Disk rounded and swollen, throughout evenly covered with small, slender, elongated spinules, having rough sides and terminated by four to six slender, rough, divergent points. These disk-spinules are less crowded, smaller, longer, and more slender than in *O. bidentata*. End of radial shields not exposed. Arm-spines very long, slender, nearly smooth, eight or nine at base of arms, those next to the edge of disk decidedly longer and forming an almost continuous band above. Tentacle-scales rather wide, but with acute tips at base of arms, rapidly becoming smaller and acute-lanceolate farther out. Mouth-shields rather small, rounded externally, and not extending much on the inter-brachial spaces, obtuse-angled on the inner side. Jaws broader and more obtuse than in most species. Mouth-papillæ rather slender, usually three or four on each side of a jaw, besides the median one; the outer one is largest, broad and flat at base, rapidly narrowed toward the acute end; the next two are more slender, spiniform, and acute; sometimes an additional smaller one stands out of line, behind those in the regular row. Color, light orange or buff. Diameter of disk of a large example, 17<sup>mm</sup>; length of arms, 110<sup>mm</sup>. Stations 2034 and 2105, in 1,346 to 1,395 fathoms, on *Brisinga elegans* V.

*Ophiacantha anomala* G. O. Sars.

B. range, 101 to 131 fathoms, off Nova Scotia, 1883. Not common; chiefly northern.

This species is easily recognized by having regularly six arms. The disk is covered with rather large and coarse stump-like spinules, rough at the obtuse or rounded summit.

*Ophiacantha spectabilis* G. O. Sars.

B. range, 131 fathoms, off Nova Scotia, 1883. One specimen only.

This species has smoothish, tapering, acute spines on the disk. The mouth-papillæ are slender, tapering, and acute.

*Ophiacantha crassidens* Verrill, Amer. Journ. Sci., February, 1885.

B. range, station 2115, in 843 fathoms, off Cape Hatteras.

This large species is easily distinguished by its disk, covered with small, conical, acute spines, and by the remarkably large, rough, and thick mouth-papillæ, which are crowded. The arm-spines are rather short and blunt. The color is dark brown in alcohol.

*Ophiacantha gracilis* Verrill, sp. nov.

B. range, 220 to 858 fathoms, mostly off Nova Scotia, on Gorgonians.

A small, delicate species, with long, slender, attenuated arms. Disk round and full, covered with relatively large, easily visible scales, each of which bears a rather large and high columnar spinule, a little enlarged at the summit and terminated by five or six or more, slender, sharp, divergent points. Arm-spines along most of the length of the arm, four or five, short for the genus, being about half as long as an arm-joint; the small upper one is tapered; the lower ones are stouter, rough, blunt, and hooked at the end; the lowest is largest and most hooked; on the two joints next to the disk the five spines are much longer, very slender, tapered, acute; the two upper ones twice as long as an arm-joint. Tentacle-scale, small, spiniform; mouth-papillæ few, about three on each side of a jaw, besides a larger, odd, terminal one; the lateral ones are small, spiniform; the two outer ones stand a little back from the slit, like tentacle-papillæ; mouth-shields small, narrow, rounded without; acute, angular within; side shields, large, angular; ventral arm plates widely separated, elongated, rounded on the outer edge; the inner end with an angular median point. Diameter of disk, 3.5<sup>mm</sup>; length of arms, about .22<sup>mm</sup>. Probably young, but very unlike the young of any of our other species.

*Ophiolebes Acanellæ* Verrill, Amer. Journ. Sci., February, 1885.

B. range, 91 to 122 fathoms, off Nova Scotia.

Disk rounded, smaller, covered above and below with rather large globular or capitata stumps, minutely spinulose at the end. Arms short. Arm-spines at base of arms, six or seven, short, obtuse, rough, with small spinules; the four, lower are shorter and stouter than the upper ones, with a blunt or clavate, rough, thorny tip; the upper ones are more cylindrical, but mostly blunt, shorter than the breadth of the arm-joint; the lower groups of three or four spines extend nearly to the mouth-angles. Mouth-papillæ, three or four on each side, small, nearly equal, rounded, obtuse. Diameter of disk, 6<sup>mm</sup>. Station 2071, on *Paramuricea borealis*, in 113 to 122 fathoms, off Nova Scotia.

*Ophiopholis aculeata* Gray.

B. range, shore to 1,000 fathoms (18 to 1,000 fathoms, 1883). Very common and widely diffused as far south as off Cape Hatteras.

*Amphiura Otteri* Ljungmann (?); Lyman.

B. range, 182 to 1,608 fathoms (487 to 1,608 fathoms, 1883). Not uncommon.

In this species the disk is covered with small scales, above and below the radial shields are elongated, wedge-shaped, with a narrow group of scales between their divergent and tapered inner ends. The arms are very long and rather slender, flattened, usually with about six spines toward the base, but in large specimens there may be as many as eight; they are moderately long, tapered, and, except the upper

ones, mostly a little bent toward the end, with the tip slightly hooked. Two flat, blunt tentacle-scales, which are very small and indistinct in young specimens; a pair of stout mouth-papillæ at the end of each jaw, and one smaller spiniform one on each side, a little farther back; a stout, erect, spiniform tentacle-papilla at the outer end of the mouth-slit on each side.

*Amphiura fragilis* Verrill, sp. nov.

B. range, 239 to 1,467 fathoms.

Disk, five-lobed, covered above with small, delicate scales, naked beneath; radial shields, pear-seed-shaped, slightly divergent, the inner ends separated by a narrow row of scales. Arms long and slender; Arm-spines, four or five near the disk, usually four along the middle and three toward the tip of the arms; they are subequal in length, the upper one a little longer and more enlarged toward the base, the tips obtuse and minutely roughened or spinulose on one side. Tentacle-scale absent or rudimentary. Mouth-shields small, rounded; side mouth-shields rather broad. Mouth-papillæ, four to each angle; a pair of large, stout, blunt ones stand at the end of the jaw, and a much smaller, spiniform, acute one a little farther back on each side; there is also an acute, spiniform, erect papilla outside of the mouth-tentacle, opposite the outer angle of the mouth-slits, as in *A. Otteri*. Ventral arm-plates, subquadrate, longer than broad, with the outer angles rounded and the inner ones truncated; farther out they become shorter and somewhat five-sided, with the outer margin rounded and the inner corners so much truncated as to form a median angle. Diameter of disk of an ordinary specimen, 5<sup>mm</sup>; length of arms, about 30<sup>mm</sup>. Resembles the young of *A. Otteri*, but differs in lacking tentacle-scales and in having the disk naked below, and in the arm-spines, which are not curved.

*Amphiura macilenta* Verrill. 1882.

B. range, 53 to 115 fathoms (70 fathoms, 1883). Very abundant locally, in moderate depths, as far south as off Cape Hatteras.

*Amphiura Goësi* (Ljung.) Lym.

B. range, 14 fathoms, station 2114, off Cape Hatteras.

*Amphiura tenuispina* (Ljung.) Lyman. Fig. 55.

B. range, 115 to 487 fathoms (407 fathoms, 1883). Not uncommon.

*Amphilepis Norvegica* (Ljung.) Lym.

B. range, 547 to 1,608 fathoms, 1882, 1883. Common and large.

*Ophiocnida olivacea* Lyman. 1869.

B. range, 63 to 192 fathoms (131 fathoms, 1883). Sometimes abundant locally.

*Ophioscolex glacialis* Müller & Troschel.

B. range, 101 to 1,000 fathoms, 1883. Common.

*Ophioscolex quadrispinus* Verrill. 1884. Figs. 56, 56a, 56b.

B. range, 101 to 234 fathoms (101 fathoms, off Nova Scotia, 1883).  
Rare.

Disk swollen; arms five, long, attenuated distally. The disk and base of arms are covered with a thick soft skin, with close wrinkles or small rounded verrucæ above, becoming concentric and radial wrinkles beneath, but beyond the basal part of the arms becoming smoother and thinner, concealing the feebly developed arm-plates. Arm-spines four, or alternately three and four, near base of arms (three in young examples), nearly equal, rather stout, tapered; lower ones blunt; upper, acute in part, scarcely as long as the breadth of the arm. Tentacle-scale small, tapering, acute; teeth, six to eight or more, rather slender, acute, often in pairs; mouth-papillæ, small, slender, acute, unequal, eight to ten on a side of each angle, besides two or three larger ones outside of the second mouth-tentacle and one within the slit at the first mouth-tentacle; the outer papillæ in large specimens are crowded so as to form two or more rows. Large examples have the disk 14<sup>mm</sup> in diameter; length of arms, 70<sup>mm</sup>. Stations 1121 and 2069; also Gulf of Maine, station 38, in 112 fathoms, 1878.

*Hemieuryale tenuispina* Verrill. 1885.

*Astronyx? tenuispina* Verrill, Amer. Journ. Sci., vol. 28, p. 219, 1884.

B. range, 1,362 to 2,033 fathoms, 1883. Locally abundant on *Scleroptilum gracile* V.

The disk is covered with thin roundish scales, visible when dried, without granules; radial shields prominent distally; arms with small scales above, and larger prominent ones along the sides; spines three, the upper longest; tentacle-scales small, spiniform; mouth-shield small, rhombic; mouth-papillæ several, small, in a regular row.

*Astrochele Lymani* Verrill. 1878. Fig. 53.

B. range, 264 to 1,608 fathoms; 407 to 1,608 fathoms, 1883. Abundant on *Acanella*.

*Astronyx Loveni* Müller and Troschel. Figs. 54, 54a, b.

B. range, 787 to 1,362 fathoms (843 to 1,362 fathoms, 1883). Common on Pennatulacea.

*Gorgonocephalus Lamarckii* Lyman.

*Astrophyton Lamarckii* M. & Tr., Syst. Ast., 1842.

B. range, 150 to 300 fathoms (194 fathoms, 1882; 239 fathoms, 1883). Common off Nova Scotia on Alcyonaria.

## CRINOIDEA.

*Antedon dentata* (Say) Verrill. Fig. 58, young.

B. range, 69 to 640 fathoms (69 to 487 fathoms, 1883). Common; sometimes abundant locally.