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SMITHSONIAN CONTRIBUTIONS TO KNOWLEDGE. ✓

SYNOPSIS

OF THE

MARINE INVERTEBRATA

OF

GRAND MANAN:

OR THE REGION ABOUT THE MOUTH OF THE BAY OF FUNDY, NEW BRUNSWICK.

BY

WILLIAM STIMPSON.



[ACCEPTED FOR PUBLICATION JANUARY, 1853.]

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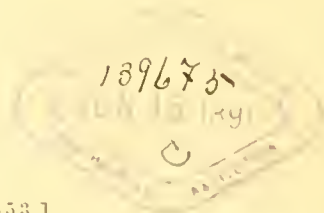
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COMMISSION

TO WHICH THIS PAPER HAS BEEN REFERRED.

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CONTENTS.

	PAGE
INTRODUCTION	5
 POLYPL.	
ALCYONIDÆ	7
ACTINIADÆ	7
LUCERNARIADÆ	8
 ACALEPHLE.	
PROLES POLYPOIDÆ	8
PROLES MEDUSINÆ	11
 BEROID MEDUSÆ	 11
 ECHINODERMATA.	
CRINOIDÆ	12
EURYALEA	12
OPHIURIDÆ	13
ASTERIADÆ	14
ECHINIDÆ	15
HOLOTHURIADÆ	16
 BRYOZOA	 17
 ACEPHALA.	
TUNICATA	19
BRACHIOPODA	20
LAMELLI BRANCHIATA	20
 GASTEROPODA.	
PROSOBRANCHIATA	22
TECTIBRANCHIATA	25
NUDIBRANCHIATA	25
 CEPHALOPODA	 27

	PAGE
DENDROCELA.	
PLANARIDÆ	27
NEMERTIDÆ	28
GEPHYREA	28
ANNULATA.	
TUBICOLÆ	29
MARICOLÆ	31
CRUSTACEA.	
PYCNOGONIDES	37
EPIZOA	38
CIRRIPEDIA	38
ENTOMOSTRACA	39
BRANCHIOPODA	39
ISOPODA	39
ANISOPODA	42
AMPHIPODA	44
STOMAPODA	58
DECAPODA	58
ALPHABETICAL INDEX	61
REFERENCES TO THE FIGURES	67

MARINE INVERTEBRATA OF GRAND MANAN.

THE Island of Grand Manan, the natural history of which this paper is intended to illustrate, is perhaps but little known, geographically, to many who may be readers of this account. It may not be out of place, therefore, to make some remarks on its position. It is more properly an archipelago than an island. The smaller members of the group lie to the east of the largest, which is twenty miles in length, with a general trend north-east and south-west, having an average breadth of nine or ten miles. It lies at the mouth of the Bay of Fundy, about ten miles from the western shore at Campo-bello and Eastport, and thirty from the Nova Scotia shore. It is surrounded on all sides by deep water (a hundred fathoms or more), as might be judged from the character of the shores, which are rocky and precipitous, especially on the western side, where cliffs of a basaltic structure rise perpendicularly to a height of several hundred feet. On the south-eastern side, where there are numerous islands, the shores are low and shelving, composed of Mica-slate having a dip of about 70° . The passages between these islands, worn out by the tides which rush with great velocity through them, are generally very shallow, while a short distance seaward the water becomes as deep as on the western side.

The following paper is intended as a compend of observations made on the marine fauna of this region, during three months' residence in the summer of 1852; and also as a catalogue, which it is hoped will prove nearly complete, of the marine invertebrates found on its shores and in the adjacent waters.

In preparing local faunas, it is desirable that the area included should be as narrowly circumscribed as the inclusion of the requisite variety of station will allow. It is only by the comparison of the results of such examinations, made at a series of *points* along a coast, that an accurate knowledge can be obtained of the distribution of marine animals, and of the effect of external circumstances on their growth, habits, and economy. We can thus ascertain whether a species may inhabit two distant localities without occurring in the intermediate space; and if so, what are the causes of this? Has it been there extirpated by geological changes not affecting the other points? If not, how was its transportation effected? Or, was it originally created in both the distant points? These, and many other questions of the same nature, may be answered in respect to species whose distribution is thus perfectly known. Such investigations will also throw much light on the distinctions of species, which cannot now be derived from their geographical distribution, on account of the loose and general manner in which it is usually recorded. And every practical naturalist knows how much he is aided in defining species, by seeing them in the beauty of life, in their natural condition and associations. So extended a series of observations will, however, require a great

number of workers. But these it is hoped will be furnished by the increasing taste for pursuits of this kind in our country. The records of depths and stations may seem trivial in the eyes of some, but upon their accumulation depends the decision of several important questions.

It will be observed that the number of new species described in this paper is quite large. This naturally results from the fact that so few families of our marine invertebrates have yet been investigated. Thus, with the exception of the shells, nearly every species required special study to determine its genus, and whether it was, or was not, identical with some European or Arctic species.

Pelagic animals are particularly abundant at Grand Manan, on account of the proximity of deep water, and by far the greater part of the species were obtained by the use of the dredge. Dredging in this region is attended with dangers, to guard against which some little foresight is necessary. The boat should always be provided with a compass, even in going short distances from land, as the fogs are very thick in summer, and are suddenly formed. The dredger must also keep an eye to windward, as the approach of a fog bank may be generally seen at least some minutes beforehand, so that a course may be taken for home; unless, indeed, he be something of a pilot himself, or have one with him, when he may often continue his operations notwithstanding the obscurity. A "horn," consisting of a *Strombus gigas* with the apex knocked off, should also be provided, to be used when lost in a fog, for, when blown, it will be answered according to the humane custom of this region, by any who may hear it, whether on shore or in boats. In many places, there are patches of rock on the sea-bottom, where the dredge is very liable to be caught. Usually, it may be disengaged by heaving in a portion of the dredge-warp, but this is often not sufficient. The only means then remaining of recovering it is to slack out all the line, while the boat is brought round and run in a direction opposite to the former course. It may even then occur that the dredge remains fixed, so that, on an excursion to these islands, two or three should always be provided.

I must here express my grateful acknowledgements to Professor Agassiz, for the use of his valuable collection of European books and specimens, which he most liberally allowed me, while as his pupil I had the pleasure of his society and the advantages of his instruction. To the officers of the Smithsonian Institution I am also greatly indebted, for affording me every possible assistance in the use of rooms, instruments, books, etc., while this paper was in preparation. I am also indebted to Professor Dana, for his kindness in giving me tracings of the details of many of his new genera of Crustacea, which have materially aided me in the determination of those herein described.

Suites of the original specimens, from which the new species in this paper were described, are deposited in the Museum of the Institution, and in the cabinet of Professor Agassiz, at Cambridge.

Outline figures are given in the plates of some of the most interesting species, especially such as form new genera.

WILLIAM STIMPSON.

POLYPI.

ALCYONIDÆ.

ALCYONIUM DIGITATUM, Lin. All the specimens obtained were very small, the largest scarcely an inch in length, and not divided into lobes. Found attached to small pebbles on shelly bottoms in 10-30 fathoms.

ACTINIADÆ.

ACTINIA MARGINATA, Le Sueur, J. A. N. S., i. 172. On rocks at low-water mark, of a very large size.

A. CARNEOLA, St., n. s., Fig. 1. Very small, about four-tenths of an inch in diameter; mouth protruding far upwards on the broad disk, on the edge of which are the tentacula, alternating in two approximated rows, there being eighteen in each row. On the disk, above the base of each of the larger upper tentacula, are two prominent white spots, one above the other; while the lower tentacula have one spot only at their inner bases. This species is of a light flesh or salmon color. It was dredged in 35 fathoms on the Hake Ground, off the north-east shore of Grand Manan. The specimens were attached to dead valves of *Pecten*, and sometimes to the test of *Ascidia callosa*, or to small pebbles.

A. OBTRUNCATA, St., n. s. Body short, with a broad flat disk, on which, between the small mouth and the margin, are placed the tentacula; which are short, very blunt at their extremities, as if cut off, usually equidistant, not very numerous, and arranged alternately in four or five very indistinct rows. Sides smooth and clean, with few porous warts, which can seldom be perceived. Color dark purplish, lighter on the disk, with broad streaks of crimson which meander among the bases of the tentacula. It is found not unfrequently at low-water mark, attached to stones in clear water, but is most abundant in the laminarian zone. It approaches *A. crassicornis*, especially in the arrangement of the tentacula, which are, however, not pointed. It wants also the prominent rim of that species.

A. CORIACEA, (?) Johnst., Brit. Zooph. A few specimens of an *Actinia* were presented to me by H. R. Storer, Esq. (which he took at low water among the outer islands), of a species which I did not myself find. It is conical, with the sides covered with small shells and pebbles, which are secured by the strong wart-like suckers. The tentacula are rather long, and not very numerous. Having never seen it alive, I am by no means certain of the accuracy of the above identification.

A. DIANTHUS, (?) Johnst., Brit. Zooph. A fine specimen, belonging probably to this beautiful species, was dredged in 50 fathoms on the "gravelly bottom," a fishing-ground situated about eight miles off Whitehead. It was unfortunately lost, owing to the roughness of the weather at the time, so that it is not yet accurately determined.

A. SIPUNCULOIDES, St., n. s., Fig. 2. Body greatly elongated, covered with a thin brownish epidermis, with eight narrow longitudinal white lines, dividing the body at the anterior extremity into eight equal lobes when contracted. Tentacula

twenty, short, curved, and with blunt extremities. It was found at low-water mark, adhering by its very small base to a large stone, from which it was easily detached. In confinement, it attached itself to the bottom of the glass, but frequently changed its place. Only one specimen was found, from which circumstance the necessary anatomical investigations which would undoubtedly result in the establishment of a new genus for this animal, could not be made.

LUCERNARIADÆ.

LUCERNARIA QUADRICORNIS, Müll. *L. fascicularis*, Johnston, Brit. Zooph., pl. xlv., f. 3-6. The specimen obtained was nearly three inches in length. It was dredged on a bottom of nullipores and sea-collanders (*Agarum*) in four fathoms. It is the first of this interesting genus yet noticed as occurring on our coast.

ACALEPHÆ.

PROLES POLYPOIDEÆ.

CAMPANULARIA SYRINGA, Lam. Johnst., l. c., 110. On *Sertularia polyzonias*, in 25 fathoms, off Duck Island.

LAOMEDEA GELATINOSA, Lamour. Johnst., l. c., pl. xxi., f. 3. This I took from the bottom of the hooker used in my dredging operations. It had reached the height of an inch in less than a month after the bottom of the vessel had been scraped clean.

PLUMULARIA TENERRIMA, St., n. s. Polypidom pinnated, the stem thick, the pinnae very slender, alternate, with the pyriform cells arranged loosely in a row on their upper surface, pointing alternately to opposite sides. It is common in 25 fathoms, shelly bottom, off the northern point of Duck Island.

P. FALCATA, Lam., An. sans vert., ii. 160. Taken often in 35 fathoms on the Hake Ground.

SERTULARIA ARGENTEA, Ellis. Johnst., l. c., 79. Common in 4-6 fathoms, attached to stones.

S. FILICULA, Ellis. Johnst., l. c., 76. Dredged in 20 fathoms, on shelly bottoms.

S. LATIUSCULA, St., n. s. Pinnae broad, compressed, attached by a slender base to the main stem; cells crowded, nearly opposite, shaped as in *S. argentea*; vesicles elongated, ovate, with a single strong spine on one side at the extremity. Color brownish. Breadth of pinna, 0.03 inch. Dredged in the laminarian zone.

S. PRODUCTA, St., n. s. Cells opposite, elongated, curving outward, with ovate apertures. Vesicles slender, elongated, subtruncate, and covered with spines at their extremities. It is of a bright silvery color. It differs from *S. margareta*, Hassal, in having more numerous spines at the top of the vesicle, and none on its sides.

S. FALLAX, Johnst., l. c., 73. A few specimens, probably of this species, were taken in deep water.

S. RUGOSA, Lin. Johnst. This species is common in deep water here, and on most parts of our coast, from Massachusetts Bay to the Grand Bank.

S. POLYZONIAS, Johnst., l. c., 61. Many forms occurred at Grand Manan, in from 10 to 40 fathoms, all of which may be referred to this species, as described by Johnston in the second edition of his work. But my own observations upon many specimens, and the consideration of the genera and species of naked-eyed medusæ, the polype forms of which are not yet known, convince me that this species, so called, is in reality a genus, and its varieties true species. The difficulty of identifying our species by the descriptions of European writers in the absence of specimens for comparison, prevents me from naming and describing the forms I have determined.

GRAMMARIA, St. n. g.

Polypidom rectilinear, elongated, cylindrical, composed of aggregated tubes, generally without branches, which, when they occur, are of the same character as that from which they spring. Cells arranged on all sides, in more or less regular and equidistant longitudinal rows, giving a section of the stem a star-like appearance.

G. ROBUSTA, St., n. s., Fig. 3. Cells large, cylindrical, curving outward, equaling in length the diameter of the stem, annulated with one or two lines of growth near their apertures. They are arranged in four or five very regular rows, being alternate in contiguity, and opposite to each other in opposite rows. Color light brown, cells paler and translucent. Dredged not unfrequently in the laminarian zone.

G. GRACILIS, St., n. s. Polypidom slender, with a polished appearance; cells small, elongated, projecting, but curving inward at their extremities, and distant from each other in the very irregular rows. Color dark brown, sometimes black. One specimen only was taken, which occurred in the laminarian zone.

EUDENDRIUM CINGULATUM, St., n. s. Polypidom small, very irregularly branched, somewhat as in *E. rameum*, but not so thickly; branchlets strongly ringed, sometimes throughout their length, always near their origins; polypes small, with long tentacles and broad blunt proboscis. It differs from *E. rameum* in the more numerous rings on the branchlets, and from *E. ramosum* in the mode of branching. Dredged in 20 f., on a shelly bottom off Duck Island.

TUBULARIA INDIVISA, (?) Lin. Johnst., l. c., 48. Found chiefly in the laminarian zone.

T. LARYNX, Ellis. Corall., pl. xvi., f. b. Dredged in 25 f., on the Hake Ground.

CORYMORPHA NUTANS, Sars, Beskrivelser og Jagttagelser, etc., 7, pl. i., f. 3. This singular animal has been hitherto found only on the coast of Norway, and among the Orkney Isles. The announcement of its occurrence on our coasts cannot but prove interesting to our marine zoologists, especially as it may be taken in the greatest abundance in some localities here, while it seems a rare animal in Europe. It lives on a sandy bottom, in from 4 to 15 fathoms. Off West Quoddy Head, a

hundred or more were taken at a single haul of the dredge. It also occurs in Welch Pool, and near Low Duck Island. I have nothing to add to the description of Forbes and Goodsir, whose observations I have mostly repeated.

ACAULIS, St. n. g.

A. PRIMARIUS, St., n. s., Fig. 4. The remarkable polype for which this name is proposed, which is probably the largest hydroid known, was observed at Grand Manan in two successive stages of development. It was first taken early in August, when it was of a sub-cylindrical form, tapering suddenly to a point at each extremity. At the upper extremity was the mouth, very small, a little below which the tentacula commenced, scattered at first, but gradually increasing in number, and somewhat in size. These tentacula were minute, very short, equalling in length about one-sixth the thickness of the body, with large globular tips. They occupied about two-thirds of the surface of the body; on the remainder below, their places were supplied by the medusa buds, which were crowded, and much larger than the tentacula, although as yet but little developed. The inferior extremity of the body terminated in a short, pointed, fleshy spike, free from appendages, from which exuded a tenacious mucus, by which it adhered to the subaqueous surfaces to which it might be applied. Around the base of this spike, and immediately under the buds, were regularly arranged eight long gracefully-curved cirriform processes, each equalling in length about half that of the body. These appeared from their motions to be in this—the first or free stage of the animal's existence—the locomotive organs.

At a subsequent time, I met with several of these animals which presented a different appearance. The tentacula were larger, especially in the region of the mouth, at the now blunt extremity of the body; and the medusa buds were in an advanced state of development, soon to become free swimming individuals. The inferior appendages had disappeared, and the body was firmly attached by a broad base, and bore much resemblance to one of the ordinary *Corynida* deprived of its stalk. In strong contractions, it assumed a shape approaching that of an hourglass. The length of the animal, in this latter stage, was half an inch, the breadth two-tenths. In the earlier stage, the dimensions were one-half these.

It was dredged in the laminarian zone, from 5 to 15 f., attached to various Rhodosperms, as *Pilota*, *Chondrus*, and *Rhodymenia*. Circumstances did not permit me to ascertain the medusoid form of this polype, although I have my conjecture.

I would here offer, for the judgment of zoologists, the following generalizations to which I have been led by the consideration of two facts exhibited in the characters of the animal above described. First, the basal cirri of the first stage are homologous to the lower or exterior tentacula of *Tubularia*, which I think is evident on comparison of parts. Secondly, these cirri, or tentacula, are deciduous with the growth of the animal, and do not appear in the second stage. Hence we should consider the *Tubulariadae*, in which they are persistent, as lower in the scale. It

might also be considered, as bearing on this question, that the medusæ of *Tubularia* never become free, as in the *Corynidae*.

It follows, also, from the above, that the species just described, having basal tentacula, is inferior to *Coryne* and its allies, in which they never appear, so that it is correctly classed between that genus and *Tubularia*; and if, as is probable, the single circle of tentacula in the *Sertulariidae* is homologous with the basal tentacula of *Acaulis* and *Tubularia*, it would follow that that family should stand lowest in the scale. Thus, as will be seen in the arrangement of the hydroids in this paper, it is a reversal only of the series followed in Johnston's work which is proposed, without derangement of the grouping of the families.

HYDRACTINIA ECHINATA, Johnst. *Acyonium echinatum*, Auct., Gould, Inv. Mass.

CLAVA MULTICORNIS, Johnst. *Coryne squamata*, Müll., etc.

Under these two names are probably included the polype forms of several species of our North Atlantic naked-eyed medusæ.

PROLES MEDUSINÆ.

Among the very numerous species of medusæ observed in this region, the following only were identified. The notices I prepared of new species, owing to the circumstances under which they were observed, are too short for publication.

SARSIA MIRABILIS, Agass., Mem. Am. Acad., 2d ser. iii. 224, pl. iv.

HIPOCRENE SUPERCILIARIS, Agass., l. c., 250, pl. i.

STAUROPHORA LACINIATA, Agass., l. c., 300, pl. vii.

AURELIA AURITA, Müll., Gould, Inv. Mass.

CYANEA POSTELSII, Gould., Inv. Mass. A *Strobila* of large size, probably the polype form of this *Cyanea*, was taken in various stages of development, in 30 fathoms, on the Hake Ground. It was of a light salmon color, with very long superior tentacula, which it used in walking inverted on the bottom of the sea.

BEROID MEDUSÆ.

PLEUROBRACHIA RHODODACTYLA, Agass., l. c., 313, Part ii., pl. i.

BOLINA ALATA, Agass., l. c., 349, Part ii., pl. vi.

ECHINODERMATA.

CRINOIDEÆ.

ALECTO ESCHRICHTII, Müll. et Trosch. The first specimen of the genus *Alecto* or *Comatula*, so interesting to palæontologists, yet taken on our coast, occurred to me in twenty-five fathoms on a shelly ground near Duck Island. It seemed to be a young individual, although nearly four inches in diameter. It was of a dark green color, dotted with white; the disk grayish, and the dorsal-jointed appendages white. I have compared it with specimens of *A. Eschrichtii* from Greenland, in the collection of Prof. Agassiz, and find differences which may be those of age, since these latter specimens were all ten inches or more in diameter. Under these circumstances, I have hesitated to describe it as new, though it may hereafter be proved so, when more extended comparison shall be possible.

EURYALÆ.

ASTROPHYTON AGASSIZII, St., *Euryale scutatum*, Gould, Inv. Mass. (non Blainv.). Until within a few years, all the northern species of this singular genus were confounded by zoologists in one. They have now been separated by Müller and Troschel, and the Scandinavian naturalists; four species in northern Europe being known, and one in Greenland, with which I have had opportunities of comparing our species, and find constant differences. The disk of *A. Agassizii* is rather large; the arms divide in two, just beyond their emersion from the disk, and then continue to branch dichotomously till at their extremities the rays are slender roughened twigs, which in preserved specimens are tangled and interlaced in every direction, but in life are usually stretched out to their utmost extension. My largest specimens were thus a foot and a half in diameter when alive, while in a dried state they measure scarce a foot. The disk is quite regularly pentagonal. On its upper surface the ten radiating ribs are narrow, prominent, and provided with numerous small, sharp, small-based warts, which are very irregularly scattered, and which exist also on the marginal ridge which surrounds the disk, except on the concave, which forms a sort of socket for the upper base of the arm. Between the radiating ribs, the disk is soft and membranous, with few scattered granules most numerous in a flat space in the centre. The disk, as well as the arms, is smooth and glabrous below; the mouth comparatively large, with small spines at the entrance, and larger ones within. The arms are flat beneath, with steep sides and convex upper surface. They are covered above with crowded minute granules, like fine oolite, which are arranged in numerous, somewhat irregular transverse rows, and decrease in number on the sides, the lower parts of which are smooth. On the flat under surface the joints are indicated by the pores, which are arranged on each side, in pairs; there being also, just outside of each pore, a row of four small blunt spines. The first pair of pores, however, next the disk, is unprovided with spines. There is also in the angle of each of the bifurcations a single pore without spines.

The characters particularly mentioned in this description are those in which our species most differs from that of Greenland. The arms and prominent parts of the disk are bright yellow, and the depressed or membranous parts of the disk dark brownish.

This species is not uncommon at Grand Manan. It is found in the coralline zone, especially among forests of *Boltonia*.

OPHIURIDÆ.

OPHIOLEPIS TENUIS, Ayres, Bost. Proc., iv. 133. Frequent among nullipores below low-water mark.

O. ROBUSTA, Ayres, Bost. Proc., iv. 134. A small graceful species, with flat disk and long slender arms tapering to mere threads. It is always highly colored, usually variegated with red, but sometimes jet black. It varies very much in its proportions, some disks having arms doubling in length those of other disks of the same diameter. It is abundant in the laminarian zone, and sometimes also at low-water mark, on rocky and nullipore bottoms.

O. CILIATA, Müll. et Trosch., Syst. der Asteriden, 91. *O. aculeata*, Ag., Proc. Am. Acad., 1851. This species is much larger than the preceding, of a bluish-gray color above, and white below. It is also very different in station, being found only on muddy bottoms and in deep water. I have taken it at a depth of 60 fathoms.

OPHIOPHOLIS SCOLOPENDRICA, M. et T., l. c., 96. *Ophiura aculeata*, Gould, Inv. Mass. Excessively common in the laminarian zone, and also under stones at low water. In this latter station I have found, in August, my largest specimens.

OPHIACANTHA SPINULOSA, M. et T., l. c., 107. A fine purplish-brown species, with long rough spines on the arms, and minute crowded ones on the dorsal surface of the disk. It varies considerably, and has often the aspect of an *Ophiothrix*. It is found sparingly on shelly bottoms in the coralline zone.

Our northern species of *Ophiuridæ* seem yet far from being well determined. One who is so fortunate as to possess very few specimens, soon becomes perfectly satisfied in his own mind as to the specific distinctions, and finds little difficulty in separating them; while one who has some hundreds, can make but slow progress, the perplexity seeming to increase with the number of specimens. I have, I trust, properly defined the limits of our New England species, by the examination of very numerous individuals from many localities, in which determination I have been most aided by the consideration of their habits, and especially of their *association*. The great difficulty now remaining is their identification with those of Northern Europe. So much discrepancy exists in the views of transatlantic naturalists, that a very general reliance only can be placed on their figures and descriptions; and the few specimens which have yet reached this country from Scandinavia and Greenland are still insufficient. So that, although I have mentioned *O. tenuis* and *O. robusta* under the names given them by an American author, I am yet confident that they can be referred to European species when these latter shall be better digested.

A S T E R I A D Æ.

ASTERACANTHION RUBENS, M. et T., l. c., 17. Specimens a foot or more in diameter are very common just below low-water mark.

A. VIOLACEUS, M. et T., l. c., 16. A purple species about four inches in diameter. The rays are rather narrow, and taper to a point. It is not common in this region.

A. LITTORALIS, St., n. s. Body tumid, rays very broad. Ambulacral spines in two rows, slender, blunt, or even clavate at their tips. Spines on the sides larger than those on the back, but both short, blunt, and showing great uniformity in size and distribution. Its color is always a dark green above, and it never exceeds an inch and a half in diameter. It is very common among the fuci in the middle region of the littoral zone, or even near high-water mark—elsewhere I have never found it.

A. MÜLLERI, Sars., Wieg. Archiv., x. 169. This remarkable species occurred to me in 30 f., off the northern point of Duck Island. It is of a bright red color above when alive, and may be readily distinguished from all others by the crown surrounding the bases of the spines, which are arranged in distinct rows on the sides of the rays. I have compared our specimens with some sent from Norway by Sars himself.

A. ALBULUS, St., n. s., Fig. 5. Small, depressed, of a uniform cream-color; rays very slender, each with a prominent rounded tuft of spines at its extremity. Ambulacra very broad, with about five rows of slender spines on each side. Back and sides having a remarkably smooth appearance, which is found to result from their being covered with closely set subquadrate tufts of short blunt spines. These tufts are arranged very regularly in rows, which can be traced both longitudinally and transversely. Those of the middle row are more closely set than the others, thus giving each ray the appearance of having a median line.

The number of rays is almost invariably six, one specimen only, out of fifty taken, having five. And what is still more remarkable, four out of five of these had three of the rays much shorter than the others. Some specimens had seven rays. Were it not for the great numbers which I found every day, I should certainly have considered them as the distorted young of some other species. They occurred most frequently among branching nullipores, in 4 or 5 fathoms, on the east side of the islands.

This species is very distinct from any yet described. It may probably form another genus, when the four rows of suckers shall become a family character instead of a generic one.

LINKIA OCULATA, Forbes, Wern. Mem. *Cribella oculata*, Forbes, Brit. Starf. *Asterias spongiosa*, Gould, Desor. Abundant on the rocks about low-water mark.

L. PERTUSA. *Asterias pertusa*, Müll. *Echinaster Eschrichtii*, M. et T. (?) Much larger than the preceding, and with elongated rays, which narrow towards their extremities. The color is also a paler red. Dredged in 30 fathoms, and found also occasionally at low-water mark.

SOLASTER ENDECA, Forbes, l. c. This species is abundant on the rocks at low-water

mark in the summer, at some localities, but these are always small, and never more than half grown. The large individuals, some of which are a foot in diameter, are found only in deep water, chiefly in the laminarian zone.

S. PAPPOSA, Forbes, l. c. This species is rare in this region, and small specimens only are found. They usually occur on shelly bottoms in the coralline zone.

PTERASTER MILITARIS, M. et T., l. c., 128. This is perhaps the most remarkable of the *Asteriade*, presenting, as it does, the singular phenomenon of a *web* among these lower animals. A soft flexible membrane connects the ambulacral spines, the inner rows transversely, the outer longitudinally; also the spines surrounding the mouth, and those surrounding the large anal pore. In one of my specimens, where this anal pore is widely open, the cavity is distinctly seen to divide into five large channels, corresponding to the five interspaces between the rays. These channels pass underneath, and parallel to, the skin, and, from their action in life, I am inclined to consider their function, at least in part, respiratory. It is perhaps superfluous to say this, when we know that this function is performed by the whole surface of the skin; the webs seeming especially qualified for the office. When, however, we place a living *Pteraster* and a *Holothuria* in the same jar, and see the same action of inhalation and expulsion of water going on at the anal aperture in each, it is difficult to refrain from considering its object the same in both, especially when they are so closely related zoologically.

This starfish has hitherto been observed only in Northern Europe, and in Greenland, where it would seem to be rarely found. At Grand Manan, I took three specimens, all of which occurred in the Hake Bay, in 35 fathoms, shelly bottom.

GONIASTER PHRYGIANA. *Asterias phrygiana*, Parel. *Goniaster equestris*, Agass. *Astrogonium phrygianum*, M. et T., l. c., 52. A large specimen was taken off Duck I., in the coralline zone. It was bright red above, and bright yellow below, being by far the most elegant of our starfishes. The minute vesicles which protrude from the dorsal pores, are short and tipped with black. The eyes are very dark red in color, and the suckers near them are very long and slender, especially a single one just above each eye.

CTENODISCUS CRISPATUS, Dub. et Kor., Skand. Echin., 253. This fine starfish is by no means rare in New England, although not yet noticed by our naturalists. At Grand Manan, it occurred on muddy bottoms in fifty and sixty fathoms.

ECHINIDÆ.

ECHINUS GRANULATUS, Say, Gould., Inv. Mass. The rocky shores of the islands in this region are covered with a zone of *Echini*, extending from the ordinary low-water mark, to a depth of half a fathom. In this zone, these animals are so crowded together that it is impossible in most places to thrust an oar to the bottom without striking some of them. Among them are found several varieties, perhaps species, which an extended investigation only can elucidate. The most common form is of a dark green color, with short blunt spines, the same, in fact, as that found in Mass. Bay, but much larger (three inches in diameter). Among the younger specimens, are found some with very long spines, as in *E. virens*, Dub. et Kor.,

which it resembles. There are also sometimes found specimens of a bright reddish or purplish color, depressed, and about two inches in diameter; these resemble *E. neglectus*, Forbes, D. et K.

ECHINARACHNIUS ATLANTICUS, Gray. Very common on sandy shores at low water.

H O L O T H U R I A D Æ.

CUVIERIA FABRICII, Dub. et Kor. *Holothuria squamata*, Gould, Inv. Mass. Small specimens were dredged abundantly among nullipores in five fathoms, and a number of very large ones were found attached to the under surface of large shelving rocks in the fourth subregion of the littoral zone. The largest was four inches in length, while its tentacles had a spread of nearly five inches, and presented a beautiful area of bright red waving plumes.

PSOLUS PHANTAPUS, Jæger. *P. levigatus*, Ayres, Bost. Proc., iv. 25. Common in forty fathoms, attached to small stones; and occasionally found at low-water mark. These were all small specimens. The large ones seem to live buried among pebbles; thus, at Eastport, one was dug from a depth of six inches in gravel. This measured three inches in length.

OCNUS AYRESII, St., n. s. Completely encased in calcareous matter in the form of polygonal plates somewhat variable in size, but usually equalling in area one-half that of the disk of the sucker. These plates have regular and equal perforations in quincunx, smaller in width than their interspaces. The suckers are stout, and are distributed distantly in five rows, in the three ventral of which they are much larger than in the two dorsal. There are about seven suckers in each row, which are encased in the calcareous plates on their sides. The tentacula are short, and have few blunt branches. The color is white, or pale fawn. Length usually two-tenths of an inch; breadth 0.15 inch. Dredged on shelly bottoms in twenty-five fathoms.

Duben and Koren include the genus *Ocnus* of Forbes in *Cucumaria* (*Pentacta*), and seem to consider the small number of feet or suckers as resulting from the immaturity of the specimens yet examined. But having seen a large number of specimens of the species now proposed as new, none of which exceeded three-tenths of an inch in length, I am led to consider the fewness and large comparative size of the feet as constant; adding to it a character not in Forbes's diagnosis;—the crowded perforated plates, which will always serve to distinguish the species of this genus from young *Pentactæ*, and by which it forms a connecting link between this latter genus and *Psolus*.

PENTACTA FRONDOSA, Jæger. *Cucumaria frondosa*, Forbes, Dub. et Kor. *Botryodactyla grandis*, Ayres, Bost. Proc., iv. 52. *B. affinis*, Ayres, id. 145. Nothing can exceed the profusion in which this species exists in some parts of the islands. It is found just below the ordinary low-water mark on rocky shores, and is, therefore, exposed at spring tides. I have seen areas of several square rods entirely occupied by them. The largest observed was nine inches in length and three wide. They are usually black or dark purple above, and pale brown or yellowish below. Some specimens are of a uniform bright yellow. They always adhere by one side—

that on which the suckers are most developed. They never bury themselves, but are found on the surface of the rocks, and sometimes in chinks or among large pebbles.

THYONIDIUM PRODUCTUM, St. *Oreula punctata*, Agass., Proc. Am. Acad., 1851, (no descr.) *Duasmolactyla producta*, Ayres, l. c., 244. This species is found in deep water, but occurs most frequently under stones, or buried to a slight depth in gravel near low-water mark.

Duben and Koren give in their generic diagnosis of *Thyonidium*, "tentacula 10, quibus interjacent totidem paria tentaculorum triplo breviorum," which character is well marked in this species. In fact, if distinct, it is at least very closely allied to their *T. pellucidum*.

CHIRODOTA LÆVIS, St. *Holothuria lævis*, O. Fabr., F. G., 353. *Synapta coriacea* Agass., Proc. Am. Acad., 1851, ii. 269. *Trochinus pallidus*, Ayres, Bost. Proc., iv. 243. This species is fully and well described by Otho Fabricius, and his account of its habits applies precisely to those of our species, as I have often observed at Grand Manan. It lives in the stony mud of the shores of these islands, buried to a depth of a few inches, usually in a horizontal position. It is found at low water, but is most abundant at a depth of four or five fathoms.

The genus *Trochinus* of Ayres is synonymous with *Chirodota* of Eschscholtz (see Esch., Zoologischer Atlas; also Middendorff, Sibirischer Reise, in which latter work full anatomical figures are given); the *Chirodota* of Forbes (Brit. Starf., 239) being a *Synapta* (see Duben and Koren, Ofvers. af Skand. Echinodermer, 323). Our *Chirodota arenata* must, therefore, form the type of a new genus, for which I would propose the name *Caulina*. It is well described by Mr. Ayres, in Bost. Proc., iv. 143. *Caulina arenata* does not occur in the Bay of Fundy, notwithstanding its abundance on every sandy shore in Massachusetts Bay.

Huxley, in Dr. Sutherland's Journal of Penny's Voyage to Wellington Channel, describes a *Chirodota* which must be closely allied to *C. lævis*; but, if his description be exact, it differs in the number of spokes in the calcareous wheels of the skin.

BRYOZOA.

TUBULIPORA PATINA, Johnst., Brit. Zooph. The species which I consider identical with *T. patina*, notwithstanding some differences, is very common on our whole coast. It is mostly found on seaweeds in shallow water.

T. CRATES, St., n. s. Polypidom generally of large size, suborbicular, sometimes irregularly lobed at the circumference. Cells very slender, curving upward, showing a disposition to linear arrangement, and often rising in circles around cup-shaped depressions, where the tallest (immature) ones have very minute or no apertures. Color white. There is no distinct margin. Diameter often three-fourths of an inch. Found encrusting *Terebratule* in deep water.

T. DIVISA, St., n. s., Fig. 6. This species resembles *T. flabellaris*, Johnst., but differs in being much more deeply divided into broad lobes or branches; also in its more erect and elongated cells, which are without transverse wrinkles. Color waxen white; length about three-tenths of an inch. Found on a valve of *Pecten*, taken in the coralline zone to the eastward of the islands.

IDMONEA PRUINOSA, St., n. s., Fig. 7. Polypidom erect at base, the upper branches curving over, so as to be nearly horizontal, with the cell-bearing surface upward. Cells arranged in transverse rows of four or five, closely packed, which rows are arranged along each side of the face of the branch, either alternate or nearly opposite. It is a rather thick and solid species, of a white color, bright and shining. It grows often to a height of one or two inches, and is very distinct from the European species, *I. atlantica*. It was found in considerable numbers in deep water, especially on shelly bottoms.

CRISIA CRIBRARIA, St., n. s., Fig. 8. Polypidom thickly branched, with the cells so crowded as to form often two or three longitudinal rows, in which they are usually opposite. The back of the polypidom is flat, or but slightly convex, presenting an irregularly striate appearance. Color white. Taken in twenty f., east of Duck Island.

C. DENTICULATA, Johnst., Brit. Zooph. On a sponge, taken in ten f., off Cheney's Head.

HIPPOTHOA RUGOSA, St., n. s., Fig. 9. This appears nearest allied to *H. catenularia*, from which it differs in its numerous transverse striæ, or rugosities, and by its somewhat smaller apertures, in each of which a rectangular foramen is observable. It was found widely branched on small pebbles dredged in twenty-five fathoms on shelly bottoms.

LEPRALIA ANNULATA, Johnst. *Cellepora annulata*, O. Fabr., F. G. This differs somewhat from the descriptions, but is probably one of the numerous varieties of the species named. Dredged in deep water, encrusting shells, etc.

L. CANDIDA, St., n. s., Fig. 10. Cells robust, oval, white, coarsely punctate, with small apertures, which are without spines, but have two blunt projections resulting from a sinus, at the top. Dredged on stones in thirty-five f., in the Hake Bay.

L. CRASSISPINA, St., n. s. Cells sub-globular, distinct, crowded, standing obliquely, or sometimes almost erect; with very minute punctures. Aperture large, trumpet-shaped (from a slightly contracted neck), with thickened margin, one stout pointed spine in the middle above, and a long blunt spine at each extremity of the distal margin, which spines are often rough with minute points. Length of each cell one-fortieth of an inch. Color in life pale greenish. Found in small radiating patches on stones and shells from deep water.

L. LABIATA, St., n. s. Ovigerous cells only of this species were observed; and in them the ovarian capsules appeared in the form of a conical chimney on the top of the aperture. The cells were sculptured with irregular distant radiating ridges, commencing at the top of the chimney, and spreading out over the back of the cell. The aperture is sub-oval, truncate behind, and with the distal margin expanded over the cell immediately in front, in the form of a broad lip. Found on small pebbles from deep water.

L. RUBENS, St., n. s., Fig. 11. The cells of this species, as will be seen from the figure, resemble those of *Flustra* more than *Lepralia*, being in straight parallel series, elongated, with small truncate apertures. Color bright vermilion. It is a common species, found in radiated patches encrusting nullipores, etc., in four or five fathoms.

CELLULARIA TERNATA (?), Johnst., Brit. Zooph. Found in twenty f., shelly bottom, in the Hake Bay.

GEMELLARIA DUMOSA, St., n. s. Polypidom white, thick, and bushy, with the branches but slightly diverging. Cells opposite, in pairs, joining each other by the broad dorsal surface, flattened, elongated, broadest at the aperture, which is ovate or sub-panduriform, narrowest behind, and without spines. Each pinna has a chainlike appearance from the constriction at the base of each pair of cells, where it joins the top of the preceding pair. Some of the bunches taken were four inches high. They were all more or less obscured by extraneous substances. It was dredged in ten f., off Cheney's Head, on a coarse, sandy, and somewhat weedy bottom.

FLUSTRA TRUNCATA, Lin. Common in four f., on nullipore bottoms, among the smaller islands.

F. SOLIDA, St., n. s., Fig. 12. Polypidom broad, very thick and solid, of a bright yellowish or cream color. Cells very long and narrow, with broadly truncated apertures. It grows to a height of three or four inches, with the branches three-eighths of an inch broad. Dredged in twenty-five f., off the northern point of Duck Island.

ACEPHALA.

TUNICATA.

Of the compound ascidians only two were observed, and these, for want of proper opportunity, were not sufficiently investigated for specific designation. One was in the form of small glistening pellucid masses, variously lobed, with the aspect of an *Aplidium*. This was common among the nullipores in shallow water. The other was met with in only one instance, in deep water, near Duck Island. It was a mass about two inches in length, encrusting a tuft of *Flustra*, of a bright green color, and very beautiful. It approximated in character the genus *Botrylloides*.

The simple ascidians were numerous and interesting. In addition to those catalogued below, I should mention that in one instance I met with what appeared to be a *Clavellina*, but so mangled by rough usage in the dredge as to be further undistinguishable.

ASCIDIA CALLOSA, St., Bost. Proc., iv. 228. Very abundant on shelly bottoms, affording attachment to many species of zoophytes.

A. TENELLA, St., l. c., 228. In thirty-five f., off Gr. Duck Island.

A. GEOMETRICA, St., l. c., 229. In forty f., off Long Island.

GLANDULA FIBROSA, St., l. c., 230. Dredged in considerable numbers on muddy bottoms in the coralline zone. They appear like hard balls of mud, about the size of an ounce bullet.

G. MOLLIS, St., l. c., 230. In ten f. sand, off Cheney's Head.

CYNTHIA PYRIFORMIS, Rathke. This species I have identified by European examples sent me by M. Sars. They are perfectly the same. It is one of the most beautiful marine productions found in this region, having, in its hard velvety surface, and bright pink blush, precisely the aspect of a blood-peach. In fact, it is called *sea-peach* by the inhabitants. Some of my specimens are three inches in length. It lives in clear water on rocky bottoms among nullipores, sometimes at low-water mark, but usually in four or five fathoms.

C. ECHINATA, St. On rocky bottoms.

BOLTENIA RUBRA, St., l. c., 232. One specimen only of this species was found, on weedy rocks, in four fathoms.

B. RENIFORMIS (?), Macleay. This species is very distinct from the preceding, being uniformly of a fine yellowish-white color, with a smooth velvety surface. It inhabits rocks in deep water, never occurring in less than fourteen fathoms. I am far from certain that it can be referred to *B. reniformis*, but approaches that species more than any of the others mentioned by Macleay in his memoir.

BRACHIOPODA.

TEREBRATULA SEPTENTRIONALIS, Couth. Common.

LAMELLIBRANCHIATA.

ANOMIA EPHIPPIMUM, L. Roots of *Laminariae*; very small.

A. ACULEATA, Gm. Rather common in deep water.

PECTEN MAGELLANICUS, Lam. This species was once taken abundantly in this locality, and used by the inhabitants as food, but seems now rapidly decreasing in numbers. It is now rarely seen alive, though beds of dead shells are often met with at depths of 20 and 30 fathoms, which afford excellent shelter to many marine animals. A few small living specimens were dredged in 10 f. sand, near Duck Island outer ledge.

P. ISLANDICUS, Müll. Distorted specimens are occasionally found under stones at low water, but it usually occurs on shelly bottoms, in 25 to 40 f.

NUCULA PROXIMA, Say. In 4 f. sand, off Duck Island weir.

N. TENUIS, Turt. In from 4 to 40 f. mud.

N. DELPHINODONTA, Migh. 25 f. mud, on the Hake Ground.

LEDA THIRACLEFORMIS, St., N. E. Test. Moll., 9. In 25 f. mud, off Duck Island.

L. SAPOTILLA, St. 10 f., Welch Pool.

L. MYALIS, St. 20 f. mud, off Duck Island.

L. LIMATULA, St. 6 f. mud.

- L. TENUISULCATA*, St. Common on muddy bottoms.
- MYTILUS DECUSSATUS*, Mont. Found at low-water mark, attached to the under side of stones by a byssus. Also in 40 f. gravel.
- M. CORRUGATUS*, St. 35 f. gravel, on the Hake Ground.
- M. DISCORS*, Linn. Found in nests formed of various marine substances, under stones at low water, and to a depth of 40 f.
- M. LEVIGATUS*, St. Dead in 35 f. gravel.
- M. DISCREPANS*, Mont. Common at various depths; sometimes growing very large—one occurred 1½ in. in length.
- M. MODIOLUS*, L. This species here inhabits the shores, being seldom found in deep water.
- M. EDULIS*, L. Very abundant at low-water mark, but usually small.
- THYASIRA GOULDII*, St. In 4 f. sand, off Duck Island weir; large specimens in 25 f. mud.
- CARDITA BOREALIS*, Con. Duck Island, at low water under stones, attached by a minute byssus. In deep water it is large and very common.
- ASTARTE SULCATA*, Flem. Common in deep water on muddy bottoms.
- A. QUADRANS*, Gould. Occurs very rarely here.
- CYPRINA ISLANDICA*, Lam. Rarely found.
- CARDIUM ISLANDICUM*, Linn. Full-grown specimens, dead, are common on nullipore bottoms, in 3 to 6 f.; the young, alive, are dredged in 20 to 40 f. mud.
- C. PINNULATUM*, Con. In 4 f., coarse sand.
- MACTRA PONDEROSA*, Phil. Common in sand at low water, buried at a depth of 4 inches.
- M. SOLIDISSIMA*, Chemn. Found sparingly accompanying *M. ponderosa*.
- TELLINA FUSCA*, Phil. Inhabits the higher levels of the littoral zone.
- T. PROXIMA*, Brown. Among nullipores on sandy ground, at low water, and in 4 f.
- SOLENS ENESIS*, L. At low water, in sand; rare.
- THRACIA TRUNCATA*, Migh. In 10 f. coarse sand, off Cheney's Head.
- T. MYOPSIS*, Beck, in Möller's Index Molluscorum Grœnlandiæ. Comparison with specimens of this species from Greenland has convinced me of its identity with my *T. Couthouyi*. I was misled by the inaccuracy of Möller's description, especially in giving "ossiculum nullum." I have observed the ossiculum in several specimens.
- T. CONRADI*, Couth. Rare.
- LYONSIA HYALINA*, Con. In 10 f. sand, off Cheney's Head.
- PANDORA TRILINEATA*, Say. In 5 f. mud.
- NEERA PELLUCIDA*, St., n. s., Fig. 13. Shell small, thin, pale white, subovate, ventricose anteriorly, and contracted posteriorly into a short but distinct rostrum. Beaks small, tumid, and placed a little before the middle. Surface nearly smooth about the beaks, with irregular, distant striae of growth near the margin, which become sharp and well-marked on the rostrum. Within, smooth and glossy; teeth very minute. Epidermis white, sometimes pale greenish on the beaks, and brownish on the rostrum. Length, .19 inch; height, .12 inch; width, .11 inch.
- It is the first of this genus taken on our coast, and resembles the young of *N.*

cuspidata, F. et H. (*Th. brevirostris*, Brown), more than any other European species. It was taken in 40 f., on a muddy bottom, off Long Island.

PANOPEA NORVEGICA, Lovèn. Taken (dead) in forty f., on the Hake Ground. This is the first instance of its occurrence on the N. E. coast.

MYA TRUNCATA, Linn. Found in considerable numbers under stones near low-water mark, at Duck Island.

M. ARENARIA, L. Common in the coves.

SAXICAVA RUGOSA, Lam. Large and common at low water, but small when found in deep water.

S. ARCTICA, Desh. Occurs occasionally in deep water.

PHOLAS CRISPATA, L. Occurs very rarely.

GASTEROPODA.

PROSOBRANCHIATA.

DENTALIUM STRIOLATUM, St. Very common on muddy bottoms in the coralline zone.

CHITON ALBUS, L. Found among nullipores in 4 f., and occasionally at low water. Those taken in the coralline zone are nearly black.

C. RUBER, Linn.

C. MARMOREUS, O. Fabr. These two species are excessively abundant just below low-water mark, on rocky bottoms, especially on the various species of *Nullipora*. To take a hundred or more in one dredgeful from this ground is by no means uncommon. They are easily distinguished from each other by their margins, that of *C. marmoreus* being smooth and leathery, while that of *C. ruber* is granulated. The *marmoreus* also grows much larger than the *ruber*; specimens of the former are commonly more than an inch in length.

C. MENDICARIUS, Migh. A few fine specimens of this rare species were dredged (alive) in 35 f., in the Hake Bay. Besides Dr. Mighels's specimen, they are the only ones now known.

PILIDIUM CÆCUM. *Putella cæca*, Müll. *P. candida*, Couth. *Pilidium candidum*, St., N. E. Test. Moll. I have been able to identify our species with the European by specimens sent me by Sars. It is not unfrequent at Grand Manan, in the coralline zone.

TECTURA TESTUDINALIS, Gray. Common in the third and fourth subregions of the littoral zone, of a very large size.

CALYPTREA STRIATA, Say. Specimens more than an inch in diameter are not uncommon in deep water. I am quite confident that it will prove a new species, but have no southern examples of the type for comparison.

DIADORA NOACHINA, Gray. During a low spring tide, in August, I obtained a

large number of this species from the under surfaces of large stones, near low-water mark. It has been hitherto found, both here and in Europe, only in deep water.

TROCHUS OCCIDENTALIS, Migh. In 25 to 40 f., in the Hake Bay. The specimens were very large and beautiful, especially when alive. The animal has four lateral cirri, thus differing from other *Trochi*, which have three; and from *Margarita*, which has five.

MARGARITA CINEREA, Gould. Inhabits shelly and pebbly bottoms in deep water.

M. OBSCURA, Gould. On sandy bottoms in the laminarian zone, as off Ross's Island.

M. UNDULATA, Sow. On weedy, rocky, and nullipore bottoms, in shallow water.

M. ARGENTATA, Gould. Taken alive in 4 f., coarse sand, off Duck Island boat moorings.

M. HELICINA, Möll. Common on the marine plants which cover the rocks above low-water mark. It is particularly abundant on the Long Island shore.

M. ACUMINATA, Sow., Migh. In 40 f., on a soft muddy bottom, off the Swallow's Tail.

ADEORBIS COSTULATA, St. Dead specimens were taken in 4 f., coarse sand, off Nantucket Island.

LITTORINA RUDIS, Gould. Everywhere above low-water mark, on rocks and seaweeds.

L. LITTORALIS, F. et H. Found with the last, and even more common. Dark varieties only occur; the banded and finely-colored specimens, so commonly found in Massachusetts Bay, are very rare here.

LACUNA VINCTA, Turt. The variety common here is strong, broad, pale brown, with one white band just under the suture.

RISSOA EBURNEA, St. In 25 f., shelly bottom.

R. ACULEUS, St. In the littoral zone; rare.

R. MIGHELISH, St. In 25 f., off the northern point of Duck Island.

R. PELAGICA, St. Rather common in the coralline zone.

TURRITELLA COSTULATA, Migh. In deep water; rare.

T. EROSA, Coult. Dredged in 40 f., muddy bottom, in the Hake Bay.

T. ACICULA, St. Dredged in 4 f., sand, off Point Franklin, and also found alive, at low-water mark, under stones.

APORRHAIIS OCCIDENTALIS, Beck. This fine species was dredged alive, for the first time, on a gravelly bottom in 35 f., to the north-east of the Island. Among the living specimens were both young and adult, the animals of which I have figured and described in my notes. They confirm the conjectures with regard to the proper genus to which it belongs, which have been founded on the shell alone; for the animal agrees in all important particulars with that of *A. perspicani* of Europe.

SCALARIA GRÖNLANDICA, Gould. On pebbly and shelly bottoms, in from 10 to 60 fathoms.

MENESTHO ALBULA, Möll. Dredged frequently alive on sandy bottoms, in the laminarian and coralline zones.

CHEMNITZIA NIVEA, St. Frequent in 35 fathoms, in the Hake Bay.

NATICA FLAVA, Gould. Taken in 50 fathoms, mud, some miles off the Swallow's Tail.

N. HEROS, Say. In sheltered muddy bays, about low-water mark; rarely found. The specimens were all of the northern, short-spined type, and of a very thin structure, with well-developed epidermis.

N. TRISERIATA, Say. At Fisher's Cove, in the littoral zone, and in 10 fathoms, off Cheney's Head.

N. GRONLANDICA, Beek. Inhabits very deep water in this region.

N. IMMACULATA, Tott. Rather common on the sands of Fisher's Cove at low water, and more rarely occurring at various depths, to 25 fathoms.

N. CLAUSA, Brod. et Sow. Taken in 25 fathoms, gravel, off the northern point of Duck Island.

VELUTINA HALIOTOIDES, Möll.

V. ZONATA, Gould. Very large specimens of this and the preceding species are taken in the laminarian zone, this inhabiting, however, deeper water than the former, which occasionally occurs at low water.

LAMELLARIA PERSPICUA, Lovèn. Inhabits rocks in the coralline zone. It is rarely taken by the dredge, however, from its preferring the crevices of the ledges to their upper surfaces.

ADMETE VIRIDULA, St. Common on shelly bottoms, in the coralline zone.

TRICHOTROPIS BOREALIS, Brod. et Sow. Rarely taken alive, though dead shells are not uncommon in the coralline zone.

PURPURA LAPILLUS, Lam. A large, thick, dark chocolate-colored variety is common.

NASSA TRIVITTATA, Say. This species must be exceedingly rare here, notwithstanding its abundance further south, as only one specimen was found.

BUCCINUM UNDATUM, Linn. This species is exceedingly abundant here in the lower levels of the littoral zone. It is seldom found in deep water, though a beautifully sculptured specimen sometimes occurs in the coralline zone.

TRITONIUM ISLANDICUM, Lovèn. Found at all depths from low-water mark to 40 fathoms.

T. PYGMÆUM, St. Found on muddy and sandy bottoms, at various depths.

T. DECENCOSTATUM, Midd. Common at low-water mark, and at various depths to 40 fathoms.

T. CLATHRATUM, Müll. On a patch of shelly bottom, about two miles north of Duck Island, this rare species is common as dead shells, but living specimens occurred in only two instances.

FASCIOLARIA LIGATA, Migh. Several of this fine species were taken in 25 fathoms, in the Hake Bay.

COLOMBELLA ROSACEA, St. Living specimens are by no means rare in deep water.

C. DISSIMILIS, St. This species occurred only once, but then in great numbers, at a haul of the dredge on a sandy spot in 8 fathoms, about two miles north-east of Cheney's Head.

MANGELIA TURRICULA, F. et H. In twenty-five f., in the Hake Bay.

M. PYRAMIDALIS, St. The specimens from this region are mostly shorter and broader than usual. Taken occasionally at low water.

- M. CANCELLATA, St. Dredged alive in twenty-five f., shelly, off Duck Island.
 M. DECUSSATA, St. Specimens here are very small and variable.

TECTIBRANCHIATA.

- BULLA HIEMALIS, Couth. In forty f., mud, off Long Island.
 B. TRITICEA, Couth. Common.
 B. PERTENUIS, Migh. In ten f., sand, off Cheney's Head.
 B. DEBILIS, Gould. Taken alive in six f., coarse sand, off Duck Island boat moorings.
 PHILINE LINEOLATA, St. Common in the shallows among the lower islands.

Besides the species above catalogued, a few probably new species of univalves occurred, which have not yet been determined for want of opportunity of comparison with European examples of the same genera.

NUDIBRANCHIATA.

CANTHOPSIS HARVARDIENSIS, Agass., Bost. Proc., iv. 191 (no descr.). A good colored drawing of this remarkable mollusk is in Professor Agassiz's possession. It is very common in sheltered muddy bays in this region, feeding on filamentous chlorosperms about low-water mark.

EOLIS FARINACEA, Gould, MSS. This fine species approaches *E. angulata*, A. et H., Brit. Nudib., Pl. 23, but is much larger, being sometimes an inch and a half in length. Its color is also different, being made up of numerous flake-white blotches and dots on a dark fawn ground. The papillæ are short and very numerous, so closely arranged that their grouping into rows can scarce be distinguished. It is very numerous, spawning on the rocks above low-water mark in August.

EOLIS STELLATA, St., n. s. Body small, slender, elongated, pale white, pellucid; head with a flake-white patch above in front of the oral tentacles. Dorsal tentacles long, but shorter than the orals, slender, wrinkled transversely, especially in contraction. They arise very near together, and bear the prominent black eyes at their bases behind. Oral tentacles very long and slender, smooth, and gracefully curved. Papillæ or branchiæ rather few in number, long and slender, arranged in about five clusters on each side; those in the second and third clusters being longest. Foot narrow, pointed behind, and strongly auricled in front. Colors: papillæ bright crimson, tipped with a ring of opaque white; tentacles pale pink near their bases, with their anterior halves white. Length, two-fifths of an inch. This species resembles somewhat *E. rufibranchialis*, Johnst., but its foot is not so long, nor its dorsal tentacles so tapering; and its papillæ are fewer and longer. It is found under stones at low-water mark, and when disturbed rolls itself up so that its branchiæ project in all directions like the rays of a star.

E. PURPUREA, St., n. s. Body large, full, robust; tentacles rather short, thick, smooth; the dorsal ones with the eyes far behind their bases. Papillæ large, flattened, crowded, arranged in five or six clusters on each side, leaving the middle

third of the body bare. Foot broad, with short auricles in front. Mouth-disk large, triangular. Colors: body pale whitish, dark in the middle line from the viscera showing through; papillæ dark purplish, with the tips covered with intense white specks. Length one inch. Found at Duck Island, under stones, at low water.

E. DIVERSA, Couth., Bost. Journ., ii. 187. The examples described by Couthouy were undoubtedly mutilated, and I have heard it suggested that the species should be exploded. At Grand Manan, however, I found specimens agreeing with his description in the tentacles, color, etc., and prefer to catalogue them for the present under this name. They occurred in 4 f. on *Laminarice*.

E. MANANENSIS, St., n. s. Body pale white; tentacles rather thick;—the dorsal ones brownish with pale tips, looking as if hollow, wrinkled;—the oral blunt, curved, with a row of opaque-white specks along the outer edge; papillæ slender, irregular, and variable in length, arranged in clusters along the sides of the back, of a bright vermilion color, with a ring of opaque-white at the tips. Foot auricled, not very broad. Length one inch and a half. It is narrower than *E. salmonacea*, has fewer papillæ, and the dorsal tentacles are wrinkled instead of serrated. It was taken in 35 f., on a gravelly bottom in the Hake Bay.

OTO CORONATA, Lovèn., Arch. Skand. Nat., 151. A pale brown variety, with the papillæ dotted with white, was dredged on rocks in 15 f., near Duck Island.

DENDRONOTUS ARBORESCENS, A. et H., I. pl. iii. Fine large specimens are taken at low water, and in all parts of the laminarian zone, on rocky bottoms. The most common variety is white or colorless. The ova were deposited in August.

ANCUA SULPHUREA, St., n. s. This species approaches so near to *A. cristata*, Lovèn., that perhaps the best mode of describing it will be to point out the differences. It is much larger in size, being often an inch and a quarter in length; and proportionally broader. The mouth tentacles are longer; and the processes from the dorsals arise at their bases, rather from the body than the tentacles. The laminae also in the dorsal tentacles are more numerous. The number of branchial tentaculiform appendages varies from eight to twelve; they are of a light sulphur color. The ova are deposited in a gelatinous belt, often three inches long, attached by one edge in a serpentine manner to the rocks. It is very common under stones at low water, and in the laminarian zone.

DORIS PLANULATA, St., n. s., Fig. 14. Body broad, depressed; mantle expanded widely beyond the foot, covered above with minute tubercles, and white with a row of irregular bright yellow spots down each side just without the margin of the foot. Dorsal tentacles elongated, slender; branchiæ very small, consisting of about ten delicate pinnated plumes. Foot narrow, truncated anteriorly, and extending posteriorly to the edge of the mantle. Mouth very small, with a flat triangular lobe on each side. Length 0.6 inch; breadth 0.45 inch. It differs but slightly from *D. repanda*, A. et H.

DORIS PALLIDA, Ag., Bost. Proc., iii. 191 (no descr.). This species is remarkable for the large size of the tubercles of the cloak. It is perhaps *D. fusca*, O. Fabr., F. G. 344 (non Müll.), and resembles much *D. diaphana*, A. et H. It was taken in 25 f. gravel, off the northern point of Duck Island.

Besides the above nudibranches, a specimen of a remarkable and probably new form, was taken, but it is not here systematically characterized, as only a few rough notes of it remain, it having fallen a sacrifice to the voracious jaws of certain *Deudronoti* shortly after its discovery. Some idea of its form may be derived from Fig. 15. It approached Eolis in the characters of the head and tentacula, while its branchiæ were in the form of numerous scalloped transverse ridges, or raised membranes. It was of a dark reddish-brown color, dotted with black; except the foot, which was white.

CEPHALOPODA.

LOLIGO BARTRAMII, (?) Les., J. A. N. S., ii. 92. A species of *Loligo* is common here during some seasons, and is used by the fishermen for bait. I did not meet with it myself, but from their accounts I am inclined to refer it to the above name.

DENDROCÆLA.

For the elucidation of this part of my subject, I am indebted to my friend, Mr. Charles Girard, who has for some time devoted himself to the subject, and to whom I referred my notes and specimens.

PLANARIIDÆ.

PROCERODES WHEATLANDII, Grd., Bost. Proc., iv. 251. Under stones near high-water mark.

TYPHOLEPTA ACUTA, Grd., n. s. Body depressed, ovoid, elongated, posteriorly rounded; anterior extremity terminating in an acute point; mouth underneath, and situated at about the middle of the body. Length about a sixteenth of an inch. Ground color pale, with reddish confluent blotches above. Found in considerable numbers creeping over the surface of *Chironota lavis*.

LEPTOPLANA ELLIPSOIDES, Grd., n. s., Fig. 16. Greatest length one inch, width about five-eighths of an inch. Color light yellowish-brown above, gray beneath. Two anterior elongated and narrow gray patches, and two posterior ones, rounded and black, situated immediately behind, and farther apart. These patches, at first, appear as if two simple pairs of visual organs; but on close examination with a magnifying-glass, they are resolved into an agglomeration of minute and black specks. This species swims by rapid undulations, somewhat as in *Aplysia*. One

was observed by Mr. Stimpson thus supporting itself in the water for nearly two minutes before it took ground again. Found at low water, under stones, in four f., nullipores, and in thirty f., shelly bottom.

NEMERTIDÆ.

POSEIDON AFFINIS, Grd., n. s. Body very slender, nearly filiform, about two inches in length when extended and in activity. Color clear reddish above, white below. Two elongated clusters of eyes at the anterior extremity. Mouth underneath, situated behind the visual clusters. In the laminarian zone.

NAREDA, Grd., n. g.

Body elongated, sub-cylindrical. Head obtusely triangular in front; neck slightly contracted; one pair of rounded ocelli.

N. SUPERBA, Grd., n. s., Fig. 17. Length from one to two inches; body posteriorly attenuated; head forming an equilateral triangle; the base of which is at the contracted neck. Color above uniform soft red; head margined by a narrow band of white. The neck is also marked by a transverse band of white, on which the eyes are situated, far apart. Below white. Dredged in thirty-five f., in the Hake Bay.

TETRASTEMMA SERPENTINA, Grd., Kell. et Tied., Nordam. Monatsb., ii. 4. Under stones, in the higher levels of the littoral zone.

OMATOPLEA STIMPSONII, Grd., n. s., Fig. 18. Length usually about six inches, often ten or more. Width in extension one-eighth of an inch; in contraction often one-half inch. Body sub-compressed, rounded above, and flat below. Head pointed, separated from the body by a slightly contracted neck. Posterior extremity tapering. Eyes six or more, minute, situated in an oblique, simple row, on either side of the head anteriorly. Mouth terminal. Color brown above, with a white margin to the head; a narrow band of white, convex forward, across the middle of the head; and a sub-triangular, somewhat elongated patch of white on each side, on the posterior part of the head and neck. It is common at low-water mark under stones.

POLIA OBSCURA, St. *Nemertes obscura*, Desor., Bost. Journ., vi. 2. *Polia gracilis*, Grd., K. et T., Nord. Monatsb., ii. 4. Common in the 1st subr., littoral zone.

GEPHYREA.

SIPUNCULUS BERNHARDUS, Forbes. *Phascolosoma Bernhardus*, Pourtales, Proc. Am. Assoc. 1851. Common in the coralline zone, in shells of *Dentalium* especially.

STERNASPIS FOSSOR, St., n. s., Fig. 19. Body subglobular in contraction, narrowed anteriorly, and annulate with fifteen or more slightly elevated rings. These rings are narrow, and dotted with minute papillæ toward the posterior or plate-bearing extremity, except on the smooth ventral surface; while they are broader and better marked toward the involute anterior terminal opening or mouth. At the posterior extremity below are placed two hard, black, corneous, subquadrate plates, nearly joining each other at their anterior interior corners, but separated by the median line, which is continued for a short distance beyond them on the ventral surface of the animal. Each of these plates is indistinctly marked with lines of growth, and bears a prominent diagonal line separating it into two unequal areas, the posterior of which is the largest. From beneath the posterior and the lateral edges of the plates project strong bristles, those from the lateral edges being much the longest. The anterior extremity of the animal, when the mouth is evolved, is bipapillate; each knob having two or three concentric semicircles of strong short bristles. The general color is cinereous, and the greatest length about one inch. It lives on muddy bottoms in the coralline zone, and when in confinement is very active, boring into the mud with great celerity, in a manner resembling that of the foot of *Solen*, or perhaps that of the proboscis of *Arenicola*.

ANNULATA.

TUBICOLÆ.

SPIROBIS SPIRILLUM, Lam. Gould, Inv. Mass., 8. On seaweeds at low water, very common.

S. NAUTILOIDES, Lam., An. sans vert., v. 359. On shells, etc.

S. VITREA, St. *Serpula vitrea*, O. Fabr., F. G., p. 382. A specimen was taken on a *Pecten* in 20 f., which agrees perfectly with the description of Fabricius.

S. PORRECTA. *Serpula porrecta*, Müll., O. Fabr., F. G., p. 378. Found chiefly on *Sertulariæ* and other corallines.

S. QUADRANGULARIS, St., n. s. Tubes large, thick, and strong, white, somewhat rugose with lines of growth; under-side flat, upper surface with two strong carinæ, one on each side; so that a transverse section of the tube is a square. Aperture rounded within and turned upwards. Diameter one-eighth of an inch. Taken in 10 f. on shells.

S. GRANULATA. *Serpula granulata*, Müll., Prodr., 2857. Common on stones, shells, and the carapaces of crabs in 20 to 50 f.

VERMILIA SERRULA, St., n. s. Tubes thick, very small; the largest having a length of one inch, a breadth of one-fortieth of an inch, and a height somewhat greater than the breadth. It is generally straight or slightly undulated, with the base somewhat expanded, the dorsal carina very prominent, sharp, and furnished

with large teeth. It is frequent on the test of *Ascidia callosa*, and sometimes on *Pecten* from deep water.

PROTULA MEDIA, St., n. s. -Tubes large, cylindrical, rather thick and strong, marked with indistinct lines of growth, irregularly and variably contorted, and adhering throughout their length. *Animal* pale yellowish; disk broad, membranous, very thin and delicate, with a scalloped margin, and extending much beyond the extremities of bristles of the seven segments it occupies. On the succeeding 40 to 50 segments there are no long bristles, while those of the last 20 + segments are very long and hair-like. Branchial plumes moderately large, of a very pale yellowish tint. The tentacula of each are about 36 in number, arranged in a spiral of one turn and a quarter, with a thin raised membrane encircling their bases within. These plumes usually drop off in specimens preserved in alcohol, and disclose two black dots corresponding to the two plume-bases which look very much like eyes. The tubes are often six inches or more in length, with a diameter at the aperture of one-fifth of an inch. It is dredged on muddy and gravelly bottoms in the coralline zone, attached almost invariably to dead valves of *Pecten Magellanicus*. It was very abundant at a spot directly under the 45th parallel of latitude, half way between the equator and the pole, from which circumstance I have derived its name, for want of a better.

SABELLA PAVONINA, Sav., Grube, Fam. der Ann., 88. *Tubularia penicillus*, O. Fabr., F. G., p. 438 (in part). This species as found here is rather short and broad, of a pale white color, with the tentacles (which are about 24 in number) white below and brownish towards their extremities. The tube is long, erect, leathery, and evenly coated with sand on the outside. It inhabits deep water.

S. ZONALIS, St. *Tubularia penicillus*, O. Fabr. (in part). Of a dark-brownish color, with about 20 tentacula, which are colored with brown and white arranged alternately in narrow zones. It is a more elongated species than the former. Found in 4 f. among nullipores; the specimens taken having their tubes thickly coated with mud.

PECTINARIA GROENLANDICA,(?) Grube. *P. Belgica*, curved var., Gould, Inv. Mass., pl. i. f. i. Very common on sandy and muddy bottoms in deep water, and at low-water mark on the sand-flats of Fisher's Cove.

LUMARA, St., n. g.

This genus is nearest allied to *Terebella*, from which it differs in the following characters. The body is elongated, and not suddenly thickened anteriorly, but tapers regularly to the posterior blunt extremity. The setæ, of both kinds, exist on all the segments of the body (42 +) instead of the anterior ones only; the aciculæ, commencing at the second segment, being very long; and the uncinæ setæ, commencing at the fourth segment, being bidentate in front, with a strong, sharp projection at the dorsal apex, and having no projections corresponding to the lateral ones in *Terebella*. (See Fig. 20.) The ventral shields are oblong, nearly touching the lateral pinnae, and extend entire to about the 17th segment; where a median

depressed line commences, running on the remaining length of the body. The branchiæ are on the first two segments. The neck is provided with a ring of eye-spots, numerous and variable in size, under the labia of the tentaculiferous disk. On the 22d segment, at the right side, just above and behind the superior pinna, arise two long tube-like cirri, which in one of my specimens are filled with eggs (?). It inhabits a tube of a thin leathery structure.

I at first considered the animals above described as immature, on account of the presence of eyes at the neck; as Prof. Agassiz states such to be the case in young specimens of his *Terebella fulgida*. (See Bost. Proc., iii. 191.) But having, among many specimens, observed none larger or further developed, and considering most of the remaining characters above mentioned as important, I have been led to propose a new genus for the reception of the species.

LUMARA FLAVA, St., n. s. Of a bright-yellow color; branchiæ with 6-8 rami, and a few short processes on the sides of their rings. Length one and a half inch; breadth, 0.11 inch. Tubes thin, of a light-yellowish color, usually with pebbles attached to the outer surface. Dredged in 35 f. in the Ilake Bay.

TEREBELLA BRUNNEA, St., n. s. This species is large, of a uniform, dark, reddish-brown color; segments about 56; aciculæ of the anterior feet rather short; the ventral shields on the first eight segments oblong, transverse, and rather narrow. Tentacula large and very numerous, brownish; branchiæ in three pairs, with 7-12 rami to each, those of the first pair being most numerous. Length about five inches; greatest breadth three-tenths of an inch. It inhabits thick-walled tubes, formed of mud and sand, which are found in great numbers on the under surfaces of large stones, near low-water mark.

The uncinæ setæ in this species are very variable in shape. They are of the same type as those of *T. parvula*, Leuckart, as figured in Wieg. Archiv, 1849, Taf. iii. f. 6, but are much more elongated and projecting above.

T. CIRRATA, Cuv. Leuck., l. c. This species differs from the preceding in its smaller number of rami in the branchiæ, in the rhomboidal shape of the last ventral shields, and in the bright-yellow color of the anterior ventral surface. The uncinæ setæ conform generally to the same type as those of *T. brunnea*, and though they have sometimes slight denticles besides the upper frontal tooth, I have never met with any precisely like those of *T. cirrata* figured by Leuckart (l. c., fig. 5). The aciculæ are longer than those of the preceding species, and widened near their extremities, which taper to fine hair-like lashes. My specimens are about three inches in length, with nearly seventy segments. They were all found in deep water, chiefly on shelly bottoms, in 20-40 fathoms.

CLYMENE LUMBRICALIS, St. (non Aud. et Edw.) *Sabella lumbricalis*, O. Fabr., F. G., p. 374. Tubes adherent to stones, shells, etc., in deep water.

MARICOLÆ.

ARENICOLA PISCATOREM, Cuv., Regne Anim., etc. Common on sandy shores above low-water mark, especially where there are scattered boulders.

SIPHONOSTOMUM ASPERUM, St., n. s. Body slender, thickest anteriorly behind

the head, and covered with dark-colored granulate papillæ, which are largest and most prominent above. There are four rows of bristles extending the whole length of the body, of which the dorsal are longest. These bristles become very long on the anterior five rings, where they are directed forwards, and extend beyond the thick green tentacula, but do not form a dense brush. The segments are about sixty in number, and the animal is two inches in length. It was dredged in the Hake Bay, on a shelly bottom, in 25 fathoms.

TECTURELLA, St., n. g.

This name I propose to apply as a generic appellation to a singular worm, of which I obtained a few specimens, and which must be very closely allied, if not identical with the *Siphonostomum vaginiferum* of Rathke, described at length by R. Leuckart, in Wiegman's Archiv for 1849, i. p. 164. A full description is therefore unnecessary here. The sheath formed by the closely arranged anterior bristles, the very numerous filiform cirri, arranged in two clusters, and the character of the lateral bristles, or rather hooks, seem good generic characters. The name was suggested by the mantle-like exterior envelop, which adheres very loosely to the interior coat.

TECTURELLA FLACCIDA, St., n. s., Fig. 21. This species presents, when alive, the appearance of a loose, flabby, elongated sac, covered with sordes, with a transverse slit at one extremity, which discloses when its labia are laid back, the broad green tentacula, and the filiform cirri. It will adhere and hang loosely by its hooked bristles (see figure), which are arranged, one to each segment, along each side of the body. The number of segments is about forty. The largest specimen obtained was two inches in length and two-fifths of an inch in breadth. It was taken among nullipores and shells in 3-15 fathoms.

BRADA, St., n. g.

Body short, cylindrical, composed of few segments. Bristles very short, equal in length in all parts of the body; the upper ones lancet-shaped (Fig. 22), the lower ones minute and imperceptible without the aid of the microscope. Oral cirri few (6) in number, green, nearly equal in size with the two tentacula. This genus I have separated from *Siphonostomum*, from having found two species, agreeing with each other except in trivial characters, and both differing from that genus in the want of the anterior brush of forward-directed bristles.

BRADA GRANOSA, St., n. s. Body covered with granulate papillæ, which are smaller on one side than on the other. Length, 0.7 inches; breadth, 0.16 inches. Color, dark brown. On sandy bottoms in 4-6 fathoms.

B. SUBLEVIS, St., n. s. Body nearly smooth, of a light reddish-brown color, from the thin coating of mud which always invests it. Length, 1 inch; breadth, .2 inch. Dredged on nullipore and muddy bottoms in the Laminarian zone.

OPHELIA GLABRA, St., n. s. Body robust, smooth and shining, tapering at both extremities, flat or even concave below. Posterior extremity with two large inferior papillæ, and eight small superior ones. Lateral cirri short and thick; about twenty pairs, on the middle and toward the posterior part of the body. At their bases are two approximated bundles of capillary setæ, which extend anteriorly as far as the mouth—where they are very minute on the broad smooth rings—and to the anus posteriorly. Color, light fawn, with iridescence. Length, 1.5 inch; breadth, 0.25 inch. Dredged on muddy bottoms in deep water.

ARICIA QUADRICUSPIS, (?) Grube. *Scoloplos quadricuspida*, Oersd., Gronl. Ann. Dors., pl. viii. f. 110. The small specimen taken was too much injured for certainty of reference.

GLYCERA CAPITATA, Oersd., Gronl. Ann. Dors., 44, pl. vii. f. 88. Of a pale flesh color. Found at low-water mark under stones on sandy shores.

G. VIRIDESCENS, St., n. s. This species is much smaller than the preceding, being only one and a half inches in length. Its color is light green. Its setæ are longer than those of *G. capitata*, but not so long as those of *G. setosa*.

PHYLLODOCE GRENLANDICA, Oersd., l. c., pl. ii., f. 19, 21, 22, 29–32. A large bright-green species. It is not uncommon in 25 f., shelly, back of Duck Island.

NEPHTHYS CILIATA, Müll. *N. borealis*, Oersd., Maricolæ, 32. The specimens found were mostly jet black. Dredged in 25 f. mud, near Duck Island, and in 40 f. mud, off Long Island.

N. INGENS, St., n. s. Resembles *N. cæva*, Oersd., Gronl. Ann. Dors., 41, pl. vi. 73, etc., but is somewhat more slender, and differs in the form of the head, which is rounded anteriorly, truncate behind, and has very short tentacula close together in front. The proboscis has about twenty fleshy teeth at its extremity, and the same number of longitudinal rows of short processes on its sides anteriorly. Length, 7.5 inch, breadth, 0.42 inch. One specimen only was taken, which was dredged by Mr. Wm. Bridges, in deep water.

NEREIS ABYSSICOLA, St., n. s. Smaller than *N. pelagica*, Linn., broadest in front, tapering gradually posteriorly. Color reddish, cupreous, darkest anteriorly. Pinnæ with four short subequal lobes; dorsal cirri and setæ long, especially on the posterior rings. Eyes four, conspicuous; those on each side being close to each other, while those in each pair are remote from each other. Proboscis with a denticulated basal ring, as in *N. denticulata*, herein described, except that the papillæ above have a circle of denticles instead of being covered with them. The setæ are longer than those of *N. pelagica*, the tentacular cirri smaller, and the body more tapering. The eyes of the anterior pair also are more distant from each other than the posterior ones. Length, 1.5 inch, breadth, 0.14 inch. In 40 f. mud, off Long Island.

N. IRIS, St., n. s. Small; body slender, translucent, bluish, with shades of light-copper color on the back. Neck rather long, palpi large, tentacular cirri long and slender. Differs from *N. abyssicola* in the want of the long superior cirri on the pinnæ, and is also much more slender. Length, 1.6 inch. It was found in a thin leathery tube, encased without with small pebbles. In 20 f., north of Duck Island.

N. DENTICULATA, St., n. s., Fig. 23. Body subcylindrical, tapering rather suddenly posteriorly. Color light reddish-brown, pearly above, nearly white below.

Pinnæ small; ventrals with the setæ longest and most numerous; dorsal and ventral cirri on the whole length of the animal. Head with short tapering tentacula; eyes small but conspicuous, posterior ones nearest each other. Proboscis with a ring of minute denticles almost encircling its base, but interrupted above by a smooth space, on which there are two prominent denticulated papillæ; also with four radiating ridges of denticles and an inferior denticulated patch, at its extremity. Maxillæ slender, much curved. Length, 6 inches; breadth, 0.25 inch. Found at low-water mark. Described from a Massachusetts Bay specimen, those from Grand Manan being lost. In Fig. 23, *a* represents a pinna of the twentieth ring; *b*, one of the posterior pinnæ.

N. GRANDIS, St., n. s., Fig. 24. Large, broad, thick anteriorly, and somewhat flattened posteriorly. Body dark brown, cupreous above, with the pinnæ lighter colored. Rings about 180 in number. Head small; eyes four, inconspicuous; tentacula very small, equalling in length only that of the very thick palpi; tentacular cirri tapering to slender threads, the longest equalling in length the first three segments of the body. Maxillæ broad and strong, dentated. Dorsal pinnæ with large subcordate lamellæ, which have short cirri above in the first forty segments. Length, 17 inches; breadth, 0.5 inch. At low water, under large stones. It is, perhaps, *N. grandifolia* of Leuckart (l. c. 207), but cannot be that of Rathke, who states his species to be *Heteronereis arctica* of Oersted, Gronl. A. D., pl. iv. f. 51, which is very different from our species.

In Fig. 24, *a* represents one of the anterior pinnæ; *b*, one behind the middle of the body.

ENONELLA, St., n. g.

Body elongated, much compressed, tapering posteriorly. Head small, subovate, terminating anteriorly in two short tentacles placed transversely, one on each side. Neck somewhat contracted. Pinna with a strong, short, simple dorsal cirrus, above which is a hard, arcuated knob or mamilla, concave towards the cirrus. These mamillæ in their succession form something like two keels to the body. Strong muscular fibres proceed from them, and they are probably of use to the animal in working through the sand, which it does with great celerity. Setæ falcigerous, long and numerous, in one bundle to each pinna. This genus wants the folded cirrus (branchia) of *Ænone*, and differs also in possessing tentacles and superior lateral cirri. See the figures.

ENONELLA BICARINATA, St., n. s., Fig. 25. Body very much elongated, subulate. Eyes small, scarcely perceptible from the thickness of the skin over them. Color uniform pale-greenish yellow when alive, but in preserved specimens dark-brown. Length, 1.5 inch; breadth, 0.09 inch. Found in fine sand at low-water mark, at High Duck Island.

Figure 25. *a*, head above; *b*, the same below, showing the mouth; *c*, pinnæ, etc., from above; *d*, side view of a pinna.

EUNICE OERSTEDI, St., n. s. Depressed, but narrow; head small, with the three

middle tentacula, between the eyes, very long and curved; the lateral ones are shorter. Tentacular cirri small. Branchiæ commencing on the fourth segment from the neck, in the form of a slender process from the cirrus of the superior pinna, which process forks on a succeeding segment, and becomes gradually more complicated till the 13th segment. On this segment, and on those succeeding it to the 30th, the branchiæ are in the form of a beautiful comb of five slender processes, reaching nearly to the middle of the back. At the 31st, they begin to decrease in size and number of filaments, and leave only the dorsal cirrus at the 40th. Above the base of this cirrus, on each segment, there is a black pigment spot under the skin. The superior setæ of the setiferous pinna are long and slender, the inferior ones are short, and form a thick tuft. Inferior cirrus thick and short, but tapering. Color light fawn or reddish with iridescence. Length, one inch + (the specimens wanting the posterior rings); breadth, 0.1 inch. In its principal characters it resembles *E. Hurassii*, Aud. et M. Edw. Dredged in 20 f., on a shelly bottom, off the northern point of Duck Island.

EUNICE VIVIDA, St., n. s., Fig. 26. A large strong species. Body broad and rather thick, rounded above, somewhat flattened below. Head with the middle tentacle longest, reaching the sixth ring of the body from the neck; the outer ones scarcely reaching the first ring. Tentacular cirri thick at base, pointed, reaching as far as the eyes. Branchiæ commencing at the first ring and ending at the 45th; increasing and decreasing in complication as in the last species. The branchial comb, where thickest, has nearly 20 closely arranged filamentary teeth. Pinnæ small, with very minute setæ; dorsal cirri tapering to a fine point; ventral cirri short, on thick globular bases. Color above cupreous. Length, 6 inches; breadth, 0.26 inch. This species I at first thought to be the adult of *E. Oerstedii*, but the proportionally smaller pinnæ and setæ seem to forbid. It is very active, and almost as uneasy as a snake, in confinement, gyrating so rapidly and in such curious circumvolutions as to threaten with destruction such unlucky invertebrates as might be caught with it.

ONUPHIS ESCHRICHTII, Oersd., Gronl. Ann. Dors., 20, pl. iii., f. 33-41, 45. Our specimens are much smaller and more compressed than those of Oersted. It is finely colored with red annulations on a bluish ground. The tube is broad, flat, and composed of large angular fragments of shells and chips of slaty stones. Taken on shelly bottoms in the coralline zone.

CRYPTONOTA, St., n. g.

Body broad, oval; segments very narrow; head minute, papilliform, placed at about the anterior fourth of the length of the animal; single median tentacle short, much narrower than the head; eyes two at the base of the tentacle. Back entirely covered by the crowded dorsal setæ, leaving only a median line of separation, which terminates anteriorly at the head, and posteriorly not far from the margin. The dorsal pinnæ are thus transverse in the middle, and longitudinal at the extremities of the body—as if radiated from the two points forming the extremities of the

dorsal line. The ventral pinnae are short and provided with strong hooked setae. They completely surround the ventral surface of the animal. The mouth is at about the anterior sixth of the length of the animal below, and from it the anterior feet radiate, as from the head above. The branchiae probably resemble those of *Euphrosyne*, to which genus this has, perhaps, the nearest relations. These organs, however, and some other details, could not be made out from the single specimen obtained.

CRYPTONOTA CITRINA, St., n. s., Fig. 27. Of a beautiful lemon-yellow color, resembling very much that of some sponges which occurred with it. Head, flake-white; back, beneath the setae, dark brown. Segments about thirty in number. Length, 0.45 inch; breadth, 0.25 inch. Dredged on a gravelly and somewhat muddy bottom, in thirty-five fathoms in the Hake Bay.

EUPIROSYNE BOREALIS, Oersd., Gronl. Ann. Dors., 18, pl. ii. f. 23-27. This species is not uncommon in deep water, and often occurs of a size double that given by Oersted. It frequents muddy bottoms.

PHOLOË TECTA, St., n. s. Back entirely covered by the elytra, those of the opposite sides overlapping as well as the consecutives. Segments about thirty-six in number, on which are about twenty-two pairs of elytra, there being anteriorly one to each alternate segment, while posteriorly every ring has one. These elytra or scales are broad, sinuated broadly in front, and remotely ciliated behind. Superior pinna arched, dotted with black along the summit at the base of the row of long curved capillary setae. Inferior pinna with a plume of few long falcigerous setae. Head ovate, with two very large oval eyes, and terminating anteriorly in a short pointed tentacle. Tentacular cirri rather short. Color, brownish and black, variegated, darkest anteriorly. Length, 0.28 inch; breadth, 0.035 inch. Dredged in 4 f., on a bottom of coarse sand and nullipores.

Oersted gives "branchiarum squamiformium paria maximam dorsi partem nudam reliquentium" as a generic character of *Pholoë*. But as this species agrees with that genus in its remaining characters, the size of the dorsal scales would seem to be of little importance in the *Aphroditaceae*. As another instance of this, I would mention the large *Acoëtes* (*A. lupina*, St.) of South Carolina, which has scales so small as to leave the back nearly bare, and yet agrees in all other important particulars with *A. Pleei*, Aud. et M. Edw., which has remarkably large scales.

LEPIDONOTE CIRRATA, Oersd. *Aphrodita cirrata*, Müll., O. Fabr., F. G., p. 308. Of a bright pink or violet color; taken about low-water mark.

L. PUNCTATA, Oersd. *Polynoe squamata*, Gould, Inv. Mass. Very common under stones at low water, and some ways above it. Sometimes also in the Laminarian zone.

L. SCABRA, Oersd., Gronl. Ann. Dors., 12, pl. i. f. 2, 7, 10, 12, 13, 17, 18. *Aphrodita scabra*, O. Fabr. Taken occasionally of a very large size, on gravelly bottoms in the coralline zone. One specimen occurred at low-water mark.

APHRODITA ACULEATA, Baster. Gould, Inv. Mass., 343. A fine large species, often four inches in length, which is taken occasionally in deep water. It is identical with the above species, at least as far as can be judged from figures. The numerous

small Aphrodites which are found on muddy bottoms in the laminarian and coral-line zones, are perhaps varieties of the young of this species, but require farther investigation.

CRUSTACEA.

PYCNOGONIDES.

PYCNOGONON PELAGICUM, St., n. s. The legs are much shorter and stouter than in *P. littorale*, and are also without the projections at the joints which are seen in the figures of that species. The surface is generally smooth and clean, without prominent hairs, and it is of a uniform yellowish-brown color. Its diameter, or the distance between the extremities of opposite legs, is three-fourths of an inch. It was taken in 30 f., on a gravelly bottom, off Head Harbor.

PHOXICHLIDIUM MAXILLARE, St., n. s. Body slender, with a sharp conical papilla on the back, just behind the origin of the mandibles; caudal projection short, but very stout. Jaw-feet or mandibles comparatively large and strong, scarcely extending beyond the end of the blunt proboscis, and with the finger and thumb curving so as to touch each other only towards their extremities. Ovigerous feet slender, except at the basal joint, which is very thick. They are long and slender, curving in genuflexions as in *Nymphon*, and arise from the lateral projections supporting the first pair of legs. The legs are long, smooth, without spines or hairs, and have small subcheliform hands at their extremities, the fingers of which are very sharp and slender. The color in life is blackish or sepia. Length of body, 0.13 in.; of a leg of the first pair, 0.53 in. Taken in tangled groups of a dozen or more, attached to the under sides of stones at low water.

ZETES SPINOSA, St., n. s. One specimen only of this species was taken, which occurred in the laminarian zone. It was hispid with minute hairs, especially on the legs, and so covered with marine sordes that the parts were made out only with great difficulty. The diameter of this specimen is one-half an inch. The body is short, and terminates posteriorly in a long, slender, subclavate anal tube, which projects obliquely upwards. The clavate proboscis is large, broad, and not so much constricted at the base as in the species figured in *Voy. en Skandinavie, Laponie, etc.* The ovigerous feet are long, pellucid, and flexible; the joints being with difficulty distinguished. Of the appendages between them and the proboscis only two pair were made out with certainty, of which those above the proboscis were very short, and those between it and the ovigerous legs almost filiform, and exceeding it a little in length. On each of the first two joints of the legs above is a short acute spine. The general color of the animal, as nearly as could be ascertained, is light brown; the proboscis being straw-colored or yellowish.

PALLENE HISPIDA, St., n. s. Body short and broad, seeming wider than it really

is, and almost orbicular, from the close approximation of the basal joints of the legs. The legs are very thick at their bases, but taper gradually to slender extremities, where they are provided with elongated, subcheliform hands. The first two joints of each are provided on their outer edges with a semicircle of sharp spines, which projects over the succeeding joint in an imbricated manner. This arrangement gives the body the appearance of being surrounded by two concentric spinous ridges. The legs are also very hispid, the hairs being short, compressed, spine-like, and arranged in three or four longitudinal rows; the interspaces being smooth. The ovigerous feet equal in length about three-fourths that of the true legs, and in my specimens had two rounded masses of eggs attached to their basal joints. The proboscis is very short, and tapers nearly to a point at its extremity. The mandibles are large and strong, extending much beyond the extremity of the proboscis, and curving downwards. The finger and thumb are small, and tipped with a hard, glossy, mahogany-colored enamel. The oculiferous knob is prominent, with a black summit divided by a cross into four minute eye spots. Finally, the caudal process is small, but prominent, smooth, and glossy, and projects nearly perpendicularly upwards. The color of the body and legs, beneath the dark brown spines and hispidities, is light yellowish. The length of the body¹ is 0.14 in.; of one of the legs, 0.37 in. It was taken among *Ascidie callosæ*, in deep water.

NYMPHON GROSSIPES, Kroyer. This large and fine species is by no means uncommon here in the coralline zone. It is generally found creeping among the polypidoms of *Tubularie* and other hydroids, upon the polypes of which it probably feeds. In life, it is of a pale wine-yellow color externally, the stomach being often of a light rose tint, varying in depth so as to give the legs a distantly annulated appearance. Specimens in egg occurred during the first week in September. The figure given by Kroyer in *Voy. en Skand., Lap., etc.*, does not apply to our specimens in every particular, but there can be no doubt of the identity of our species with the *Pyenogonum grossipes* of Otho Fabricius, *Fauna Gronl.*, p. 229. The curious six-legged young of this animal, so different from the adult, occurred in August in considerable numbers parasitic on *Goniaster phrygiana*. These were a quarter of an inch in diameter.

EPIZOA.

LERNÆA BRANCHIALIS, (?) Lid. A few specimens were found fixed in the flesh of the neck, in young cod-fishes.

CALIGUS PISCINUS, Gould, *Inv. Mass.*, 340; Latr., *Hist. Nat. des Crust.* (?) Found in great abundance on the surface of the Halibut.

CIRRIPEDIA.

BALANUS GENICULATUS, Conrad, *J. A. N. S.*, vi. 265. Gould, *Inv. Mass.*, 14, pl. i. f. 9. This species is identical with one of those of Northern Europe, as I have

¹ The length of the body in this species and the others herein described, is taken from the base of the proboscis to the extremity of the caudal process.

ascertained by comparison of specimens; but the synonymy of this European species is unknown to me, as I have not yet seen the work on Cirripedes by Darwin, in which it is fully elaborated. It occurs abundantly on dead valves of *Pecten*, and on stones, in the coralline zone, and it varies greatly in form.

B. BALANOIDES. *Lepas balanoides*, Lin. *Balanus ocularis*, Lam., An. sans vert., v. 660. Gould, Inv. Mass., 17. pl. i. f. 7. *B. rugosus*, Mont., Gould, l. c., 16, pl. i. f. 10. Found abundantly, and generally of large size, on the rocks in the littoral zone. Several fine specimens were found attached to living examples of *Littorina littoralis*.

ENTOMOSTRACA.

CYPRIDINA EXCISA, St., n. s., Fig. 28. This fine entomostracan occurred in considerable numbers among nullipores in four or five fathoms. It is about one-tenth of an inch in length, and in shape regularly oval with a deep emargination below anteriorly. Such details as can be observed of the parts protruding from the shell when the animal is in motion are given in the figure. The color is pale yellowish, and sometimes bright pink on the back, from the large round eggs showing through.

BRANCHIOPODA.

CUMA BISPINOSA, St., n. s. This species is distinguished from all those of Northern Europe, described by Kroyer in his Tidsskrift, by the short spine-like projections on the carapax, of which there is one on each side, not far behind the large triangular rostrum. In other particulars, it differs but little from the ordinary forms. The tail terminates in a slender stylet, set on the extremity of a thicker one of equal length, from the base of which proceed the long lateral stylets with bifid extremities. The color of the body is brownish; that of the tail paler or nearly white. Length, 0.45 inch. Dredged in 35 f., gravel, in the Hake Bay.

ISOPODA.

IDOTEA TUFTSI, St., n. s. This species resembles *I. caea*, Say, J. A. N. S., i. 424, more than any other species, but it differs in the following particulars. It is smaller, being but four-tenths of an inch in length. The eyes are easily seen, and of an opaque-white color in life. The internal antennæ are blunt at their tips, and equal in length one-third that of the external ones. The tail is greatly elongated, and regularly sublanceolate. It is of a pale fawn color, with crowded dark brown dots or punctations. It was dredged on a sandy bottom in 10 fathoms, off Cheney's Head.

I have dedicated this species to Mr. Samuel Tufts, of Lynn, Mass., one of our most active marine zoologists, to whom I have been often indebted for new and curious forms of deep sea animals from Massachusetts Bay.

I. IRRORATA, M. Edw., Suites à Buffon, Crust. *Stenosoma irrorata*, Say, J. A. N. S., i. 423. Gould, Inv. Mass., 338. This species is found on marine plants about

low-water mark. It rarely occurs here, although so common on the southwestern portions of the coast of Maine.

IDOLEA MONTOSA, St., n. s. Body elongated ovate, abruptly narrowing at the commencement of the abdomen. The back seems divided longitudinally into three unequal lobes, of which the middle one is by far the largest. This results from the prominent, well-defined, rounded lobes into which the segments expand at each extremity of their width. The lateral incisions, separating these segments, reach, in depth, the margin of the middle lobe of the back. The abdomen in length equals six-tenths that of the thorax, and has its segments soldered together, except that slight transverse depressed lines indicate two short¹ anterior segments, which bear a large rounded knob in their middle; and one scutiform posterior segment, which also bulges up strongly in the middle; this latter protuberance being separated from the former by a deep depression. The antennæ are very small; the internal or superior ones much the longest, reaching the second thoracic segment; the external ones about half the length of the internals, and without an articulated flagellum. The feet are identical in character throughout, each terminating in a delicate, elongated, subcheliform hand, with a very slender, almost acicular finger or nail. The first pair is shortest; they then increase in length to the fifth, which is longest, and then decrease very slightly to the seventh and last pair. The opercular abdominal appendages are margined with a sharp elevated ridge, and have very minute articulated pieces at their posterior extremities, and elongated subsidiary pieces for about half their length anteriorly and interiorly. The color is dark grayish. Length, 0.4 in.; greatest breadth, at the fourth segment, 0.19 in.; length of a foot of the fifth pair, 0.2 in. Taken in deep water on sandy and muddy bottoms. The characters of the antennæ would, strictly, exclude this species from *Idotea*. It belongs to a group of which I have three or four species from the New England coast, and which will probably be found to constitute a new genus.

JÆRA COPIOSA, St., n. s., Fig. 29. Body suboblong, narrowing slightly at each extremity, and a little convex above. Head rather large, with the small but very obvious black eyes near its posterior corners; thoracic segments not widely separated at their hairy external edges, but far apart along the middle; abdomen with three segments, of which the anterior two are very small and narrow, and the posterior one broad, with its caudal appendages very minute and close together in a niche at its posterior extremity. The thick-based internal antennæ are about one-third the length of the rather stout external ones, which reach the third segment of the body. Feet weak and slender, all of the same character, terminating in a sharp nail. Branchial lamina or operculum, considerably smaller than the abdominal cavity. Color above grayish, punctate; those with eggs are bright green below. Length, 0.2 in.; greatest breadth, at the third segment, 0.1 in. Found in great numbers on our whole New England coast north of Cape Cod, living on the under surfaces of stones in the first (upper) subregion of the littoral zone. At Grand Manan, it was most frequent in sheltered situations.

¹ By the length of a segment, is meant its extent longitudinal with the body, so that its width in Isopods is almost always much greater than its length.

ASELLODES, St, n. g.

Body loosely articulated as in *Asellus*. Abdomen uniarticulate, with two long bifid caudal styles. External pair of natatory feet having each two laminae like the others, but broader and hardened so as to perform the office of an operculum. External antennae longer than the body, and terminating in very long multiarticulate flagella. Internal antennae minute, with flagella of few articulations, each of which bears a very long hair-like appendage. Legs nearly as long as the body, with the terminal article in each bearing two or more minute unguiform spines at its extremity. In the first pair, the last two articles form a large subcheliform hand.

The very long external antennae and legs call to mind the genus *Munna* of Kroyer, in which, however, the caudal appendages are rudimentary.

A. ALTA, St., n. s., Fig. 30. Body suboblong; head with its anterior angles produced, and with a prominent sharp rostrum, which is almost erect and curves forward at its summit; internal antennae very short and slender, with long hairs, which are numerous at the extremities; externals with an articulated scale or spine on its second segment exteriorly; outer edges of the dorsal segments produced at their anterior angles, and each having one or two deep emarginations laterally. Abdominal segment subquadrangular, a little broader anteriorly, minutely serrated on its lateral margins, and undulated at its posterior margin. Color pale whitish, with numerous black pigment spots somewhat regularly arranged above. Antennae and feet white. Eyes large, black. Length, 0.27 in.; breadth, 0.1 in. Dredged in soft mud in 40 f., off Long Island, G. M.

ÆGA POLITA, St., n. s. Elongated, very convex, so that the sides of the back are perpendicular, and a little incurved below; head subtrapezoidal, broadest before; at its anterior corners are the rather small but prominent black eyes, which are elongate-trapezoidal in shape, narrowest anteriorly. Antennae small but rather stout at base, placed transversely, curving backward, the superior ones being three-fifths as long as the inferior ones, which reach the middle of the first thoracic segment at its lower edge. Feet long, compressed, hairy on their edges, with their second and third articles produced at the outer angles. The epimera in the first thoracic segment are indicated by a slight depressed line only; while in the second, third, and fourth they are better separated; and in the fifth, sixth, and seventh they are articulated, elongate-triangular, and produced into acute angles posteriorly, the last pair thus reaching the fifth abdominal segment. The first five abdominal segments occupy three-sevenths the length of the abdomen; the first one being scarcely distinct from the last thoracic, the next three equal, the next a little longer than the preceding ones. The terminal segment is scutiform, narrower than the others, and with caudal styles resembling the natatory feet in character, but thicker, harder, and narrower; the inner stylet being three times as broad as the outer, and elongate-subrhomboidal in shape. The color is light opaque yellowish, with patches of black punctae on the front of the head, on the posterior two-thirds of all the dorsal segments except the terminal one, which is almost entirely covered with them, on the

middle of the caudal styles, and on the exterior or first pair of natatory feet. There are also a few black dots on the legs. The length of the largest specimen is 0.62 inch. The proportions of the other parts to the length are as follows: breadth, .24; length of longest (5th) thoracic segment, .11; of the abdomen, .34; of the terminal abdominal plate, .20; of the longest leg (of 6th segment), .41. Found on the fine sands at low-water mark on High Duck Island. A species from Charleston, S. C., Harbor (*Æ. concharum*, St., n. s.), resembles this very closely, but the superior antennæ are shorter, the eyes larger and triangular, the last epimer reaching only the third abdominal segment, the inner lamina of the caudal styles thinner and broader, and the legs proportionately broader. The color is nearly the same. The length is 0.9 inch; of which the proportions corresponding to those above are, .23, .15, .29, .16, and .33.

ANISOPODA.

PRANIZA CERINA, St., n. s., Fig. 31. This curious little Isopod resembles *P. cerulata*, of the coast of Great Britain, in its proportions, but is very distinct from that species in its details. The two reduced neck segments are very small and narrow, but nevertheless distinct; and the rings are not difficult to make out, even on the ventricose middle portion of the body. The rudimentary legs of the first two thoracic segments reach forward nearly to the extremities of the mandibles. They are pressed against, and seem to constitute a portion of the mouth parts, and one pair is provided with strong hooked nails. The remaining five pairs of well-developed feet are long, but almost filiform, and somewhat hairy; the last pair but one being shortest. The superior antennæ are shorter than the inferior ones, of which a flagellum of about seven articulations constitutes nearly one-half the length. The eyes are prominent, bulging out from the sides of the head. The natatory feet are of large size, with very long plumes of hairs; the fifth pair being much smaller than the rest. Caudal styles hairy on their edges, the inner one of each pair broadest and with pointed extremity, extending considerably beyond the end of the triangular caudal segment. Its color a pale yellowish or waxy. Length of body, 0.22 inch; of which the proportions of the other parts are: length of head and first four segments, .27; of the abdomen, .32; of the longest leg (that of 5th thoracic segment), .32; width of body at the third segment, .11; at the sixth, .37; at the abdomen, .07. Many specimens were dredged on gravelly and coralline bottoms in 20–30 fathoms in the Hake Bay.

With the above, and in about equal numbers, was taken another form, which, with some doubt, I am at present inclined to consider the female of the same species. In color and details it differed from *P. cerina* but slightly, but the proportions were very different; as the very ventricose middle portion of the body, which in every case was filled with eggs, constituted nearly the whole of the animal; the head and abdomen being very short, and projecting but little beyond it.

ANCEUS AMERICANUS, St., n. s. Body very regularly rectangular, abruptly narrowed at the commencement of the abdomen, which has the appearance of another very small rectangle set into the first, and of only one-third its width. It is of a

dark brownish color above; the back with transverse ridges at the articulations, very rugose and covered with marine sordes. Below, white. Last thoracic segment deeply emarginate behind for the reception of the abdomen. Maxillæ very strong, crossing each other toward their extremities, and curving upward beyond the anterior margin of the head. Eyes minute. Antennæ two on each side, close together, one above the other, at the corners of the head; the inferior ones being a little the longest. Legs slender, with hard curved nails at their extremities. Abdominal segments well defined, the anterior one narrowest, and the terminal one becoming very narrow and tapering after the juncture of the caudal appendages, which are highly developed, subequal, and extending considerably beyond the extremity of the caudal segment. Length, 0.2 in.; breadth of thorax, 0.08 in.; length of abdomen, 0.085 in. Dredged on a sandy bottom in ten fathoms, off Cheney's Head. It is very sluggish in its motions, which are ambulatory only. It is more elongated than *A. maxillaris* of Europe, the head and jaws not so large, and the caudal appendages much larger.

ANTHURA BRACHIATA, St., n. s. Body very slender, subcylindrical, tapering at the head, broadest at the fifth thoracic segment, and greatly constricted at the articulations of the second thoracic segment, which is narrower than any of the others. The first three thoracic segments are sharply convex below; the next three concave along the middle, with a deep indentation on the back of each anteriorly; the last one very short, equalling in length a little more than one-third that of the penultimate one. The antennæ are very minute, about equal in length, and all arising close together at the anterior extremity of the head. The first three pairs of legs are placed anteriorly on their respective segments; the last four on the middle. Those of the first pair are a little shorter than the others, but very thick throughout their length, the large ovate hand being set by the middle of its lower side on the third and fourth articles, which are only rudimentary, while the first and second are greatly developed. The finger or nail of this hand is very small. The legs of the second and third pairs are shorter and not so slender as those of the fourth, fifth, sixth, and seventh, but all terminate in small subcheliform hands. The segments of the abdomen are with difficulty distinguished above. The caudal appendages (last pair of abdominal feet), are much expanded, especially the exterior lamina, which curve over above so as to inclose the terminal segment in a kind of trumpet-shaped cavity. The outer lamina of the first or exterior pair of natatory feet are hardened, and serve as opercula to the others, while the inner lamina of this pair are minute, and articulated at about half the length of the outer ones on their inner surfaces. The color is a uniform light brown when the animal is clean, but it is usually covered with a reddish-brown muddy slime, owing to its sluggish habits. Its length is 0.69 inch, of which the proportions of the other parts are: length of the abdomen, .13; of the longest leg, .20; of the antennæ, .10; and the greatest breadth, .125. It was dredged on a shelly and somewhat muddy bottom, in twenty fathoms, off the northern point of Duck Island.

TANAIS FILUX, St., n. s. Very minute, slender, rounded on the back, white, looking very much like a short piece of thread. Head small, and rather narrowed in front; first thoracic segment of great length; the second half as long as the third,

which is about equal in length with the fourth, fifth, and sixth; the seventh being a little shorter than the sixth. The segments of the abdomen are well defined, the first five equalling each other in length, and the terminal one longer than the fifth, but narrower, and rounded behind. Antennæ short and thick, without flagellæ, with blunt tips crowned with few hairs, as are also their articulations. The inner ones are directed forward, and much the stoutest, especially toward their bases; while the outer ones are more slender and curve outward and backward. First pair of legs exceedingly thickened, with very large ovate hands and strong curved fingers. They are generally closely applied against the breast. The remaining thoracic feet are very slender, terminating in sharp slender fingers, which in the second pair are very long and nearly straight, and in the other pairs short. The legs of the posterior pair are a little the longest and thickest. The ambulatory feet in five pairs are of great length and resemble those of Amphipods. The caudal stylets are in length about four-fifths that of the abdomen, and consist of four or five articles, with few hairs, each article becoming narrower, the last one with a tuft of few hairs at its extremity. Length, .15 inch; breadth, .02. Dredged among *Ascidia callosa*, in 20 fathoms, in the Hake Bay.

AMPHIPODA.

CAPRELLA LOBATA, Kroyer. *Squilla lobata*, Müll., O. Fabr., F. G., p. 248. This species is more slender than any of the others, of a bright crimson color, and an inch or more in length. The first two segments are especially elongated, the second bearing the arms nearly at its posterior extremity; and the inferior antennæ are scarce half the length of the superior ones. It is found, not commonly, however, among nullipores, in 4-6 fathoms.

C. SANGUINEA, Gould, Inv. Mass., 336. A very common species in the higher levels of the laminarian zone. It may be distinguished from the others by its very slender antennæ and proportionally large hands. Color bright crimson. Length three-fourths of an inch.

C. LONGIMANUS, St., n. s. Body with a few spines along the back of each segment. Superior antennæ rather stout and twice as long as the inferior ones, which are very slender. Hands very long and rather broad, with two or three teeth along the inner edge; the arms to which they belong are placed on the thickened posterior part of the second segment. Color light-yellowish brown. Eyes red. Length about three-fourths of an inch.

C. ROBUSTA, St., n. s. This is a very large, thick, and robust species, of an olivaceous or often a light brown color. There are numerous short spines on the back, very variable in size and number in different specimens. The antennæ are not large, the upper ones being about half the length of the body, and the lower ones nearly as long and very hairy. Arms placed at about the middle of the second segment, with the hands having strong teeth on the lower edge, and short thick nails. Length (excluding antennæ), 1.25 inch; breadth, 0.1 inch. Dredged on a rocky bottom, in 12 fathoms, back of Duck Island ledge.

ÆGINA SPINOSISSIMA, St., n. s. Body slender, much thickened at the origins of

the appendages, covered everywhere on the back and sides with sharp broad-based spines, some of which are very long. These sometimes show a tendency to arrangement in transverse rows. There is one very strong spine just above each branchial lamina. The head is large, with prominent eyes; the inferior antennæ very much more slender than the superior ones, and the mouth parts well developed, the triarticulate palpi of the mandibles being small but obvious. The arms are placed at the thickening near the anterior extremity of the second segment, and have two spines on the first article in each, also two spines on the hand, one at its extremity and the other on the inner edge, just reached by the long curved finger when closed. The posterior thoracic legs are highly developed with their subcheliform hands provided with a spine in the middle. Abdomen very short, with a pair of posterior appendages which nearly equal it in length. The ground color is either purplish or brownish, upon which are numerous spots and patches of sulphur-white irregularly distributed. Length of the body (excluding antennæ), one inch; of which the proportions of the other parts are: greatest breadth, .09; length of superior antennæ, .8; of inferior antennæ, .3; of the third and fourth segments conjointly, .34; of the arms to tip of finger, .47; of one of the last pair of legs, .33; of the abdomen, .035. This beautiful species was dredged in great numbers adhering to *Gemellaria dumosa* in ten fathoms, off Cheney's Head.

UNCIOLA IRRORATA, Say, Journ. Acad. Nat. Sci., Philad., i. 389. This large and finely-colored species is found here in considerable numbers, as well as on our whole New England coast. It inhabits invariably sandy bottoms, usually in the laminarian zone, but is occasionally found at low-water mark. The color of my specimens is bright red or vermilion, mottled with flake white.

PODOCERUS NITIDUS, St., n. s. Small, slender, subcompressed, smooth and shining above, and of a pale wine-yellow color. Head rather elongated, eyes oval, black, placed obliquely at the bases of the superior antennæ, a little below. Antennæ slender, the superior ones most so, very hairy, about equal in length; the superior ones having the longest flagellum. Thoracic legs of the first pair elongated, with numerous long hairs on their edges, with the hand smaller and narrower than the antepenultimate article, and a strong finger equalling the hand in length. Those of the second pair large, with a short spine on the second article in front; hand large, oval, with a small curved finger of about half its length. The legs of the third and fourth pairs are very small; those of the sixth and seventh long, and with their terminal unguiform articles strong and sharp. Caudal styles of the first pair much the longest, reaching to the extremities of those of the second; those of the third pair small, biramous, with blunt tips. Length,¹ 0.3 in.; of which the proportions of the other parts are: greatest breadth, .25; height at the middle of the fourth thoracic segment, .25; length of the superior antennæ, .6; of a leg of the second pair, .37; of a leg of the longest (seventh) pair, .5. This species was dredged in thirty fathoms on a shelly bottom in the Hake Bay.

¹ The length of an Amphipod, as herein given, is taken from the bases of the antennæ to the extremities of the posterior caudal stylets.

LEPTOTHOE, St., n. g.

Body linear, segments well separated, epimera very small; superior antennæ longest, with a long accessory flagellum; inferior ones subpediform; legs of the first two pairs with subcheliform hands, those of the second pair being largest, with uniaarticulate fingers. Caudal stylets of the last pair very long, with equal lanceolate rami on short peduncles. This genus differs from *Podocerus*, Leach, in possessing accessory flagella to the superior antennæ; and from *Cratophium*, Dana, in its long nonuncinate terminal stylets, and in having the superior antennæ longest.

LEPTOTHOE DANÆ, St., n. s., Fig. 32. Body somewhat compressed, but rounded above, glabrous, and of a uniform bright flesh color; head three times as long as the first thoracic segment, but not as broad, and bearing the small subreniform eyes. Superior antennæ with long terminal flagellum, and an accessory one of nearly one-third its length, set on the very short penultimate article; inferior antennæ with the penultimate article as long as the terminal one; both pairs very hairy. Legs of the first two pairs compressed, those of the first pair very small, but similar in character to those of the second, which have very large hands obliquely truncate at their extremities for the reception of the short finger when closed. The remaining thoracic legs are slender, those of the posterior pairs having elongated basal articles. Natatory feet much elongated. The first three abdominal segments together nearly equal in length that of the last four thoracic segments conjointly, and the last of the three is considerably expanded below and produced backwards. The caudal stylets of the first pair project beyond those of the second, and those of the third pair are very long, their peduncles constituting only about one-fifth of their length. The tail terminates in a short, lamellar, bifid process. The thoracic segments in this species are each marked with an indistinct vertical line down the middle on each side. Length, 0.9 inch; of which the proportions of the other parts are: greatest breadth, .1; height at the middle of the fourth thoracic segment, .12; at the seventh, .13; length of the superior antennæ, .42; of the inferior antennæ, .25; of a leg of the second pair, .28; of a leg of the longest (seventh) pair, .37; of the caudal stylets of the first pair, .19; of the terminal stylets, .2. This species inhabits the laminarian zone, and seems to prefer for its residence patches of sandy bottom, on which there are numerous weedy rocks. I have frequently taken what appeared to be the young, in the coralline zone. It is more sluggish in its motions than is usual with Amphipods.

CERAPUS RUBRICORNIS, St., n. s., Fig. 33. *Male* much broader than high, tapering at both extremities, the head being about half the width of the second thoracic segment; the black eyes at the anterior corners of the head, on the oblique or almost horizontal line connecting the bases of the upper and lower antennæ. The second thoracic segment is the point of the greatest breadth, from its bulging out to accommodate the very large second pair of legs. Epimera very small, but increasing in size from the first to the fifth thoracic segment, in which latter they are comparatively large, while those of the sixth and seventh are scarcely perceptible.

Antennæ strongly subpediform, curving downwards and very hairy; the inferior ones, which arise beneath the head and behind the eyes, being a little the longer. Legs of the first pair small, with a small subcheliform hand; those of the second pair long, with the basal article curved, and the hand of great size, bearing a long spine or thumb below, and a large bi-articulate finger, the penultimate article of which is very thick, and seems rather part of the hand. The whole hand, when closed, is of an elongated oval or suboblong form. The legs of the third and fourth pairs are small, but with broad, flat, basal articles; those of the fifth pair shortest of all; those of the sixth and seventh slender, with sharp nails at their extremities. Caudal stylets of the first two pairs with long peduncles; those of the first pair projecting a little beyond the others; those of the last pair very short, simple, and subuncinate at their extremities. Color on the back dark mottled gray; epinera blackish; terminal articles of the four antennæ bright red; hands yellowish. *Female* generally larger than the male; superior antennæ as long as the inferior ones; legs of the second pair not large, with a small, short, and broad hand, which has a short uniaarticulate finger, and a thumb consisting of a sharp projection from the base of the antepenultimate article. In other words, the penultimate article is here expanded into a hand, instead of the antepenultimate as in the male, which latter article, however, bears the thumb in both. The colors are the same as in the male, except that the under side of the thorax is bright yellow, from the contained eggs. The dimensions of a large female are as follows: length, 0.5 inch; of which the proportions of other parts are: greatest breadth, at the 4th segment, .21; height at 4th segment, .1; length of superior antennæ, .42; the 1st pair of caudal stylets, .15; of a leg of 2d pair, .35; of a leg of the longest (7th) pair, .36. The largest male was 0.41 inch in length, the proportion of the breadth at 4th segment being .2; of the length of the second pair of legs, .61. The figures represent views of the posterior caudal stylets. This species was dredged abundantly on stems of *Boltonia* in 20 f., rocks, off Moose Inlet, towards the Seal Islands. It afterwards occurred sparingly in 10 f., off Cheney's Head, and in 25 f., off Duck Island. Specimens occurred on the tenth of August, with eggs, which were hatched on the twenty-fifth of the same month.

The *Cerapus rubicornis* inhabits flexible tubes, of sizes corresponding to that of the individuals, composed of fine mud and some animal cement by which it is agglutinated. These tubes are generally adherent for about one-half their length, and closed below. They are usually found in large groups, attached to submarine objects, and to each other. The animals are very active, protruding and retracting the anterior portion of their bodies, while their antennæ are in continual motion, lashing about in search of some object which might serve for food. It is very amusing to watch a colony of these animals, with their conical gestures in their disputes with each other, and their awkward celerity in regaining their respective tubes after having left them on temporary excursions. I have in no instance met with an individual transporting a free tube, as is said by Mr. Say to be the case with his *C. tubularis*. (Journ. Acad. Nat. Sci., i. 51; Pl. iv., f. 7-11.) There can be no doubt that the tube is fabricated by the animal, and this is not without precedent in the *Crustacea*, for I have often met with examples of *Pagurus*, which had enlarged their

borrowed shells by additions to its aperture. From what I have seen in such species of *Corophidae* as have fallen under my observation, I am inclined to think that most of the members of that family form more or less permanent tubes under certain circumstances. The *Unciola*, when kept in captivity, will frequently retire to some corner and collect the sand around it by some glutinous substance, so as to form a cavity, in which it will often remain for some time; but it may easily be made to leave it, and will make another if it be destroyed. On the other hand, some of the other individuals in the same jar will make no tubes; and often at low water it may be seen swimming about perfectly free. The same is true of some of the other species of the family here mentioned, and of many species whose habits I had opportunities of observing in the Harbor of Charleston, S. C., in the winter of 1851-2.

It will be seen from this and the succeeding descriptions, that the female of *Cerapus* has uniarticulate fingers on the second pair of legs, and Kroyer mentions an instance of a male *Podocerus* having bi-articulate fingers. It might be concluded from this that the genera should be united. But there are *Podoceri* in which both males and females have uniarticulate fingers; to these the genus should perhaps be restricted, while Kroyer's species will come under *Cerapus*. Dana gives, in a diagnosis of *Cerapus*, "Styli caudales 3tii biramei, ramis subæquis, longiusculis" (Amer. Journ. Sci., 2d ser., xiv. 309). In the *Cerapi* herein described, however, the posterior pair of these caudal appendages consists of two thick simple stylets, at the extremities of which are articulated one or two short spines, curved upward.

CERAPUS FUCICOLA, St., n. s., Fig. 34. *Male*, slender, smooth above, with the breadth and height about equal. Epimera, small but conspicuous, proportionally larger than in *C. rubricornis*. Inferior antennæ stout, strongly subpediform, with their terminal articles constituting about one-fourth their length. Superior antennæ of about two-thirds the length of the inferior ones. First pair of legs very small, subchelate. Second pair with long curved basal articles; the fourth or antepenultimate short; the penultimate elongated, very thick, curved, thickly hirsute along the inner edge with short pinnate hairs, and with a stout curved finger of less than half its length. Third and fourth pairs with long narrow basal articles; last three pairs with broad ones. Caudal stylets of the last pair short, the peduncle constituting nearly their whole length, with two very short curved processes at the extremity of each. *Female*, differing from the male in having its superior antennæ of nearly the same length with the inferior ones, and in its small, slender, simply subchelate feet of the second pair, which have no pinnate hairs. The color varies from light olive or greenish, to bright crimson. Eyes usually white. The articles of the antennæ are sometimes alternately red and white. Length of a large male, 0.36 inch. Proportions: breadth, .22; length of inferior antennæ, .61; of a leg of the 2d pair, .59; of a leg of the 6th pair, .46. The figure represents the caudal stylets. It inhabits slender tubes, which are found in considerable numbers on large algae in the laminarian zone. In this species, the hand is formed of the penultimate article of the second pair of legs, the preceding article being very short; so that it cannot strictly remain in the genus. But it is so closely allied in general appearance, habit, and details to the preceding species, that it cannot with propriety be separated.

CERAPUS FASCIATUS, St., n. s., Fig. 35. *Female*, elongated, head narrow, thorax very broad in the middle, where the height equals scarcely one-third of the breadth; abdomen very slender throughout its length, being about one-half the width of the thorax. Antennæ very slender, with long flagella, the inferior arising much behind, and somewhat longer than the superior ones, which are greatly thickened at their bases. Legs of the first two pairs with small subcheliform hands, those of the second pair largest. The remaining thoracic legs are slender, the third and fourth pairs with oval basal articles, and the last pair longer than the others. Natatory feet of great length. Caudal stylets very long and slender, those of the first pair projecting beyond the others, those of the last pair short and rather thick, each terminating in two short curved processes. Ground color wine-yellow, with narrow transverse bands of dark-reddish brown, one to each segment, on the back. The small epimera of the last three thoracic segments are also dark brown. Eyes rather large, rounded, black. Length, 0.32 inch; proportions of other parts: greatest breadth, .23; length of superior antennæ, .5; of the last pair of legs, .44; of the abdomen, .48; of the first pair of caudal stylets, .19. The figure represents the caudal stylets, seen from above. It was dredged in thirty-five fathoms, on a gravelly bottom, in the Hake Bay. The degree of elongation and flexibility of the terminal articles of the antennæ seems a character of insufficient importance to separate this species from *Cerapus*.

ORCHESTIA GRYLLUS, Gould, Inv. Mass., 334. *Talitrus gryllus*, Bose, Hist. Nat. des Crust., ii. 104 (?). Say, Journ. Acad. Nat. Sci., i. 386. This species is found plentifully among the half-dried *Fuci*, which line some of the shores just above high-water mark in large quantities. It is of a dark-yellowish color, very glossy, with three dark olive longitudinal bands along the back. It is very active, leaping to considerable distances. I have never found it immersed, although some moisture is, of course, necessary to its existence. The species found in similar positions in Massachusetts Bay is undoubtedly the same, but there are doubts whether it is identical with that described by Bose, from the salt marshes of South Carolina.

ALLORCHESTES LITTORALIS, St., n. s., Fig. 36. Small, robust, rounded above, smooth and shining; eyes very large, black, rounded, not far removed from each other; superior antennæ about two-thirds as long as the inferior ones, which are rather stout, and equal in length about one-fourth that of the body; second pair of legs with short, but stout hands, much larger than those of the first pair; posterior legs long, with each article projecting a little at the insertion of the succeeding one. Caudal stylets short, but very thick, spinous; those of the first pair much the longest; the simple ones of the posterior pair very short but thick at base. Tail terminating in an arched lamella. Color varying from bright green, through the various shades of olive, to brown. Length, 0.3 inch. Taken abundantly on stones in the second subregion of the littoral zone, especially where the *Fucus nodosus* and *F. vesiculosus* flourish. It occurs on our whole coast from Massachusetts Bay to Grand Manan.

LYSIANASSA SPINIFERA, St., n. s. Body smooth and shining, slightly compressed, but rounded above, broadest anteriorly, tumid at the head, and much compressed at the abdomen, which constitutes nearly one-half the length of the body. Epimera not very large. Head rounded, with a prominent down-curving rostrum, and rather

large red eyes. Superior antennæ two-thirds as long as the inferior ones, thick at their bases, but tapering suddenly after the juncture of the long accessory flagellum, which is nearly one-half the length of the principal one. Inferior antennæ with very thick basal articles, and equalling in length two-thirds that of the body, their flagella constituting more than one-half their length. Legs hairy, all terminating in short hooked fingers; those of the first two pairs slender, longer than the rest, with the antepenultimate article in each a little expanded, but scarce sufficiently to form a hand. Posterior legs much shorter than usual, and provided along their edges with short spine-like hairs. First three segments of the abdomen serrated above on their posterior edges; last three compressed above into sharp spine-like projections, of which the middle one is the longest. Caudal stylets of the first pair very long and slender, projecting beyond the sharp extremities of the second pair, which are short, while those of the third pair are long, with long lanceolate rami projecting beyond the others. The tail terminates in two long spines. Color wine-yellow; inferior antennæ annulate with reddish. Length, 0.32 inch. Dredged in forty fathoms on a soft muddy bottom off Long Island, G. M.

ANONYX NOBILIS, St., n. s. This species most resembles *A. appendiculosus*, Kroyer, Grönlands Amphipoder, Tab. i. f. 2, from which it differs in the following particulars. The black eyes are oblong or oval, and sometimes nearly round, instead of clavate. The basal joints of the superior antennæ are cylindrical rather than conical. The epimerals are much larger, especially those of the fifth segment; and there are no deep serrations on the edges of the femora in the last two pairs of legs. The rami of the last pair of caudal stylets are much larger. Color white. Antennæ light fawn. Length three-fourths of an inch. It was taken in considerable numbers on the sandy flats of Fisher's Cove, Nantucket Island, etc., at low-water mark.

The curious appendicula on the segments of the flagella of the antennæ appear like little flasks attached by their constricted necks. The legs of the second pair terminate in small, compressed, circular articles, provided with hairs, but without any indication of a finger or nail.

A. POLITUS, St., n. s. Elongated, broad and rounded above, but with less height than is usual in *Anonyx*; head small, tumid, with the eyes subrectangular, but broadest below, and of a bright red color. Superior antennæ very short and thick, regularly tapering to a point, with a short accessory flagellum, and in length one-fourth that of the inferior ones, which equal in length about one-half that of the body, and have very long and slender flagella. Legs of the first pair with small but well-formed subcheliform hands; those of the second pair very long, but usually bent up beneath the epimera, and terminating in a small, flat, rounded, hirsute article, without a nail. Abdomen with a deep sinus between the segments bearing the natatory feet, and those bearing the caudal stylets; all of which latter appendages terminate in long, smooth, pointed rami. The tail terminates in two pointed spines, about two thirds the length of the last pair of caudal stylets. Color light-yellow. Length, 0.4 inch. Dredged in forty fathoms, on a soft muddy bottom off Long Island, G. M.

A. PALLIDUS, St., n. s. Body short, slightly compressed, rounded above, with a sinus at the abdomen as in *A. politus*. Head with large, black, subclavate eyes,

broadest below, as in *A. appendiculosus*, Kr. Antennæ hairy, very short, the superior ones very thick and tapering, equalling the inferior ones in length, that is, reaching the second thoracic segment. Legs slender, very hairy, in structure like those of the above species. Caudal stylets of the first two pairs long and pointed, slightly serrated above, those of the last pair short, thick, and spinous. Color pale-whitish, the brownish viscera showing through along the middle. Length, 0.35. Taken in four fathoms, in sand, off Duck Island moorings; in ten fathoms off Cheney's Head; and in twenty fathoms, mud and shells, off the northern point of Duck Island.

A. EXIGUUS, St., n. s. Minute, compressed, but rounded on the back; last three thoracic segments nearly equalling the first four in extent. Epimera of the first four pairs equalling in height that of the segments which bear them. Abdomen with its third segment tumid posteriorly, and curving downwards to the fourth, thus forming a sinus, which appears deeper from a blunt projection on the middle of the fifth segment. Head small, with the eyes bright red or vermilion in color. Superior antennæ short and thick, about half the length of the very slender inferior ones, which reach the fourth thoracic segment. Legs slender, in structure nearly the same as in the above species. The posterior five pairs terminate in long slender fingers. Basal joints of the posterior three pairs very broadly expanded, and deeply serrated along their posterior edges. Caudal stylets as in *A. politus*. Color yellowish. Length, 0.2 inch. Dredged on sandy bottoms in 8-15 fathoms, east of the Passage, and off Cheney's Head.

STENOTHOE CLYPEATA, St., n. s. Body compressed; epimera very large, especially those of the fourth pair, which constitute great shields extending for a length equal to that of three thoracic segments. Superior antennæ short, curved, with long flagella; inferior antennæ long and slender, with very short flagella. External maxillipeds very long, reaching up to the bases of the antennæ. First pair of legs slender, with small hands; those of the second pair with very large hands, each of which has two strong teeth on the lower edge, the basal one longest, and a stout, curved finger. Legs of the fifth pair wanting the expansions of the basal joints. Caudal stylets of the first two pairs biramous, subulate; those of the third pair simple, terminating in a thick sharp spine. Tail terminating in a minute elongated scale. Natatory feet terminating in long slender lashes. Color, bright yellow; in the young, pale bluish. Eyes conspicuous, red. Length, 0.5 inch. Dredged in thirty fathoms, on a shelly bottom in the Hake Bay.

LEUCOTHOE GRANDIMANUS, St., n. s., Fig. 37. Large, robust, thick; epimera very small; head depressed below the first thoracic segment, subquadrate, with a slight rostrum in front, between the superior antennæ. Eyes large, on the sides of the head. Mandibles with minute, triarticulate palpi. Maxillipeds slender, freely projecting. Superior antennæ with very thick and elongated basal articles, and short flagella; inferior ones arising some distance below, and much more slender, but about as long as the superior ones, which are in length about one-fourth that of the body. In the first pair of legs the third joint is very minute, the antepenult subquadrate, compressed, and with its inferior apex produced into a slender process, or thumb, of equal length with the penult joint, which is very much elongated, slender, and

bears a slightly curved finger, or terminal unguiform joint, which overlaps the thumb for nearly half its length. In the second pair of legs, the antepenult joint projects into a curved thumb of about half the length of the penult article, which forms a thick ovate hand of great size, equalling in length more than that of the first three thoracic segments together. Its finger is strong, and curved. The remaining legs are rather long, but very slender, with short terminal joints. Caudal stylets long, slender, nearly smooth, and pointed. Color, in life, pale yellowish. Length, 0.44 inch; height at the fourth segment, 0.14 inch; breadth, 0.12 inch. Dredged in thirty fathoms, on a shelly bottom off Low Duck Island.

ACANTHONOTUS SERRATUS, St. *Oniscus serratus*, O. Fabr., Fauna Grönl., No. 237. *Amphithoe serra*, Kroyer, Grönlands Amphipoder, t. 2, f. 8. This species is very beautiful in coloration, which consists of deep pink annulations, one to each segment of the body, on a yellowish-white ground. The anterior half of each ring is thus pink, and the posterior half white. The last pair of epimerals is also conspicuously colored. The anterior halves of the antennæ are also red. This species occurred in thirty-five fathoms on a gravelly bottom, north-east of Nantucket Island.

*AMPHITHONOTUS*¹ *CATAPHRACTUS*, St., n. s. Body robust, carapax very stout, with seven carinæ extending for greater or less distances on the back and sides, viz.: one strong median dorsal carina commencing on the first thoracic segment, becoming strongly dentate on the last thoracic segments, and ceasing on the second abdominal; the next two carinæ (proceeding outwards) are developed in the form of strong teeth on the last two thoracic, and all the abdominal segments, being spine-like on the second, and almost lamelliform on the last four abdominals; the next carinæ are sharp ridges, extending along the bases of the epimera, and slightly continued on the first two abdominal segments; and the last, or outer carinæ, are very short, extending only along the bases of the last three pairs of legs. Epimera large, angular. Head with very large, rounded, convex eyes, and a rostrum of great size, which is elongate-triangular, pointed, curving downwards, concave above, and with a sharp median ridge below. Antennæ slender, about equal in length, and one-fourth the length of the body. Legs of the first two pairs with large ovate hands, dentate below, with curved fingers of about two-thirds their length; antepenult joints with slight thumbs. The remaining legs are slender; femora of posterior pairs but slightly expanded. Caudal stylets all biramous; external rami of the last two pairs shorter than the inner ones. Tail terminating in a subquadrate lamella. Color very variable, generally dark reddish or brown, variegated and mottled with white. Some specimens were of a uniform deep purple, others pure white. Eyes yellowish or vermilion colored, with a black dot in the middle. Length, half an inch. This is one of the most curious, and by far the finest species

¹ *Amphithonotus*, Costa, in *Catalogo Crustacei Italiani*, per Fr. Gugl. Hope, Napoli, 1851. "Illis ex *Amphithois* sp. constitutum est hoc genus, quæ dorsum vel omnino carinatum et spinosum, vel saltem quibusdam abdominis articulis si non et thoracis postice in spinam vel dentem productis habent; ex quo peculiarem habitum præbent, *Amph. marionis*, Edw., *A. panopla*, Kroyer, *A. carinatus*, ejusd. et quæ sequuntur ad hunc genus pertinent." This genus is synonymous with *Acanthosoma*, Owen; which name, however, is preoccupied in insects. It may include those species of *Amphithoe* which have dorsal carinæ, and small epimera of the fifth pair.

taken. It occurred only once, but then in considerable numbers, in ten fathoms, on a sandy bottom, inside of Duck Island ledge. It resembles *Acanthosoma hystric*, Owen, which, however, has no rostrum. Certain northern *Acanthonoti* also approach it in external appearance; but the characters of the legs of the first two pairs separate it from that genus. In its very hard carapax and large strong epimera, it possesses great security; and, when disturbed, it rolls itself up and remains quiescent, as if feigning death, as is the manner of some spiders. Most other Amphipods will, on the contrary, endeavor to escape when molested. When in motion, this animal preserves an erect posture, like the Isopods, with its tail-bent up underneath. It seldom swims, but makes powerful leaps by means of its well-developed caudal stylets.

AMPHITHOE¹ VIRESCENS, St., n. s. Slender, of a softer structure than is usual, smooth and rounded above. Epimera small, rounded below. Head of moderate size, with very small red eyes.² Antennæ about equal in length, more than half as long as the body; the superior ones with flagella constituting nearly two-thirds of their length; the inferior ones thick-based, and slightly subpediform. Mandibles large, with their curved apices long and projecting. Legs covered with long simple hairs; the first two pairs with hands of moderate size, equal; posterior three pairs with strong, hooked, terminal articles. Caudal stylets of the first two pairs spinous above; those of the last pair with short, thick rami, the outer ones having two hooks at their extremities above, the inner ones simply hairy. Natatory feet of great length. Color, pale-greenish, with minute black punctæ distantly and regularly arranged, most numerous on the epimera. Length, 0.45 inch; height at the fourth segment, 0.1 inch; breadth, 0.08 inch. Dredged in four fathoms, on a nullipore bottom, off Duck Island boat-moorings.

A. MACULATA, St., n. s. Body rather broad, smooth and well rounded above; epimera of moderate size, those of the fifth pair largest; antennæ rather stout, subequal; inferior ones subpediform, with very short terminal articles; hands of the second pair of legs larger than those of the first pair; posterior five pairs with small, sharp, curved nails; fifth pair very short; caudal stylets short and thick. Color greenish or grayish, with very numerous minute punctations, and a white spot on each of the segments along the middle of the back. Length, 0.65 inch; breadth, 0.14 inch; height at the fourth segment, 0.15 inch; length of antennæ, 0.22 inch; of the second pair of legs, 0.2 inch; of the head and first five segments together, 0.34 inch; of the abdomen, 0.28 inch. Taken on rocky bottoms in the laminarian zone, and occasionally at low water. It differs from the last species in being more robust and of a much harder structure; also totally in coloration.

IPHIMEDIA VULGARIS, St., n. s. Smooth, subcompressed, abdomen with segments slightly projecting at the articulations, but not dentated; head large, with very large reniform eyes, which are colorless in preserved specimens. Antennæ sub-

¹ The genus is here taken as restricted by Dana; to those species which have large epimera of the fifth pair, and uncinatæ external rami to the posterior caudal stylets.

² The color of the eyes is quite characteristic of the species in the *Amphipoda*. It is, however, only to be observed in living individuals; as the eyes invariably become either black or colorless after death.

equal, with very long, slender, filiform flagella, and in length about equalling that of the body; the superior ones thick-based, and a little the largest. Mandibles with sharp curved apices, and large palpi consisting of three articles, the basal one of which is very short, the second broad, and the terminal one very slender. Maxillipeds slender, pointed, with large internal lamellæ. Hands very small, those of the first pair largest. Posterior five pairs very slender, terminating in curved fingers. Natatory feet well developed. Caudal stylets of the first two pairs almost acicular, with small spines above; those of the third pair with broad lancet-shaped rami. Tail terminating in two lamelliform spines. Color variable, generally dark-mottled purplish. Length, 0.4 inch, generally much smaller. It differs from *Amph. inermis*, Kr., Grönl. Amphip., t. iii. f. 11, in its larger eyes and epimera, and much longer caudal stylets. This species may always be found in the greatest abundance in the little pools left by the tide among the rocks near low-water mark. They are very active, swimming about in all directions, and seldom resting long in one place.

MONOCULODES, St., n. g.

Body tumid anteriorly; head rostrate, with the eyes so close together as to appear one. Superior antennæ without accessory flagellum; inferior ones subpediform. Legs of the first two pairs with large subcheliform hands, formed of the last two articles of each; the antepenult joints having their inferior apices produced into slender thumbs. Legs of the posterior five pairs unguiculate, those of the last pair being exceedingly long. Caudal stylets all biramous; the rami being equal. Maxillipeds large, elongated, with unguiform terminal articles, and internal lamellæ of about one-half their length. Mandibles palpigerous.

This genus resembles *Eusirus* in the structure of the hands, and *Ædiccerus* in its long posterior feet.

M. DEMISSUS, St., n. s. Body smooth and shining, broad and thick anteriorly, and slender posteriorly; the abdomen constituting more than three-sevenths of the total length. Epimera of the first five pairs of considerable size; the rest very small. Head tumid, terminating anteriorly in a large, subtriangular rostrum, curving downward; at the base of which above are the large vermilion-colored eyes, which are so near together as to appear one, even when viewed from above. Antennæ thick-based and about equal in length, reaching the fourth thoracic segment; the superior ones with a much longer flagellum than the subpediform inferior ones. Legs of the first two pairs with large oval hands, strong fingers, and thumbs formed from prolongations from the antepenult joints, which are largest in the second pair. The remaining legs are simply unguiculate, the fifth and sixth pairs being very short, and the seventh of great length. Caudal stylets nearly smooth, of considerable length, tapering to fine points; the first pair reaching the extremities of the third. Color wine yellow. Length, 0.35 inch. Dredged in four fathoms, on a coarse sand and nullipore bottom, off Duck Island boat-moorings.

GAMMARUS SABINII, Leach, Sabine's Appendix, t. i. f. 8-11; Kroyer, Grönland's

Amfipoder, t. i. f. 3; Tidsskr., ii. 257. The specimens obtained differ from the figures and descriptions of the above species, in possessing the same appendicula to the flagella which are seen in *Anonyx appendiculosus* and *nobilis*. This is perhaps a sexual character; if so, the specimens figured by Kroyer, in his Grönland's Amfipoder, are females. The hands, also, are there represented smaller than is the case with our specimens.

G. MACROPTALMUS, St., n. s. Very closely allied to the preceding species in color and general appearance. The back, however, is carinated only at the abdomen, which readily distinguishes it. The appendicular branches of the superior antennæ are minute, and scarcely perceptible. Eyes very large, subreniform, near each other. Epimera small. Caudal stylets of the first pair as long as those of the second; both with their outer rami shorter and narrower than the inner ones; last pair with broad, lancet-shaped rami, shorter than in *G. Sabinii*. Color sometimes bright crimson, but usually mottled red and flake-white; very variable. Length, 0.5 inch; of the inferior antennæ, which are longest, 0.2. Dredged on rocky bottoms in the laminarian zone, and occasionally taken at low-water mark.

G. PULEX. *Cancer pulex*, Lin. *Oniscus pulex*, Mull.; O. Fabr., F. G., 254. *Gammarus locusta*, Mont., Lin., Trans., ix., pl. iv. f. 1; Kroyer, Grönl. Amf., 27; Tidsskr. ii. 258; Gould. Inv. Mass., 334. This species is very abundant under stones in all parts of the littoral zone. It is usually of a dark-green color, but often lighter, never, however, variegated. The length of some specimens is more than an inch. Notwithstanding its abundance on the shores, only one specimen occurred below low-water mark, which probably got there accidentally; showing that the littoral zone is its proper habitat.

G. PURPURATUS, St., n. s. Large, compressed, but rounded on the back, with slight spinous prominences on the posterior abdominal segments, as in *G. pulex*. Eyes small, black, oval. Superior antennæ slender, two-thirds as long as the body, with very slender accessory flagella; inferior ones five-sevenths as long as the superiors. Hands of the second pair much the largest; femora of the posterior pairs of legs very large, and suboblong. Caudal stylets of the posterior pair with the internal rami minute, and the external ones long, thick, and sword-shaped, equalling in length one-fifth that of the body. The color never varies, being a uniform dark purple in all the specimens which have come under my notice. Length one and one-tenth inch. Taken on a sandy bottom, in twelve fathoms, off Cheney's Head. It also occurs in deep water in Massachusetts Bay. Except in color, this species has almost precisely the external appearance of *G. pulex*; but the remarkable character of the posterior pair of caudal stylets at once distinguishes it. They are also entirely different in station.

PTILOCHEIRUS, St., n. g.

Body broad, as in the *Corophida*; epimera large and strong, much higher than broad. Mandibles with greatly elongated palpi; maxillipeds with their internal lamellæ of half their own length. Superior antennæ appendiculate, inferior ones

subpediform. Legs of the first pair subchelate, very thick and strong throughout their length, in the male; those of the second pair plumose, without hands, but minutely unguiculate; those of the third and fourth pairs small, slender, and tapering, with the last three articles forming a kind of hooked finger, but with no dilated hand; posterior three pairs strongly unguiculate; those of the last pair much the longest. Caudal stylets all biramous, those of the first two pairs with a strong spine projecting from the inferior apex of the peduncle, along with the rami.

This genus resembles in most characters *Leptocheirus*, Zaddach, and may perhaps prove the same; that name, however, is preoccupied in insects. It has relations with the *Pontoporicæ* in its plumose hairs, and somewhat in the structure of the legs of the third and fourth pairs; while it also approaches those genera of the *Gammarinæ* which recall the *Corophidæ*.

P. PINGUIS, St., n. s. *Male*, robust, very broad anteriorly, narrowing posteriorly; head large, equalling in length that of the first thoracic segment, and bearing the reniform black eyes at the anterior angles, between the bases of the superior and those of the inferior antennæ. First thoracic segment equalling in length that of the second and third together; third abdominal segment also very large, nearly equalling the first and second together. Epimera very strong; the first large, subrhomboidal; the second much the largest, projecting downward, and furrowed along the middle; the fifth very small. Superior antennæ in length about half that of the body, terminating in long filiform flagella, with a minute appendicular branch; inferior ones as long as the superior, and strongly subpediform. Legs of the first pair very thick throughout their length, with a very short, subquadrate hand, and curved finger. Those of the second pair elongated, covered with long plumose hairs, and terminating in an exceedingly minute, slender, unguiform article. Legs of the posterior pairs with well-expanded femora. Caudal stylets very spiny above, those of the last pair short. *Female*, with the superior antennæ longer than the inferior ones; the head equalling in length that of the first two segments, which equal each other, together. Epimera of the first pair very small, subtriangular; those of the second pair without groove, and not projecting beyond the others, though still the largest. This results from the smaller size of the legs of the first pair, which are much more slender, and those of the second pair proportionally more elongated, than in the male.

The color is dark grayish, on all the segments, epimera, and femora, except at their margins. Antennæ and legs white. The dimensions of a large male are: Length, 0.64 inch; breadth, 0.18 in.; height at the third thoracic segment (epimera included), 0.2 in.; length of a leg of the first pair, 0.21 in.; one of the seventh pair, 0.37 in.; distance between the centres of the eyes, 0.06. This species is abundant on the whole coast of New England, as well as at Grand Manan. It is most abundant on sandy bottoms in the laminarian zone; although sometimes occurring at low-water mark, as at Fisher's Cove; or in the coralline zone, as in twenty-five fathoms, off Duck Island.

PSEUDOPTHALMUS, St., n. g.

Body greatly compressed, with large epimera. Head with an irregular deposition of blackish or reddish pigment anteriorly, in which are one or two orbicular clear spots on each side, without facets. Maxillipeds with five articles, of which the terminal one is oval; internal lamellæ with combs of spines at their apices. Mandibles palpigerous. Antennæ very slender, the superior ones with their basal articles much thickened, and without accessory flagella; inferior ones arising much behind the bases of the superior ones. Legs of the first and second pairs sometimes with small subcheliform hands, shorter than the antepenult segment, but often simply unguiculate; those of the third and fourth pairs elongated, tapering, with their second joints very small, the third expanded into a hand; posterior pairs short; last pair with very broad basal joints. Caudal stylets all biramous. Tail terminating in a thin lamella. Epimera and third and fourth pairs of legs with plumose setæ along their edges.

P. PELAGICUS, St., n. s. Compressed, very smooth and shining; head with dark-red pigment, with two clear spots on each side, one above the other, at the bases of the superior antennæ. Inferior antennæ very slender, as long as the body; superior ones two-fifths as long as the inferior ones. Legs slender, posterior ones with few stout spine-like hairs. Caudal stylets of the first and third pairs projecting beyond those of the second. Abdomen sinuated above on the last three segments. Color pale wine-yellow. Length, 0.4 inch. Taken on a soft muddy bottom in 35-50 fathoms, off Long Island, G. M., and in 30 f., sand, in the Hake Bay.

Another species (*P. limicola*, St., n. s.) is taken at low water in Charleston Harbor, S. C., living in holes in the soft mud, which is larger than the preceding, and has but one clear eye-spot on each side of the head. The first two pairs of legs are simply unguiculate, and in the third and fourth pairs the third joint forms a slender hand, and the last three joints a finger, of which the terminal unguiform article is exceedingly long and slender. The last pair of caudal stylets terminate in very broad, flat, lanceolate rami. This notice of a southern species is added to illustrate the genus.

PHOXUS FUSIFORMIS, St., n. s. Body tapering at both extremities. Head small, with white eyes. Rostrum subtriangular, scarce distinct from the head, broadly projecting over the bases of the antennæ, which are short, in structure like those of *Anonyx*, except that the bases of the inferior ones are broad, compressed, and very hairy on their edges. The superior and inferior ones are about equal in length, and would reach the second thoracic segment. The accessory flagella of the superior ones are nearly as long as their terminal articles. Legs of the first two pairs subequal, with broad, oval, subcheliform hands, which have a slight offset on the lower edge, just reached by the finger when closed. Third and fourth pairs with the antepenult article but slightly expanded, and three or more unguiform spines set on the extremity of the terminal article. Sixth pair with long,

straight, spine-like terminal articles. Antennæ, epimera, and legs all hirsute with plumose setæ. Caudal stylets all biramous; those of the third pair with the internal rami much shorter and more slender than the outer ones. Tail terminating in two short lamellæ, in length one-half that of the last caudal stylets. Color white. Length, 0.2 inch. Dredged on coarse sandy bottoms, in the laminarian and coralline zones. It has more nails on the third and fourth legs than *P. plumosus*, Kr.

P. KROYERI, St., n. s. Larger, and thicker than the preceding, glabrous above, and of a pale-red color, with the eyes white. The antennæ, legs, and epimera are all very hairy, but the hairs are simple instead of plumose. Superior antennæ shorter and more slender than the inferior ones. Mandibles with palpi almost as long as the superior antennæ. Legs of the first pair with more elongated hands than in the preceding species; those of the sixth pair not so long in proportion. Third and fourth pairs with simple terminal nails. Tail terminating in two sharp spines. Length, 0.3 inch. Taken at low-water mark, on a sandy shore, at High Duck Island. It resembles most *P. Holbollii*, Kr.

STOMAPODA.

MYDIS OCVLATA, (?) Kr. A species of *Mysis* is very abundant in the waters at the mouth of the Bay of Fundy, swimming near the surface in swarms, and generally far from land. They form almost the only food of the herring, whose stomachs may always be found distended with this kind of food. It is particularly numerous in what are called the "Ripplings," which take place on the flood-tide at a line of shoals several miles east of Grand Manan; which form the chief fishing-ground of the herring-catchers.

DECAPODA.

PANDALUS LEVIGATUS, St., n. s. This large species differs from *P. borealis*, Kroyer, in the want of dorsal spines on the third and fourth abdominal rings, and in having only eleven superior spines or serrations on the rostrum, which are situated only on the posterior two-thirds of its length. Its color is usually a very pale yellow, with narrow blue lines on the back. Dredged on rocky bottoms in the laminarian zone.

HIPPOLYTE ACULEATA, Gould, Inv. Mass., 332. Very common in the laminarian zone. It is beautifully mottled with bright red, with some white or bluish spots.

CRANGON VULGARIS, Fabr., M. Edw., Gould, Inv. Mass., 331. Taken, not commonly, at low water, in sheltered, sandy coves.

C. BOREAS, Phipps. This fine species was dredged in four fathoms, on a nullipore bottom, near the Passage, and in twenty fathoms, shelly, off Duck Island ledge.

HOMARUS AMERICANUS, M. Edw., Hist. Nat. des Crust., ii. 334. The lobster is said by the inhabitants to occur in great numbers in May, at Grand Harbor, living

in holes in the sand just below low-water mark. They are easily taken with boat-hooks.

BERNHARDUS STREBLONYX, Dana. *Pagurus Bernhardus*, Fabr., M. Edw., Gould, Inv. Mass., 329. Not so common here as the succeeding species. I have had opportunities of comparing this with European specimens, and find them precisely the same.

B. PUBESCENS, St. *Pagurus pubescens*, Kroyer, Tidsskrift, ii. 251. Taken in considerable numbers, but not abundantly, in the laminarian zone, especially on nullipore bottoms. It inhabits chiefly shells of *Buccinum undatum*. It is easily distinguished from *B. streblonyx*, by its hairy, carinated hands.

HYAS COARCTATA, Leach; M. Edw., Hist. Nat. des Crust., i. 312. Not uncommon in the laminarian zone.

CANCER IRRORATUS, Say; Gould, Inv. Mass., 322. *Platycarcinus irroratus*, M. Edw., De Kay. Found, very rarely, however, in cavities among the rocks at low water.

FINIS.

INDEX.

[The synonyms, or names of genera and species to which incidental reference only is made, are in Roman.]

- ACALEPHLE, 8.
 ACANTHONOTUS, 53.
 SERRATUS, 52.
 Acanthosoma, 52.
 HYSTRIX, 53.
 ACAULIS, 10.
 PRIMARIUS, 10.
 ACEPHALA, 19.
 Acætes, 36.
 lupina, 36.
 Pleci, 36.
 ACTINIA CARNEOLA, 7.
 CORIACEA, 7.
 crassicornis, 7.
 DIANTHUS, 7.
 MARGINATA, 7.
 ORTRUNCATA, 7.
 SIPUNCULOIDES, 7.
 ACTINIADÆ, 7.
 ADEORBIS COSTULATA, 23.
 ADMETE VIRIDULA, 24.
 ÆGA concharum, 42.
 POLITA, 41.
 ÆGINA SPINOSSISSIMA, 44.
 Agarum, 8.
 ALCYONIDÆ, 7.
 ALCYONIUM DIGITATUM, 7.
 echinatum, 11.
 ALECTO ESCHRICHTII, 12.
 ALLORCHESTES LITTORALIS, 49.
 AMPHIPODA, 44, 53.
 AMPHITHOE, 52.
 carinata, 52.
 inermis, 54.
 MACULATA, 53.
 marionis, 52.
 panopla, 52.
 scirra, 52.
 VIRESCENS, 53.
- AMPHITHONOTUS, 52.
 ANCEUS AMERICANUS, 42.
 maxillaris, 43.
 ANCULA cristata, 26.
 SULPIUREA, 26.
 ANISOPODA, 42.
 ANNULATA, 29.
 ANOMIA ACULEATA, 20.
 EPHIPPIUM, 20.
 ANONYX, 50, 57.
 appendiculosus, 50, 51, 55.
 EXIOUUS, 51.
 NOBILIS, 50, 55.
 PALLIDUS, 50.
 POLITUS, 50, 56.
 ANTHURA BRACHIATA, 43.
 APHRODITACEÆ, 36.
 APHRODITA ACULEATA, 36.
 cirrata, 36.
 scabra, 36.
 APLIDIUM, 19.
 Aplysia, 27.
 APORRHAIIS OCCIDENTALIS, 23.
 pespelicani, 23.
 ARENICOLA PISCATORUM, 31.
 ARICIA QUADRICUSPIS, 33.
 ASCIDIA CALLOSA, 7, 19.
 GEOMETRICA, 20.
 TENELLA, 20.
 ASELLODES, 41.
 ALTA, 41.
 ASTARTE QUADRANS, 21.
 SULCATA, 21.
 ASTERACANTHION ALBULUS, 14.
 MULLERI, 14.
 LITTORALIS, 14.
 RUBENS, 14.
 VIOLACEUS, 14.
 ASTERIADÆ, 14.

- ASTERIAS pertusa, 14.
 phrygiana, 15.
 spongiosa, 14.
 Astrogonium phrygianum, 15.
 ATROPHYTON AGASSIZII, 12.
 AURELIA AURITA, 11.
 BALANUS GENICULATUS, 38.
 BALANOIDES, 39.
 ovularis, 39.
 rugosus, 39.
 BERNHARDUS PUBESCENS, 59.
 STREBLONYX, 59.
 BEROID MEDUSÆ, 11.
 BOLINA ALATA, 11.
 BOLTENIA, 13, 47.
 RENIFORMIS, 20.
 RUBRA, 20.
 BOTRYLLOIDES, 19.
 Botryodaetyla affinis, 16.
 grandis, 16.
 BRADA, 32.
 GRANOSA, 32.
 SUBLÆVIS, 20, 32.
 BRACHIOPODA, 32.
 BRANCHIOPODA, 39.
 BRYOZOA, 17.
 BUCCINUM UNDATUM, 24.
 BULLA DEBILIS, 25.
 HIEMALIS, 25.
 PERTENUIS, 25.
 TRITICEA, 25.
 CALIGUS PISCINUS, 38.
 CAMPANULARIA SYRINGA, 8.
 CANCER pulex, 55.
 IRRORATUS, 59.
 CANTHOPSIS HARVARDIENSIS, 25.
 CAPRELLA LOBATA, 44.
 LONGIMANUS, 44.
 ROBUSTA, 44.
 SANGUINEA, 44.
 CARDITA BOREALIS, 21.
 CARDIUM ISLANDICUM, 21.
 PINNULATUM, 21.
 Caudina, 17.
 arenata, 17.
 Cellepora annulata, 18.
 CELLULARIA TERNATA, 19.
 CEPHALOPODA, 27.
 CERAPUS FASCIATUS, 49.
 FUCICOLA, 48.
 RUBRICORNIS, 46, 47.
 tubularis, 47.
 CHEMINITZIA NIVEA, 23.
 Chirodota, 17.
 arenata, 17.
 LÆVIS, 17, 27.
 CHITON ALBUS, 22.
 MARMOREUS, 22.
 MENDICARIUS, 22.
 RUBER, 22.
 Chondrus, 10.
 CIRRIPIEDIA, 38.
 CLAVA MULTICORNIS, 11.
 CLAVELLINA, 19.
 CLYMENE LUMBRICALIS, 31.
 COLOMBELLA DISSIMILIS, 24.
 ,ROSACEA, 24.
 Comatula, 12.
 Corophidæ, 48, 56.
 CORYMORPHA NUTANS, 9.
 Coryne, 11.
 squamata, 11.
 Corynidæ, 10, 11.
 CRANGON VULGARIS, 58.
 Cratophium, 46.
 Cribella oculata, 14.
 CRINOIDEÆ, 12.
 CRISIA CRIERARIA, 18.
 DENTICULATA, 18.
 CRUSTACEA, 37.
 CRYPTONOTA, 35.
 CITRINA, 36.
 CTENODISCUS CRISPATUS, 15.
 Cucumaria, 16.
 frondosa, 16.
 CUMA BISPINOSA, 39.
 CUVIERIA FABRICII, 16.
 CYANEA POSTELSI, 11.
 CYNTHIA ECHINATA, 20.
 PYRIFORMIS, 20.
 CYPRIDINA EXCISA, 39.
 CYPRINA ISLANDICA, 21.
 DECAPODA, 58.
 DENDROCELA, 27.
 DENDRONOTUS ARBORESCENS, 26.
 DENTALIUM STRIOLATUM, 22.
 DIADORA NOACHINA, 22.
 DORIS diaphana, 26.
 fusca, 26.
 PALIDA, 26.
 PLANULATA, 26.
 repanda, 26.
 DOTO CORONATA, 26.
 Duasmodactyla producta, 17.
 ECHINARACHNIUS ATLANTICUS, 16.
 Echinaster Eschrichtii, 14.

- ECHINIDÆ, 15.
 ECHINODERMATA, 12.
 ECHINUS GRANULATUS, 15.
 neglectus, 16.
 virens, 15.
 EOLIS angulata, 25.
 DIVERSA, 26.
 FARINACEA, 25.
 MANANENSIS, 26.
 PURPUREA, 25.
 rufibranchialis, 25.
 salmonacea, 26.
 STELLATA, 25.
 ENONELLA, 34.
 BICARINATA, 34.
 ENTOMOSTRACA, 39.
 EPIZOA, 38.
 EUPENDRIUM CINGULATUM, 9.
 ramcum, 9.
 ramosum, 9.
 EUNICE OERSTEDII, 34.
 Harassii, 35.
 VIVIDA, 35.
 EUPHROSYPNE BOREALIS, 36.
 Eusirus, 54.
 EURYALE, 12.
 scutatium, 12.
 FASCIOLARIA LIGATA, 24.
 FLUSTRA, 19.
 TRUNCATA, 19.
 SOLIDA, 19.
 Fucus nodosus, 49.
 vesiculosus, 49.
 GAMMARINÆ, 56.
 GAMMARUS locusta, 55.
 MACROPTHALMUS, 55.
 PULEX, 55.
 PURPURATUS, 55.
 SABINII, 55.
 GASTEROPODA, 22.
 GEMELLARIA DUMOSA, 19, 45.
 GEPHYREA, 28.
 GLANDULA FIBROSA, 20.
 MOLLIS, 20.
 GLYCERA CAPITATA, 33.
 setosa, 33.
 VIRIDESCENS, 33.
 GONIASTER equestris, 15.
 PIRYGIANA, 15, 38.
 GRAMMARIA, 9.
 GRACILIS, 9.
 GRAMMARIA ROBUSTA, 9.
 Heteroneis arctica, 34.
 HIPPOCRENE SUPERCILIARIS, 11.
 HIPPOLYTE ACULEATA, 58.
 HIPPOTHOA, catenularia, 18.
 RUGOSA, 18.
 Holothuria, 15.
 levis, 17.
 squamata, 16.
 HOLOTHURIADÆ, 16.
 HOMARUS AMERICANUS, 17.
 HYAS COARCTATA, 59.
 HYDRACTINIA ECHINATA, 11.
 IDMONEA Atlantica, 18.
 PRUINOSA, 18.
 Idotea, 40.
 caeca, 39.
 IRRORATA, 39.
 MONTOSA, 40.
 TUETSII, 39.
 IPIHIMEDIA VULGARIS, 53.
 ISOPODA, 39.
 JERA COPIOSA, 40.
 LACUNA VINCTA, 23.
 LAMELLIBRANCHIATA, 20.
 LAMELLARIA PERSPICUA, 24.
 LAONMEDEA GELATINOSA, 8.
 LEDA LIMATULA, 20.
 MYALIS, 20.
 SAPOTILLA, 20.
 TENUISULCATA, 21.
 THRACLEFORMIS, 20.
 Lepas balanoides, 39.
 LEPIDONOTE CIRRATA, 36.
 PUNCTATA, 36.
 SCABRA, 36.
 LEPRALIA ANNULATA, 18.
 CANDIDA, 18.
 CRASSISPINA, 18.
 LABIATA, 18.
 RUBENS, 19.
 Leptochirus, 56.
 LEPTOPLANA ELLIPSOIDES, 27.
 LEPTOTHOE, 46.
 DANÆ, 46.
 LERNÆA BRANCHIALIS, 38.
 LEUCOTHOE GRANDIMANUS, 51.
 LINKIA OCULATA, 14.
 PERTUSA, 14.
 LITTORINA LITTORALIS, 23.
 RUDIS, 23.
 LOLIGO BARTRAMI, 27.
 LUCERNARIADÆ, 8.
 LUCERNARIA fascicularis, 8.
 QUADRICORNIS, 8.

- LUMARA, 30.
 FLAVA, 31.
 LYONSIA HYALINA, 21.
 LYSIANASSA SPINIFERA, 49.
 MACTRA PONDEROSA, 21.
 SOLIDISSIMA, 21.
 MANGELIA CANCELATA, 25.
 DECUSSATA, 25.
 PYRAMIDALIS, 24.
 TURRICULA, 24.
 MARGARITA ACUMINATA, 23.
 ARGENTATA, 23.
 CINEREA, 23.
 HELICINA, 23.
 OBSCURA, 23.
 UNDULATA, 23.
 MARICOLÆ, 31.
 MENESTHO ALBULA, 23.
 MONOCULODES, 54.
 DEMISSUS, 54.
 MYA ARENARIA, 22.
 TRUNCATA, 22.
 MYSIS OCVLATA, 58.
 MYTILUS CORRUGATUS, 21.
 DECUSSATUS, 21.
 DISCORS, 21.
 DISCREPANS, 21.
 EDULIS, 21.
 LEVIGATUS, 21.
 MODIOLUS, 21.
 Munna, 41.
 NAREDA, 28.
 SUPERBA, 28.
 NASSA TRIVITTATA, 24.
 NATICA CLAUSA, 24.
 FLAVA, 24.
 GRONLANDICA, 24.
 HEROS, 24.
 IMMACULATA, 24.
 TRISERIATA, 24.
 NÆRA cuspidata, 22.
 PELLUCIDA, 21.
 Nemertes obscura, 28.
 NEMERTIDÆ, 28.
 NEPHTHYS borealis, 33.
 cæca, 33.
 CILIATA, 33.
 INGENS, 33.
 NEREIS ABYSSICOLA, 33.
 NEREIS DENTICULATA, 33.
 grandifolia, 34.
 GRANDIS, 34.
 IRIS, 33.
 NEREIS pelagica, 33.
 NUCULA DELPHINODONTA, 20.
 PROXIMA, 20.
 TENUIS, 20.
 NUDIBRANCHIATA, 25.
 Nullipora, 22.
 NYMPHON GROSSIPES, 38.
 OCNUS AYRESII, 16.
 Oedicurus, 54.
 Ænone, 34.
 OMMATOPLEA STIMPSONII, 28.
 Oniscus pulex, 55.
 serratus, 52.
 ONUPHIS ESCHRICHTII, 35.
 OPHELIA GLABRA, 33.
 OPHIACANTHA SPINIFLOSA, 13.
 OPHIOLEPIS aculeata, 13.
 CILIATA, 13.
 ROBUSTA, 13.
 TENUIS, 13.
 OPHIOPHOLIS SCOLOPENDRICA, 13.
 Ophiothrix, 13.
 Ophiura aculeata, 13.
 OPHIURIDÆ, 13.
 ORCHESTIA GRYLLUS, 49.
 Oreula punctata, 17.
 Pagurus, 47.
 Bernhardus, 59.
 pubescens, 59.
 PALLENE HISPIDA, 37.
 PANDALUS borealis, 58.
 LEVIGATUS, 58.
 PANDORA TRILINIATA, 21.
 PANOPÆA NORVEGICA, 22.
 Patella candida, 22.
 cæca, 22.
 PECTEN ISLANDICUS, 20.
 MAGELLANICUS, 20.
 PECTINARIA Belgica, 30.
 GRONLANDICA, 30.
 PENTACTA FRONDOSA, 16.
 Phascolosoma Bernhardus, 28.
 PHILINE LINEOLATA, 25.
 PHOLOE TECTA, 36.
 PHOLAS CRISPATA, 22.
 PHOXICHLIDIUM MAXILLARE, 37.
 PHOXUS FUSIFORMIS, 57.
 Holbollii, 58.
 KROYERI, 58.
 plumosus, 58.
 PHYLLODOCE GRONLANDICA, 33.
 PILIDIUM candidum, 22.
 CÆCUM, 22.

- PLANARIÆ, 27.
 Platycarcinus irroratus, 59.
 PLEUROBRACHIA RHODODACTYLA, 11.
 PLUMULARIA FALCATA, 8.
 TENERRIMA, 8.
 PODOCERUS NITIDUS, 45.
 Pontoporina, 56.
 POLIA gracilis, 28.
 OBSCURA, 28.
 POLYNOE SQUAMATA, 36.
 POLYPI, 7.
 POSEIDON AFFINIS, 28.
 PRANIZA CERINA, 42.
 cærulata, 43.
 PROLES MEDUSINÆ, 11.
 PROLES POLYPOIDÆ, 8.
 PROSOBRANCHIATA, 22.
 PROTULA MEDIA, 30.
 PSOLUS levigatus, 16.
 PHANTAPUS, 16.
 PSEUDOPTHALMUS, 57.
 LIMICOLUS, 57.
 PELAGICUS, 57.
 PTERASTER MILITARIS, 15.
 PTILOCHEIRUS, 55.
 PINGUIS, 56.
 Ptilota, 10.
 PURPURA LAPILLUS, 24.
 PYCNOGONIDES, 37.
 PYCNOGONON grossipes, 38.
 littorale, 37.
 PELAGICUM, 37.
 RISSOA ACULEUS, 23.
 EBURNEA, 23.
 MIGHELSII, 23.
 PELAGICA, 23.
 SABELLA lumbricalis, 31.
 PAVONINA, 30.
 ZONALIS, 30.
 SARSIA MIRABILIS, 11.
 SAXICAVA ARCTICA, 22.
 RUGOSA, 22.
 SCALARIA GRONLANDICA, 23.
 Scoloplos quadricuspis, 33.
 Serpula granulata, 29.
 porrecta, 29.
 vitrea, 29.
 SERTULARIA ARGENTEA, 8.
 FALLAX, 9.
 FILICULA, 8.
 LATIUSCULA, 8.
 Margareta, 8.
 POLYZONIAS, 8, 9.
 SERTULARIA PRODUCTA, 8.
 RUGOSA, 9.
 SIPHONOSTOMUM ASPERUM, 31.
 vaginiferum, 32.
 SIPUNCULUS BERNHARDUS, 28.
 SOLASTER ENDECA, 14.
 PAPPOSA, 15.
 SOLEN ENSIS, 21.
 SPIROBIS GRANULATA, 29.
 NAUTILOIDES, 29.
 PORRECTA, 29.
 QUADRANGULARIS, 29.
 SPIRILLUM, 29.
 VITREA, 29.
 Squilla lobata, 44.
 STAUROPHORA LACINIATA, 11.
 Stenosoma irrorata, 39.
 STENOThOE CLYPEATA, 57.
 STERNASPIS FOSSOR, 29.
 STROBILA, 11.
 STOMAPODA, 58.
 Synapta, 17.
 coriacea, 17.
 Talitrus gryllus, 49.
 TANAIS FILUM, 43.
 TECTIBRANCHIATA, 25.
 TECTURA TESTUDINALIS, 22.
 TECTURELLA, 32.
 FLACCIDA, 32.
 TELLINA FUSCA, 21.
 PROXIMA, 21.
 TEREbella BRUNNEA, 31.
 CIRRATA, 31.
 fulgida, 31.
 parvula, 31.
 TEREBRATULA SEPTENTRIONALIS, 20.
 TETRASTEMMA SERPENTINA, 28.
 THURACIA brevirostris, 22.
 CONRADI, 21.
 COUTHOUYI, 21.
 MYOPSIS, 21.
 TRUNCATA, 21.
 THYASIRA GOULDI, 21.
 THYONIDIUM PRODUCTUM, 17.
 pellucidum, 17.
 TRICHOTROPIS BOREALIS, 24.
 TRITONIUM CLATHRATUM, 24.
 DECEMCOSTATUM, 24.
 ISLANDICUM, 24.
 PYGMEUM, 24.
 Trochinus, 17.
 TROCHUS OCCIDENTALIS, 23.
 TUBICOLÆ, 29.

TUBULARIADÆ, 10.
TUBULARIA INDIVISA, 9.
 LARYNX, 9.
 penicillus, 30.
TUBULIPORA CRATES, 17.
 DIVISA, 18.
 flabellaris, 18.
 PATINA, 17.
TUNICATA, 19.

TURRITELLA ACICULA, 23.
 COSTULATA, 23.
 EROSA, 23.
TYPHIOLEPTA ACUTA, 27.
UNCIOLA IRRORATA, 45.
VELUTINA HALIOTOIDES, 24.
 ZONATA, 24.
VERMILIA SERRULA, 29.
ZETES SPINOSA, 37.

REFERENCES TO THE FIGURES.

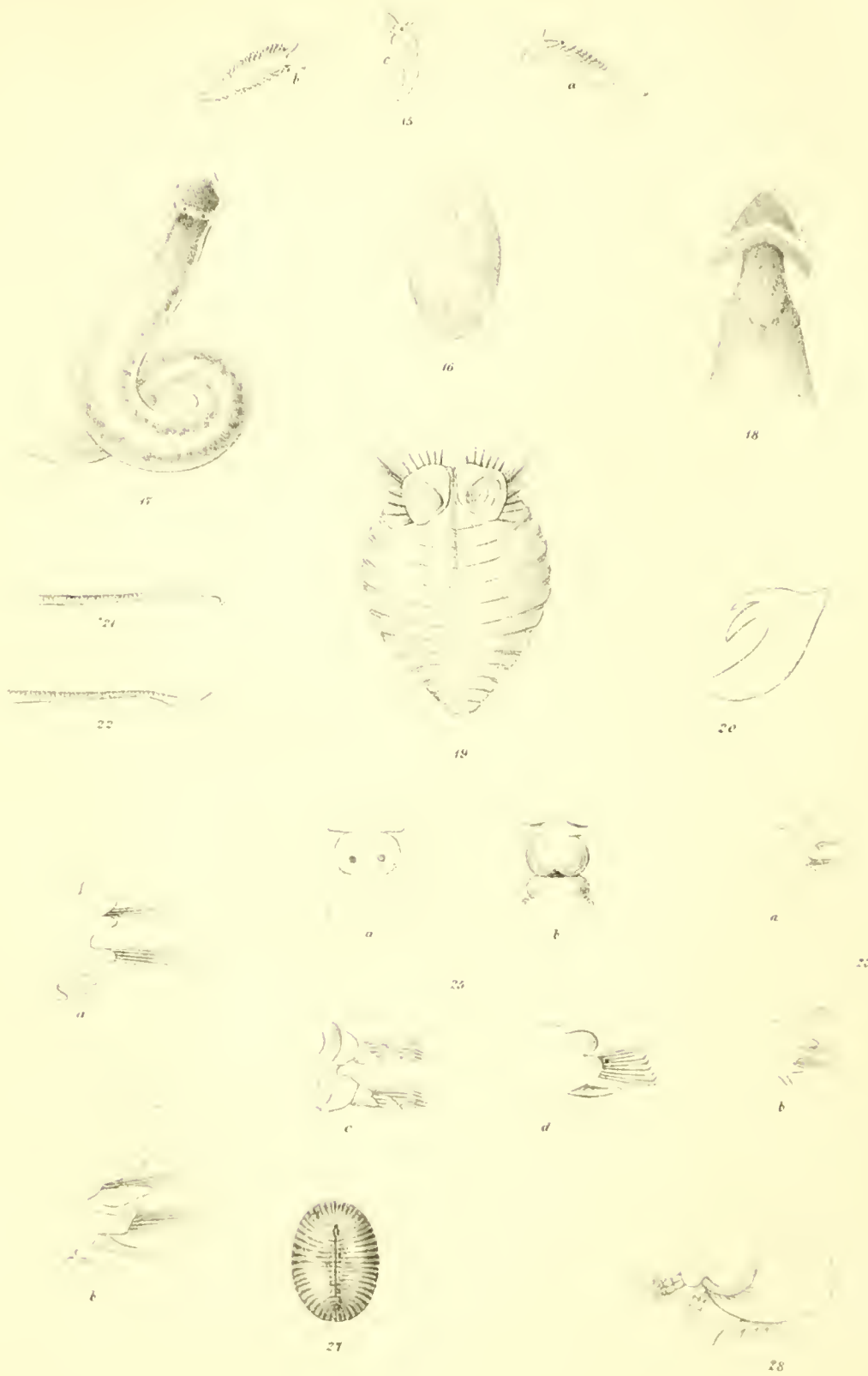
- Fig. 1. ACTINIA CARNEOLA.
2. SIPUNCULOIDES.
3. GRAMMARIA ROBUSTA.
4. ACAULIS PRIMARIUS.
5. ASTERACANTHION ALBULUS.
6. TUBULIPORA DIVISA.
7. IDMONEA PRUINOSA.
8. CRISIA CRIBRARIA.
9. HIPPOTHOA RUGOSA.
10. LEPRALIA CANDIDA.
11. RUBENS.
12. FLUSTRA SOLIDA.
13. NEREA PELLUCIDA.
14. DORIS PLANULATA.
15. *See page 27.*
16. LEPTOPLANA ELLIPSOIDES.
17. NAREDA SUPERBA.
18. OMMATOPLEA STIMPSONII.
19. STERNASPIS FOSSOR.

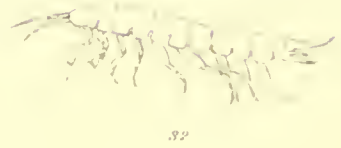
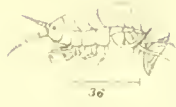
- Fig. 20. LUMARA FLAVA.
21. TECTURELLA FLACCIDA.
22. BRADA, n. g.
23. NEREIS DENTICULATA.
24. GRANDIS.
25. ENONELLA BICARINATA.
26. EUNICE VIVIDA.
27. CRYPTONOTA CITRINA.
28. CYPRIDINA EXCISA.
29. JÆRA COPIOSA.
30. ASELLODES ALTA.
31. PRANIZA CERINA.
32. LEPTOTHOE DANÆ.
33. CERAPUS RUBRICORNIS.
34. FUCICOLA.
35. FASCIATUS.
36. ALLORCHESTES LITTORALIS.
37. LEUCOTHOE GRANDIMANUS.

Plate 1.



Plate II.







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