

*Leptophidium profundorum*, Gill.

Specimens of *Leptophidium profundorum*, Gill, were obtained from the following stations:

Number.	North latitude.	West longitude.	Depth.
2378 .....	29° 14' 30"	88° 09' 30"	<i>Fathoms.</i> 68
2402 .....	28 36 00	85 33 30	111
2350 .....	23 10 39	82 20 21	213

NOTICE OF RECENT ADDITIONS TO THE MARINE INVERTEBRATA OF THE NORTHEASTERN COAST OF AMERICA, WITH DESCRIPTIONS OF NEW GENERA AND SPECIES AND CRITICAL REMARKS ON OTHERS.

PART V.—ANNELIDA, ECHINODERMATA, HYDROIDA, TUNICATA.

By A. E. VERRILL.

ANNELIDA.

*Polynoë Acanellæ* Verrill.

Verrill, Trans. Conn. Acad., vol. iv, p. 324*b*, pl. 6, figs. 5, 5*a*, 1881; pl. 14, figs. 9, 9*a*, 9*b*.

Verrill, Report U. S. Fish Com. for 1883, [p. 23], pl. 39, figs. 172, 172*a*, 172*b*, 172*c*, 1885.

Body elongated, strongly depressed, moderately wide, widest at about the anterior third, tapering to the posterior end, composed of about sixty-five setigerous segments. Scales thin, nearly smooth to the naked eye, moderately large, but usually leaving the middle of the back uncovered, broad-ovate or roundish in form, with a smooth, even margin. The surface under a microscope shows numerous minute, blunt, sub-conical papillæ, of nearly uniform size. Head broader than long, with the sides well-rounded, narrow posteriorly, strongly bilobed in front, the lobes terminating anteriorly in small, conical papillæ. Eyes large, dark blue, the anterior ones about opposite the posterior base of the middle antenna; the posterior pair a little behind the middle, looking a little backward. Median antenna rather long, the length equal to about three times the length of the head, slender, with a rather stout basal article. Palpi stout, gradually tapered to the acute tip, smooth, of about the same length as the median antenna. The two upper tentacular cirri are of nearly the same length as the palpi, but much more slender; the inner ones are much smaller, scarcely more than one-third the length of the palpi. The ventral cirri of the first segment are long and slender, about as wide as the median antenna, and about three-fourths as long. The proboscis is large, usually exerted in preserved specimens, dark brownish purple in color, with eighteen marginal, pale purple papillæ, centered with a dark purple line. Dorsal cirri long, slender, smooth, delicately tapered, extending beyond the ends of the setæ. Ventral

cirri much shorter, gradually tapered, small, acute, reaching a little beyond the end of the setigerous lobe. The setæ are numerous, in moderately large clusters; the dorsal fascicles are much smaller than the ventral, with much shorter setæ, which are scarcely more than one-fourth as long as the ventral ones on the posterior segments and about a third as long on the anterior ones. The dorsal setæ radiate in different directions, while the ventral setæ are in two groups which are only a little divergent. In the preserved specimens the dorsal setæ are often angular or have the sides more or less concave toward the tips; they are crossed by numerous rows of very minute spinules, which do not extend quite to the acute tips. The ventral setæ have a slender, smooth shaft, with a somewhat broader, lanceolate, terminal portion, which is closely and sharply spinulated on one side along the broadest part, but naked and a little incurved at the acute tip; the lowest ones are smaller and have the terminal portion more bent. The diameter of the largest of the dorsal setæ is about equal to the broadest portion of the ventral setæ. The color of the setæ is translucent, pale amber. The scales are translucent, pale yellowish white, usually more or less specked or stained with pale orange-brown, and with a somewhat brilliant iridescence in certain lights. The body in the preserved specimens is yellowish white or pale salmon, with the parapodia a little paler; sometimes the median dorsal portion of the segments is tinged with purplish brown.

Length of the largest specimens, in alcohol, about 75<sup>mm</sup>; greatest breadth, not including setæ, 10<sup>mm</sup>; with setæ, 15<sup>mm</sup>; breadth of head, about 1.5<sup>mm</sup>.

This species is very abundant on the Gulf Stream slope, off Martha's Vineyard, in deep water, wherever *Acanella Normani* is found. It lives among the close branches near the base of this coral, a dozen or more frequently occurring on a single *Acanella*. Most of the specimens when obtained had cast off many or all of their scales, and many of them had lost their posterior segments.

This species is readily distinguished from most of our other species of *Polynoë* by the very elongated form of the body, composed of an unusual number of segments, and the large, dark purple proboscis. It resembles, in general appearance, *P. spinulosa* V., with which it is often associated, more than any other species.

Stations 894 and 895, in 365, 238 fathoms, 1880, abundant. Also from numerous other stations in 146 to 500 fathoms, in later years.

*Polynoë aurantiaca* Verrill, sp. nov.

Verrill, Trans. Conn. Acad., vol. iv, pl. 14, figs. 8, 8a, 8b.

Verrill, Report U. S. Fish Com. for 1883, [p. 22], pl. 40, figs. 173, 173a.

Body large, stout, broad, tapering somewhat posteriorly, composed of 35 to 37 setigerous segments, covered entirely with 16 to 18 pairs of smooth, thin scales, of which the last two pairs are very small; the first pair rounded; the rest broad reniform. Color bright orange-red, when

living. Head small, prominent, convex above, rounded laterally, narrowed posteriorly and in front; the lateral lobes pass directly into the basal article of the lateral antennæ, while the base of the median one is scarcely larger, and directly between them. Eyes blue, situated on the convex lateral surfaces of the head; the anterior ones are a little the larger, looking outward and slightly forward, the posterior ones looking outward and backward. Antennæ remarkably small, smooth, acute; the median one, with its base, is scarcely longer than the head; the lateral ones are about one-fourth shorter. Tentacular cirri also small, the long one rather larger and nearly twice as long as the median antenna, and exceeding the length of the head, smooth, with acuminate tip. The other cirri are similar to the lateral antennæ in size and appearance, and, like them, are tipped with dark pigment. Elytra are borne on segments 1, 3, 4, 6, 8, . . . 22, 25, 28, &c. They are large, broad-reniform, very thin and soft, translucent, perfectly smooth and without fringe. Dorsal cirri well-developed, resembling the large tentacular cirri in size and appearance, abruptly acuminate at the tip, and scarcely smaller below it. Parapodia large and stout; setigerous lobe of the lower ramus with two swollen lips, giving exit to a small upper fascicle of slender, acute, sparingly serrulate, golden setæ, and a few lower ones, which are stouter and nearly smooth. Upper ramus represented by a small rounded papilla, without setæ. Ventral cirrus small, short, acute, tipped with brown. Ventral papillæ small, but distinct, at the origin of the parapodia. Posterior segments and appendages very small. Length 40 to 50<sup>mm</sup> or more.

Lives among the tentacles of large actinians (*Bolocera Tuediæ*).

Stations 879 and 880, in 225 and 252 fathoms, 1880, and at numerous other localities in subsequent seasons, in 160 to 317 fathoms.

*Leanira robusta* Verrill, sp. nov.

Verrill, Trans. Conn. Acad., vol. iv, pl. 14, figs. 10, 10a, 10b.

Verrill, Report U. S. Fish Com. for 1883, pl. 41, fig. 173, 1885.

Body large, stout, tetragonal, resembling *Leanira tetragona*. Parapodia with a large dorsal branchial lobe, rather longer than the setigerous lobe, from which it is separated by a rather wide interval, which is covered by large cilia. Upper setigerous lobe rather small, lanceolate, nearly as long as the lower, with a short dorsal cirrus, and with a superior cluster of slender cirriform processes. Lower setigerous lobe much larger and broader than the superior one, blunt at the tip, with a slender ventral cirrus, a large superior and a small inferior group of cirriform processes. Dorsal setæ very slender, a little enlarged and spinulose on each side, near the end, and tapered to a very acute tip. Ventral setæ much stouter and somewhat longer, with a slender, tapering, very acute terminal article.

Stations 873, 876, 877, off Martha's Vineyard, in 100 to 126 fathoms, 1880, and at several other stations in subsequent years.

**Amphinome Lepadis** Verrill, sp. nov.

Verrill, Trans. Conn. Acad., vol. iv, pl. 23, fig. 3.

Body stout, appearing squarish, broadest in the middle, tapering both ways, convex above. Head small, slightly bilobed in front. Caruncle cordate, as seen from above, with thickened edges, the emargination in front at the origin of the middle antenna; two front antennæ orange, directed forward, tapered, subacute, about equal in size and length to the median, and about equal to the breadth of the head, or buccal segment, two lateral antennæ stouter, rather shorter, bent downward. Two first setigerous segments have no gills, but below the setæ in each ramus is a cirrus; the upper ones are like the antennæ in size and length, and as long as the setæ; ventral ones smaller, tapered, all orange, with pale tips; setæ white, brittle. Branchiæ begin on the third setigerous segment. They are large and finely arborescently branched; color deep brown, with orange tips; stems short, dark brown. Back dark purplish brown, with bluish luster.

The largest specimens are 70<sup>mm</sup> to 100<sup>mm</sup> long; 12<sup>mm</sup> broad.

Taken on floating timber in the Gulf Stream, among goose-barnacles (*Lepas*). In confinement it continually crawled in and out of *Teredo* burrows.

**Leodice Benedicti** Verrill, sp. nov.

This species somewhat resembles *L. polybranchia*, but is more slender in form, much less thickened anteriorly. It has much fewer branchiæ, which do not extend to the middle of the body. The superior antennæ are much longer and more slender. The buccal segment is much smaller and shorter.

The body is moderately large, not very stout, broadest along the anterior third, narrowing toward the head and gradually tapering toward the tail. The anterior segments, back to about the eighth, are strongly convex dorsally, while those which succeed are depressed and broader. The segments along the middle and posterior regions of the body are more elongated than the anterior ones, but the latter are not so short and crowded as in *L. polybranchia*. The branchiæ commence on the third body-segment, as simple slender cirri, and become pectinate on the fifth; they occur on about thirty segments. The anterior ones are pectinate, with about six long, slender papillæ; farther back, on the eighth segment, they become much larger, in length being equal to about one-half the breadth of the body, and bear twenty or more long, slender, tapering papillæ. The head is short, thick, and slightly bilobed or emarginate in front. It bears five slender tapering antennæ, of which the median-dorsal and outer-lateral ones are much shorter than the superior-lateral pair. The latter, when turned back, reach to about the tenth body-segment; they are very long, slender, and delicately tapered. The median antenna, in the specimen examined, is about equal in length to the outer lateral, and is not more than one-eighth the length of the superior lat-

eral antennæ. (In the specimen described it may have been lost and reproduced.) The eyes are black, rather conspicuous, and situated between the bases of the lateral antennæ. The anterior part of the buccal segment is not much elongated on the dorsal side, or scarcely longer than the posterior half; its anterior dorsal margin is deeply concave behind the antennæ, but on the sides advances toward the anterior margin of the head so as to partially cover the eyes and sides of the head. The posterior portion of the buccal segment is about equal in length to the succeeding segments, it bears a pair of slender, tapering tentacular cirri, which extend forward to the front margin of the head and are about equal in length to the lateral antennæ, though somewhat more slender. The parapodia of the first segment are small and have a small, conical, tapering, dorsal cirrus and a ventral cirrus of the same form, but shorter and less acute at tip; the setigerous lobe is rudimentary. On the next two segments the dorsal cirrus becomes long, slender, and tapered to the tip, and the ventral cirrus is elongated, round, somewhat fusiform and subacute at tip. The setigerous lobe on the second segment is small and bears a cluster of setæ; it increases in size and number of setæ on the following segments. On the sixth and succeeding segments the ventral cirrus has the base thickened and swollen; this gradually increases in size, while the terminal portion diminishes in length and becomes reduced to a low, conical tubercle, but on the posterior segments it again becomes a small, round, tapered papilla. The caudal cirri are long, very slender, tapered to a fine tip, about equal in length to the twelve last segments.

Station 865, 1880, and 943, 1881, in 65 and 157 fathoms.

This species is named in honor of Mr. J. E. Benedict, of the United States Fish Commission.

**Leodice polybranchia** Verrill.

Verrill, Proc. U. S. Nat. Mus., vol. iii, p. 357, 1880.

Verrill, Trans. Conn. Acad., vol. iv, p. 323, pl. 14, figs. 7, 7a, 7b.

Verrill, Report U. S. Fish Com. for 1883, [p. 22], pl. 41, fig. 180, a, b, 1885.

Body large, much elongated, composed of very numerous short segments, much thickened and rounded anteriorly; somewhat depressed and tapered in the middle and posterior regions. The anterior segments are much shorter and closer than those behind the middle. The dorsal surface of the anterior portion of the body is convex; the ventral surface usually has a shallow median groove. The body is broadest a short distance back from the head, gradually increasing in breadth from the buccal segment to the tenth to twelfth body-segments.

The head is short, rather narrow, deeply emarginate or bilobed in front, and bears five slender, tapering antennæ, of which the three upper are nearly equal and about three or four times as long as the lateral ones. The two frontal lobes or palpi are broadly rounded in front, thick, and turned somewhat downward. The buccal segment bears on

its short posterior annulation a pair of slender, tapering tentacular cirri, which are about equal in length to the lateral antennæ, and when directed forward their tips extend beyond the bases of the superior antennæ. The eyes are small, not conspicuous, and situated between the bases of the two outer antennæ. The head in preserved specimens is often concealed as far as the eyes at the bases of the antennæ, by being retracted beneath the free anterior edge of the large buccal segment, which is about as long as the four succeeding segments. The branchiæ commence on the sixth body-segment and extend to near the posterior end of the body, only about five of the caudal segments being without them. The gills when best developed are pectinate, with about eight long, slender papillæ. The parapodia of the first four or five anterior segments bear a long, slender, tapering, dorsal cirrus; a much shorter, obtuse, papilliform ventral cirrus; and a small, short, round, setigerous lobe. On the sixth and succeeding segments the ventral cirrus becomes a low, rounded or oblong tubercle, surmounted by a minute papilla, but on the posterior segments the ventral cirrus again becomes an elongated, conical, obtuse papilla. The dorsal cirri decrease in length from the second segment backward, but those on the seven anterior segments are distinctly longer than those that succeed them. The setigerous lobe increases in size from the anterior segments backward. The setæ on the anterior segments are few and small, but increase in number and size on the succeeding segments. The caudal cirri are moderately long, slender, acute, in length somewhat exceeding the tentacular cirri.

Stations 865, 871, 872, in 65 to 115 fathoms, 1880; station 950, in 71 fathoms, 1881; stations 1092 and 1109, in 202 and 89 fathoms, 1882, and at many other stations in later years, in 60 to 258 fathoms.

**Hyalinœcia artifex** Verrill.

Verrill, Proc. U. S. Nat. Mus., vol. iii, p. 358, 1880.

Verrill, Trans. Conn. Acad., vol. iv, p. 323, pl. 14, figs. 6-6*d*; pl. 17, figs. 14, *a*, *b*, 14*a*, 1881.

Verrill, Bull. Mus. Comp. Zool., vol. xi, p. 45, pl. 6, figs. 1, *g*, *h*, *k*, *j*, *i*, 1883.

Verrill, Report U. S. Fish Com. [p. 22], pl. 41, figs. 178, *a*, *b*, 178*a*, 179, *a*, *b*, *c*, *d*, *e*; pl. 44, fig. 177, 1885.

Body much elongated, composed of very numerous segments, broad and strongly depressed, except near the anterior end, where the body becomes narrower and thicker to the buccal segment, which is nearly as high as broad. The anterior segments are much longer than those farther back, strongly convex above, and with a broad and deep ventral furrow in the preserved specimens. These segments are widest and somewhat swollen at the front edge, narrowing backward in the middle and posterior regions; the segments are short and closely crowded, less convex above, nearly flat, and with a shallow groove beneath; these segments have only a slight constriction between them on the dorsal and ventral surfaces, while those of the anterior region have a much

more marked constriction. The post-buccal segment is longer and somewhat broader than those which succeed it; its breadth on the ventral surface is more marked than on the dorsal, the sides are swollen and extend forward to the parapodia, which are very large and conspicuously directed forward and downward so as to have a somewhat claw-like appearance; the dorsal margin of this segment is nearly transverse, but often has a slight median lobe; the outline on the ventral side is deeply concave. The next segment and its appendages are also larger than those which follow, but not so conspicuously different as the post-buccal; its parapodia are large and project forward, but not so strongly as the preceding ones; dorsally it does not differ much from those which follow, but on the ventral side it is somewhat longer and is only partially crossed by the ventral groove. The next two or three segments show a transition to the ordinary segments of the anterior region, the parapodia becoming less prominent and less turned forward, while the ventral cirrus becomes gradually reduced in length. The buccal segment is narrower and shorter than the post-buccal, and bears no appendages.

The cephalic lobe is short, narrower than the buccal segment, and bears five long, slender, tapering antennæ, which are arranged nearly in a transverse line; of these the three upper are nearly equal in length, while the lateral ones are about one-third the length of the others; all have large, conspicuous, basal articles, which are crossed by about three conspicuous annulations. The two frontal antennæ are in the form of small, short, rounded, obtuse verrucæ, standing out close together from the anterior margin of the head. The palpi are more than twice as large as the frontal antennæ, and situated just below; they are short, thick, rounded verrucæ in contact at their bases, directed forward and downward in front of the mouth. No eyes are distinctly visible in preserved specimens, although there are irregular patches of black pigment around the bases of the antennæ. In the preserved specimens two hard, white, acute maxillary plates are usually protruded just below the wrinkled and papillose lower lip, which surrounds them on the lower side like a collar. The parapodia of the post-buccal segment are large, conical, with swollen bases turned forward and downward and strongly transversely wrinkled or annulated around the base; they bear a slender, tapering dorsal cirrus about the middle of the upper side, and a similar, somewhat shorter, ventral cirrus close to the base beneath; the setigerous lobe is large, swollen, obtuse; and bilobed at the end, the upper lobe being flat, obtuse, concave beneath, while the lower posterior lobe is in the form of a small conical papilla of equal length close to the tip; the setæ are amber-colored, usually about three in number, large, stout, spine-like, and curved somewhat downward toward the tip; part of these are usually broken or wanting. On the next segment the parapodia are decidedly smaller and less turned forward; the dorsal

cirrus is somewhat longer and rises nearer the base; the ventral cirrus is nearly as large, but not quite so long as the dorsal, and the setigerous lobe is bilabiate, with the two lips less unequal in size; the posterior one is flattened and a little longer and narrower than the anterior, which is obtusely rounded at the tip. The setæ are more slender, more numerous, less spine-like than in the preceding segments. The parapodia of the third segment are a little smaller than the second, with the dorsal and ventral cirri nearly the same, but the posterior lip of the setigerous lobe becomes decidedly longer, narrower and more tapered, considerably longer than the anterior lip, which is short, flat, and obtusely rounded at the end; the setæ form a fascicle of four or five, and are more slender and acute. The parapodia of the fourth segment differ from those of the third in having the ventral cirrus much reduced in length in the form of a short, somewhat compressed, obtuse papilla slightly separated from the base of the setigerous lobe; the length of the posterior lip of the setigerous lobe is also increased, while the anterior one is more reduced.

On the fifth segment the ventral cirrus becomes still shorter, broader, and more verruciform, while the posterior lip of the setigerous lobe becomes slender, tapering, and cirriform, but the anterior lip becomes more rudimentary. On the succeeding segments the ventral cirrus becomes more and more reduced in length and increased in transverse breadth, in the form of a broad, low wart or cushion, below the bases of the parapodia, which beyond about the twenty-fifth is decidedly broadest in a transverse direction. The branchiæ commence at about the twenty-eighth segment in the form of a long, slender, tapering cirrus arising from the base of the dorsal cirrus, which it at first equals or somewhat exceeds in size and length. Farther back the branchiæ increase in size and length, while the dorsal cirri gradually decrease, so that along the middle region of the body the branchia is long and slender, equal in length to about one-half the breadth of the body, while the dorsal cirrus is a small, slender, tapered papilla, not more than one-eighth as long. The caudal segment is small, narrow, rounded or truncate at the end, and bears two long, slender caudal cirri, nearly as long as the longest antennæ but much more slender.

The color of preserved specimens is light yellow, usually with a brilliant iridescence anteriorly, and usually with a dark brown median dorsal stripe consisting of two rows of spots, a pair to each segment, but the median stripe is not unfrequently absent, especially on the anterior segments.

Stations 869, 879, 880, 881, 894 in 192 to 365 fathoms, 1880. Also taken in great abundance at many stations in subsequent seasons by the Fish Hawk and Albatross, in 110 to 500 fathoms. Among others at stations 2170, 2175, 2178, 2200, in 148 to 452 fathoms, 1884, at all of which it was abundant.

**Nothria conchyphila** Verrill.

Verrill, Trans. Conn. Acad., vol. iv, pl. 23, fig. 4, 1881.

Verrill, Report U. S. Fish Com. for 1883, [p. 22], pl. 41, fig. 181, 1885.

Body elongated, depressed, narrow and slender, of nearly uniform width throughout the greater part of its length. The head is moderately large, short, nearly as broad as the buccal segment. The median and upper lateral antennæ are long, slender, gradually tapered, with a large basal portion composed of seven, eight, or more annulations. The outer lateral antennæ are similar in form, but are scarcely more than half as long as the upper lateral ones. The buccal segment is large, longer, but not so wide as the first body-segment; it is broadest in front and tapers backward to the suture, and bears near its front dorsal margin a pair of small, fusiform tenacular cirri, which scarcely reach forward to the bases of the antennæ. The first body-segment is larger than those that succeed it, broadest anteriorly, narrowed posteriorly to the suture; it bears large, prominent parapodia, which turn somewhat forward and downward. These bear rather long dorsal cirri, rising from beyond the middle of the dorsal side, and a similar but somewhat shorter, slender ventral cirrus, with a cirriform setigerous lobe and a small cluster of setæ between them. The two succeeding pairs of parapodia are similar in form and structure, but are less turned forward, and bear larger fascicles of setæ. Branchiæ commence on the fifth body-segment and have at first three or four divisions; farther back they increase in size and number of pinnae.

Stations 865 to 867 in 64 to 65 fathoms, abundant, and at station 895 in 238 fathoms, 1880; also taken in great abundance at many other stations in subsequent seasons by the Fish Hawk and Albatross, in 65 to 350 fathoms. Especially abundant off Chesapeake Bay and Cape Hatteras in 60 to 100 fathoms.

**Notophyllum Americanum** Verrill, sp. nov.

Verrill, Trans. Conn. Acad., vol. iv, pl. 23, figs. 7, 7a.

Verrill, Report U. S. Fish Com. for 1883, pl. 40, fig. 184, 1885.

Body rather large, elongated, composed of numerous segments, somewhat narrowed toward the head, abruptly narrowed and obtuse at the posterior end. Head rather small, subtruncate posteriorly, somewhat narrowed and obtuse anteriorly, broadest across the eyes, which are large, situated near the posterior angles, and project somewhat beyond the margin of the head. Four frontal antennæ nearly equal, somewhat fusiform, tapered to the tip, in length about equal to the head, each with a dark green spot in the middle. Median antenna much longer than the frontal, similar in shape, and with a similar median spot; it arises from between the eyes. Tentacular cirri four on each side, the two anterior shorter, scarcely more than half the length of the two posterior, but about one-third longer than the median antenna. The two posterior tentacular cirri are rather large, stout, regularly tapered, and about four times the length of the median antenna. Behind the posterior

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dorsal border and at the base of the upper tentacular cirri there is, on each side, a cluster of small papillæ, about five in each cluster. Caudal cirri two, small, rather obtuse, papilliform, projecting but slightly beyond the posterior parapodia, and shorter and more obtuse than the frontal antennæ. The parapodia bear very large dorsal branchiæ, which are broadly rounded, imbricated, and almost completely cover the back; the anterior pair are smaller, narrower, and more ovate than those that succeed them. The posterior branchiæ are more crowded and more closely imbricated than the anterior ones, and entirely conceal the dorsal surface of the body. Color very dark green.

Off Martha's Vineyard, in 100 fathoms, 1881. U. S. Fish Commission steamer Fish Hawk.

***Anaitis formosa* Verrill, sp. nov.**

Verrill, Trans. Conn. Acad., vol. iv, pl. 23, fig. 8.

Body moderately large, rather slender, tapered to both ends. Head moderately large, somewhat pentagonal in outline; it is broadest opposite the eyes, which are situated close to the lateral angles, a little behind the middle. From the lateral angles the head narrows rapidly to the anterior end, which is small and obtusely rounded; posteriorly the head narrows less, and the posterior border is subtruncated in the middle. Eyes rather large, wide apart, black. Frontal antennæ four, subequal, small, slender, tapered to acute tips; their length is less than the breadth of the head. Proboscis, as seen extended, is narrow, cylindrical, and covered with rather large, prominent, obtuse papillæ. Buccal segment is large, broader than the head, and extends forward on the sides of the head to the lateral angles. Tentacular cirri four on each side, similar in form, the two superior ones somewhat longer than the two inferior; they are all thickened a short distance above the base, and then taper gradually to the short acute tips. The longer ones are in length as long as the head and buccal segment together, and extend back to the fourth body-segment in alcoholic specimens. The branchiæ on the first few segments are rather small, ovate; farther back they gradually increase in size until at the eighth they become large, broad-ovate, with the ends well rounded, and conceal the parapodia and a considerable portion of the dorsal surface of the body. Color, pale green, crossed by two conspicuous bands of much darker green on the seventh and eighth body-segments.

Vineyard Sound, Massachusetts, in shallow water; also taken at the surface, August 1, 1881.

***Anaitis picta* Verrill sp. nov.**

Verrill, Trans. Conn. Acad., vol. iv, pl. 14, figs. 1, 1a, 1881.

Body of moderate size, rather slender, gradually narrowed anteriorly, broader and obtusely rounded at the posterior end. Head rounded

laterally, subtruncate posteriorly, broadest near the posterior end, somewhat narrowed to the anterior end, which is subtruncate and rather broad; the lateral and posterior angles are well-rounded. Frontal antennæ small, very slender, equal in length to scarcely more than half the breadth of the head. Eyes moderately large, situated near the lateral angles, at about the posterior third of the head. Buccal segment large, broader than the head, extending forward on the sides of the head beyond the eyes. Tentacular cirri unequal, the two inferior pairs much shorter than the two superior ones; all are thickened or somewhat swollen above the basal article, and then taper gradually to a slender, acuminate tip. The two inferior pairs are nearly as long as the head, the two superior ones about one-third longer; all have a well-defined basal article. The second superior pair evidently arise from the first body-segment. The caudal cirri are very small, scarcely projecting beyond the end of the body, and are of a short elliptical or oblong form, obtuse at the end. The branchiæ on the anterior segments are rather small, obovate, narrowest at the basal end, broadly rounded distally, each with a distinct dark green spot in the middle; farther back they gradually become much larger and broader; posteriorly they become broad-ovate, broadest near the basal end and narrowed distally. The setæ are very long and numerous, in large fascicles, which project far beyond the branchiæ and ends of the parapodia.

The ground-color of the body is pale green or greenish white; along the back are three rows of dark green spots, one row occupying the median line, with a transverse elliptical spot on each segment; the lateral rows are formed by a spot on the sides of each segment, just at the bases of the parapodia. Each branchia has also a dark green spot in the center, which gives the appearance of a dark-green line of spots when the branchiæ lie back in regular imbricated order. On the sixth, seventh, and eighth body-segments there is an appearance of a broad, transverse, interrupted band of dark green color, produced by an increase in the size of the median dorsal spots, which become so large as to coalesce more or less. When closely examined, however, this band can be separated into its constituent spots, separated by paler intervals.

Vineyard Sound, Mass., 1882, in shallow water.

This species is closely related to *A. speciosa*. It may be distinguished by the more slender body; the more heart-shaped head; the longer and narrower form of the branchiæ; and by the different coloration, especially in wanting the clearly-defined band on the seventh and eighth segments, seen in the latter.

*Castalia cincinnata* Verrill, sp. nov.

Body with about forty-six setigerous segments, thickest near the head, tapering back to the narrow, caudal segments. Dorsal surface very convex and prominent, with a median dorsal groove; lower side flat. Para-

podia elongated, prominent, directed rather downward; setæ numerous and long, pale yellow, with a slender terminal article. Head broader than long, truncate or slightly emarginate in front, with the angles prolonged in the form of stout, tapered tentacles, nearly as long as the breadth of the head; hind border narrower. Eyes four, dark-brown, reniform, two anterior twice larger and a little farther apart than the posterior, with a distinct, transparent front lens; the two pairs very little separated. Proboscis short, swollen, with a circle of about twelve small, conical papillæ at the edge, as expanded, and a small, raised, lateral lobe at the base, on each side. Frontal antennæ close to the lateral on each side, much more slender, of about the same length; three pairs of slender tentacular cirri on each side, crowded together, the three upper ones with short, basal joints, very long, thread-like, much longer than the dorsal cirri; these stand above the line of the parapodia. The two first pairs of dorsal cirri are similar in size and length, and also have very large basal joints, more prominent than those of the following ones, which are slender and moderately long. All the cirri are transversely annulated, but not beaded. Near the tip of the parapodia, above, is a small conical cirrus, and another occurs on the lower side at the tip.

Ventral cirrus small, slender, not very long, situated beyond the middle of the parapodia. The papillæ on the proboscis are about four dorsal and four on each side, apparently with none on the ventral side, where there is a groove.

Total length in alcohol 18<sup>mm</sup>.

Station 871, in 115 fathoms, 1880; station 925, in 229 fathoms, 1881; station 2021, in 179 fathoms, 1883.

*Syllis spongiphila* Verrill, sp. nov.

Verrill, Trans. Conn. Acad., vol. iv, pl. 24, figs. 10, 10a, 1881.

Verrill, Report U. S. Fish Com. for 1883, pl. 42, fig. 183, a, 1885.

A large, stout species, composed of numerous segments, which are separated by well-marked constrictions. Head short, broad, nearly semicircular in outline, with the middle of the posterior dorsal edge a little produced backwards in the form of a very obtuse, rounded lobe. Eyes four, the anterior larger and farther apart, situated near the outer bases of the lateral antennæ; the posterior pair are situated behind the bases of the same antennæ. The palpi are large, prominent, projecting forward in the form of broad, ovate, flattened lobes, which in length considerably exceed the length of the head; their outer-posterior edges are broadly rounded, projecting somewhat beyond the margin of the head, while the anterior ends are narrowed, but obtusely rounded at the tips. The odd median antenna is rather long, rising from the posterior margin of the head, and, like the lateral antennæ, it is regularly beaded. The lateral antennæ are about two-thirds as long as the median and somewhat more slender. The tentacular cirri are nearly equal and

similar in size, length, and beading to the median antenna. The dorsal cirri on the first body-segment are stouter and nearly twice as long as the median antenna, which they resemble in form and the character of the beading. On the succeeding segments the dorsal cirri are similar in structure, size, and appearance, but some are considerably shorter than others, with some indications of alternation in length, which, however, does not appear to be regular; but the cirri of the second segment appear to be one-third shorter than those of the first segment. The ventral cirri are short, tapered, and scarcely exceed the setigerous lobe. The setæ are numerous, not very long, nor very slender, with a small acute-triangular terminal article, which is minutely bidentate at tip. Pharynx large, crooked, extending through about seven body-segments, armed near the anterior end by a single small, sharp, conical tooth. Color yellowish white. Length about 25<sup>mm</sup>.

Off Martha's Vineyard to Cape Hatteras, common and often very abundant among sponges and hydroids in 65 to 125 fathoms.

*Ophioglycera*, gen. nov.

Head large, ovate, obtuse, depressed; divided into two parts by a constriction in front of the eyes, the posterior portion with a raised middle area. Antennæ none. Eyes minute. Proboscis long, armed with a ring of denticles, and a large jaw on each side having several teeth, unequal in size; and with a circle of soft papillæ around the orifice. Body large and stout, consisting of very numerous well-defined segments, and divided into two well-marked regions; the anterior region is shorter and more rounded than the posterior, and consists of shorter segments, with very different parapodia, those of the anterior region having prominent, elongated cirri, above and below, with a small, intermediate, three-parted, inferior setigerous lobe, bearing a small fascicle of setæ; upper setigerous lobe rudimentary. The posterior parapodia are much larger, and divided into two flattened, bilobed branches, separated by a rounded space; the lower ramus bears a ventral cirrus, and each bears a large fascicle of setæ.

*Ophioglycera gigantea* Verrill, sp. nov.

Verrill, Trans. Conn. Acad., vol. iv, pl. 15, figs. 1, 1a, 1b; pl. 25, fig. 1, 1881.

Verrill, Report U. S. Fish Com. for 1883, pl. 42, figs. 185, 185a, 1885.

Body large, very long, stout, anterior region subterete, narrower than the posterior, which is broad and depressed. Head, in the living specimens, ovate, longer than broad, narrowed, but obtusely rounded in front, smooth, but with two slightly-marked longitudinal grooves, which terminate in two small pits at the posterior dorsal border; four small specks, which are probably rudimentary eyes, form a quadrangle on the posterior segment of the head. In an alcoholic specimen, especially when the proboscis is protruded, the head-lobe becomes much shorter and subtriangular, with the tip obtuse. The buccal segment is similar to the six succeeding ones.

The first seven pairs of parapodia are smaller than the following ones, but are two-branched; the lower branch is divided into distinct, terminal lobes, and bears a ventral cirrus and a small fascicle of setæ; the upper branch is swollen, papilliform, and turned upward. The succeeding segments of the anterior region increase successively in size, and bear larger parapodia. These parapodia have a long, ligulate ventral cirrus, longer than the setigerous lobe; the setigerous portion bears two groups of setæ, and is divided into three tapering lobes, two of which terminate the anterior lip and are smaller than the posterior lip. At about the fifty-eighth segment the small, acute, papilliform, superior lobe appears; this contains a small fascicle of short setæ. Arising from the superior side of the parapodia, close to the base, there is an elongated, flattened, tapering, acute, ligulate process, with the tip directed upward; this is similar to the ventral cirrus in size and length. Farther back, beyond the seventy-fifth segment, the upper dorsal ligula develops a lobe or auricle on its upper side, near the base, which becomes more prominent further back, where the terminal portion of the ligula becomes reduced in size. At about the ninetieth segment there is an abrupt change in the form and size of the body and parapodia; beyond this point the segments are much broader and more depressed; the median dorsal field is smooth and nearly continuous, and nearly similar to that of the anterior region, each segment being marked by two distinct transverse lines; the lateral fields above the parapodia are broad and deeply incised between the segments.

The ventral surface has, as in the anterior region, a broad and deep, concave groove, bordered on each side by a raised, rounded ridge; the lateral portion is much more prominent than on the anterior region. The parapodia of this region are prominently two-branched, the ventral branch being much larger, and separated from the dorsal branch by a rather wide, rounded interval, appearing like a furrow along the sides; the dorsal branch consists of a swollen, conical, setigerous lobe, bearing a broad cluster of very slender setæ arising somewhat in two groups, and a broad, swollen, dorsal ligula, with a distinct lobe at the base on the dorsal side, and a prominent, papilliform tip. The inferior branch has a large, prominent setigerous lobe, divided at the end into two distinct, tapering, acute, anterior lips, and a broad, flattened, spatulate, posterior lip, terminating in a small, central, acute papilla; between these lips is a broad, fan-shaped fascicle of slender, capillary setæ, much longer than those of the dorsal branch. The ventral ligula is as long as the setigerous lobe and arises from about the middle of the lower edge; it is swollen at the base, flattened toward the end, somewhat falcate, tapering to near the end, which is obliquely subtruncate and ends in a small papilliform tip. Close to the base of the parapodia and at some distance from the ligula there is a very small papilliform organ. Towards the posterior end of the body this becomes larger and more prominent. The posterior parapodia have the dorsal branch nearly as

large as the ventral, with the setigerous lobe and the superior ligula nearly equal in size and both lanceolate; the ventral ligula is shorter, more flattened, and lanceolate in form, with a tapering tip. The dorsal fascicle of setæ becomes very small and inconspicuous, posteriorly. The parapodia on the segments close to the end become much smaller. The last segment is small, rounded, papilliform, and has a small, central orifice; in the living specimens it bore two small caudal cirri.

The proboscis is large and clavate when exerted, with the surface nearly smooth, but showing minute granules under a lens. Around the orifice there is a circle of a larger, soft, blunt papillæ; within these is a ring of minute, black denticles, mostly two-lobed at the tip, and a much larger jaw on each side, terminating in five sharp, recurved, unequal denticles. These jaws are surrounded at the base by a special circle of soft papillæ.

Color of the specimens, in alcohol, dark brownish olive, becoming somewhat glaucous blue on the segments, and with a somewhat lustrous surface. The lower surface is more yellowish, with the median groove and transverse lines, corresponding to the segments and intervals between them, glaucous blue. In life the surface has a brilliant metallic luster.

The first and much the largest specimen was taken in the evening in the harbor of Newport, R. I., swimming at the surface, by Master Willie Gray, August, 1880. This specimen was 20 inches in length and nearly one-half an inch in greatest breadth.

*Polydora tubifex* Verrill, sp. nov.

Tentacles very long and slender, of nearly uniform breadth throughout, but slightly tapered, the edges crenulated. Head with the central lobe narrow, prominent, in the usual state emarginate or bilobed anteriorly, with the lobes short and rounded; posteriorly extending back on the first segment to a blunt point. Eyes four, nearly in a transverse line, the outer ones a little farther forward, often with an additional small black spot on each side. Lateral lobes of the head (or buccal segment) large, thick, and swollen, laterally and beneath. Four anterior segments with short appendages and papilliform dorsal cirri, and with long capillary setæ; fifth segment with a small upper fascicle of slender, capillary setæ and a lower one of rather small and slender spines; sixth segment with short appendages; on the seventh, the branchiæ commence as short, flat, blunt, rounded organs, strongly ciliated; farther back they become longer, ligulate, scarcely tapered, or sometimes even broadest distally, in length equal to about half the breadth of the body; they extend to near the tail. Caudal appendage small, consisting of four short, blunt lobes; the lower ones slightly prolonged ventrally.

Color pale yellow or salmon, with bright red vessels; on the anterior five or six segments there are often, on each side, greenish black, linear, transverse marks on the anterior side of the parapodia or between the segments. Antennæ, pale greenish.

Length, 24<sup>mm</sup> to 36<sup>mm</sup>; diameter about 1<sup>mm</sup>.

This species constructs long, slender, straight, round tubes of fine sand and mud, 48 to 70<sup>mm</sup> long; 1<sup>mm</sup> in diameter, found on a bottom of sandy mud, in from 1 to 5 fathoms, Wood's Holl, Mass., September 6, 1884.

This species is easily distinguished from all others known on our shores by having the four eyes nearly in a transverse row. The larvæ in various stages of growth were taken at the surface, in the evening, in the harbor of Wood's Holl, during August and September.

*Ammochares artifex* Verrill, sp. nov.

Head appendages partly forked and partly bifurcate, white, the two dorsal longest, bifurcate, with about six divisions, which are blunt, the length about one-half the diameter of the body; the upper-lateral pair are shorter, but also bifurcate, with four small, short, blunt branches; below these are two shorter, smaller, lateral pairs, only once forked. Head obliquely truncate in front, with the mouth terminal. Two first setigerous segments are coalescent with the head, short, with an upper fascicle of slender acute setæ, but no lower ones; on the third setigerous segment there is a long and broad band of uncini, and a group of slender setæ above. Several segments are long and round, not distinctly separated by a sulcus; several anteanal segments are short and indistinct, three, four, or more bearing setæ; anal segment simple, with minute papillæ.

Color anteriorly whitish, the head and buccal segment reddish, with a pale ring behind the tentacles; toward the posterior end the segments are pale flesh-color, translucent, showing the red vessels, and an orange, internal, convoluted organ.

This species constructs a long, slender, flexible tube, covered with small imbricated grains of sand, which are attached only by their inner ends, so as to be freely movable, one upon another, when the worm is in motion.

Off Cape Cod, at station 322, in 67 fathoms, 1879.

*Lepræa abyssicola* Verrill, sp. nov.

Verrill, Trans. Conn. Acad., vol. iv, pl. 20, figs. 3, 3a; pl. 27, fig. 2.

Verrill, Report U. S. Fish Com. for 1883, pl. 43, figs. 187, 187a, b, 1885.

Body large, elongated, composed of numerous segments, tapering gradually to the posterior end. Many of the segments of the posterior region are destitute of capillary setæ. Cephalic cirri numerous, long and slender. Cephalic collar rather broad, with a row of numerous small black ocelli arranged in many rows just behind the anterior margin. Branchiæ in three pairs, the anterior ones much the largest, the posterior ones the smallest. The anterior pair have a rather long stem giving off five or six branches from the posterior side, the first originating at a little distance from the base, leaving a naked stem. The branches again divide and subdivide in a somewhat arborescent man-

ner, the ultimate branchlets being small and not very numerous. The second and third pairs of branchiæ are similar in form, but have fewer branches, all of which arise from the posterior side of the stem. Capillary setæ commence on the third branchiferous segment, but a pair of small papillæ corresponding to the upper parapodia occur on the second branchiferous segment; they continue on seventeen segments. The tori commence on the second branchiferous segment, but distinct rows of uncini first occur in those of the first segment behind the branchiæ. The uncini are in long rows and have a rather narrow, somewhat crescent-shaped base, with three terminal hooks, of which the innermost is much the largest, long, sharp, rather narrow, somewhat incurved, while the outermost is very small and acute, closely pressed against the base of the intermediate one.

Color, when fresh, dark red or reddish brown.

Length of the body usually from 60 to 75<sup>mm</sup>. Some are larger. Station 874, in 85 fathoms, 1880, and in many other stations in subsequent seasons, in 50 to 130 fathoms.

*Sabella picta* Verrill, sp. nov.

Verrill, Trans. Conn. Acad., vol. iv, pl. 20, figs. 5, 5a, 5b; pl. 21, fig. 7.

Verrill, Report U. S. Fish Com. for 1883, pl. 42, figs. 188, 188a, 1885.

Body elongated, moderately stout, 50 to 60<sup>mm</sup> in length, with a well-marked ventral groove on the eight anterior segments. Collar well-developed, with a plain, somewhat revolute margin, emarginate beneath; posterior end abruptly tapered, with numerous short segments, the last simple. Branchiæ numerous, long, slender, forming a beautiful wreath in expansion, united nearly half their length by a web, with a small, spatulate, naked tip. Cirri numerous, close, long, slender, longest on the distal half; ocelli none. The spatulate setæ are rather stout, with the tips considerably expanded and bluntly rounded. The uncinate setæ are somewhat recurved, a little swollen distally, with the tips strongly bent and beak-shaped, and with about four small denticles at the curvature. Caudal segment acute-conical. Color of the body greenish, specked with bright red, most so posteriorly and anteriorly, on the collar the red predominates. Branchiæ transparent greenish white, with transverse spots of flake-white and bright red; bases light red.

Off Martha's Vineyard in 30 to 120 fathoms; off Point Judith, R. I., at station 784, in 20 fathoms, 1880.

## ECHINODERMATA.

*Synapta brychia* Verrill, sp. nov.

Verrill, Report U. S. Fish Com. for 1883, p. 37, 1885.

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>.

Station 2111, in 938 fathoms, off Cape Hatteras, 1883.

*Ophiomitra spinea* Verrill.

Verrill, Amer. Journ. Sci., xxix, p. 153, 1885.

Verrill, Report U. S. Fish Com. for 1883, p. 42, 1885.

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>.

Station 2035 in 2,038 fathoms, 1883, two specimens.

*Ophiacantha fraterna* Verrill, sp. nov.

Verrill, Report U. S. Fish Com. for 1883, p. 43, 1885.

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.

Taken at numerous stations by the Fish Hawk and Albatross in 908 to 1,608 fathoms. Common.

*Ophiacantha varispina* Verrill, sp. nov.

Verrill, Report U. S. Fish Com. for 1883, p. 43, 1885.

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 the 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>.

Peculiar in the mixture of sharp spines and obtuse thorny stumps on the disk. General appearance much as in *O. bidentata*.

Off Nova Scotia, station 2069, in 101 fathoms.

**Ophiacantha granulifera** Verrill.

Verrill, Amer. Journ. Sci., xxix, p. 153, 1885.

Verrill, Report U. S. Fish Com. for 1883, p. 44, 1885.

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 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.

Off Nova Scotia, in 101 to 200 fathoms.

**Ophiacantha enopla** Verrill.

Verrill Amer. Journ. Sci., xxix, p. 153, 1885.

Verrill, Report U. S. Fish Com. for 1883, p. 44, 1885.

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.

Off Martha's Vineyard, stations 1122, 1124, 2046, etc., in 351 to 640 fathoms, 1882, 1883, 1884.

**Ophiacantha aculeata** Verrill.

Verrill, Amer. Journ. Sci., xxix, p. 153, 1885.

Verrill, Report U. S. Fish Com., p. 45, 1885.

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>.

Off Martha's Vineyard, stations 2034 and 2105, in 1,346 to 1,395 fathoms, 1883. On *Brisinga elegans* V.

*Ophiacantha crassidens* Verrill.

Verrill, Amer. Journ. Sci., February, 1885.

Verrill, Report U. S. Fish Com. for 1883, p. 45, 1885.

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.

Station 2115, in 843 fathoms, off Cape Hatteras, 1883 (No. 9370).

*Ophiacantha gracilis* Verrill, sp. nov.

Verrill, Report U. S. Fish Com. for 1883, p. 46, 1885.

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, 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.

Mostly off Nova Scotia, in 220 to 858 fathoms, on Gorgonians.

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

*Ophiacantha spinulosa* (M. and Tr.) Lyman, Illus. Catalogue Mus. Comp. Zoology, p. 93, figs. 6, 7.

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, in part at least, belong to *O. fraterna*.

Common northward, in moderate depths, from Massachusetts Bay to Greenland.

**Ophiolebes Acanellæ** Verrill.

Verrill, Amer. Journ. Sci., vol. xxix, p. 153, February, 1885.

Verrill, Report U. S. Fish Com. for 1883, p. 46, 1885.

Disk rounded, swollen, covered above and below with rather large, globular or capitate 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>.

Off Nova Scotia, in 91 to 122 fathoms. Station 2071, on *Paramuricea borealis*, in 113 fathoms.

**Amphiura Otteri** Ljungmann (?); Lyman.

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 a 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.

Off Martha's Vineyard in 182, to 1,608 fathoms (487 to 1,608 fathoms, 1883). Not uncommon.

**Amphiura fragilis** Verrill, sp. nov.

Verrill, Report U. S. Fish Com. for 1883, p. 47, 1885.

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.

Off Martha's Vineyard, in 239 to 1,467 fathoms, 1883, 1884.

*Ophioscolex quadrispinus* Verrill, 1884.

Verrill, Report U. S. Fish Com. for 1883, p. 48, figs. 56, 56a, 56b, 1885.

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>.

Off Martha's Vineyard to Nova Scotia, in 101 to 234 fathoms (101 fathoms, off Nova Scotia, 1883). Stations 1121 and 2069; also Gulf of Maine, station 38, in 112 fathoms, 1878. Rare.

*Hemieuryale tenuispina* Verrill. Report U. S. Fish Com. for 1883, p. 48, 1885.

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

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-shields small, rhombic; mouth-papillæ several, small, in a regular row.

Off Martha's Vineyard, in 1,362 to 2,033 fathoms, 1883. Locally abundant on *Scleroptilum gracile* V.

## HYDROIDA.

*Cladocarpus flexilis* Verrill, sp. nov.

Verrill, Report U. S. Fish Com. [p. 35] for 1883, pl. 10, fig. 29, 1885.

Stem tall, slender, flexible, sparingly branched; branches with long, slender pinnæ; calicles narrow, elongated, closely appressed, separated by intervals equal to about half their length; margin prolonged dorsally into a small, acute denticle; dorsal surface but little convex, anterior half nearly parallel with the branch. The posterior median nematophore is rather large, situated close to the posterior end of the calicle, or a little behind it, with its opening oblique and directed upward and outward; the lateral nematophores are smaller, cup-shaped, and project forward but little beyond the margin of the calicle. Opposite each calicle there are five or six internal transverse divisions of the branch and about three in the intervals between the calicles. The gonothecæ are few, moderately large, ovate, borne on sparingly branched processes arising from the stem at the bases of the pinnules. Color, light yellowish horn-color. Height from 100<sup>mm</sup> to 200<sup>mm</sup>.

Very common in 70 to 125 fathoms, on hard spongy bottoms, off Martha's Vineyard to Cape Hatteras.

## TUNICATA.

*Culeolus Tanneri* Verrill, sp. nov.

Verrill, Report U. S. Fish Com. for 1883, p. 27, pl. 31, figs. 144, 145, *a*, *b*, 1885.

Stem long, slender, somewhat decreasing in size from the base to the summit. Body irregularly pear-shaped, the lower end tapering to a conical form, where it joins the stem, while the stem itself can be seen extending upward about 15 to 20<sup>mm</sup> along the dorsal margin, where it forms, for that distance, a rounded midrib, terminating in a prominence in one specimen and at a depression in another. The dorsal margin is nearly straight, but swells out a little in the middle, and is subcarinate, with a row of small scattered papillæ along the ridge. The distal end is large, rounded, swollen, and bordered on each side by a distinct keel, which is covered with several crowded rows of prominent, rough, though soft papillæ, which merge into a large, triangular patch of similar but larger papillæ, situated on the dorsal side near the distal end, where the dorsal carina meets the lateral ones; the papillæ in this cluster are large, stout, tapering to a point, and covered on all sides with minute, conical spinules. The lateral rows of papillæ extend back to about the middle of the body on the ventral side, where they meet, thus inclosing a large

ovate area, near the middle of which the large cloacal-opening is situated. This opening is bilabiate, each lip bordered with one or two rows of elongated, rough papillæ, like those of the lateral carinæ. The oral opening is very large, in expansion nearly round, the proximal side sometimes bending inward, leaving a sinus on either side of it; the margin is thickened and revolute, bordered by a row of small, tapering papillæ. The whole surface of the test is covered by minute, granule-like or conical elevations, which are rather close over the dorsal parts, less numerous beneath. Color, dull yellowish gray, the stem dark brown.

Length of the stem of one specimen, 155<sup>mm</sup>; its diameter near the base, 2<sup>mm</sup>; length of body, 70<sup>mm</sup>; greatest diameter, 40<sup>mm</sup>; diameter of mouth, 8<sup>mm</sup>.

Station 2041, in 1,608 fathoms, 1883.