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XXII.—The Marine Nemerteans of New England and Adjacent Waters. By A. E. Verrill.

The following article is intended as a descriptive catalogue of all the Nemerteans of the North-eastern Coast of North America that have been observed with enough care to permit me to give a description presumably sufficient to enable ordinary observers to identify the species when seen living. Therefore all my own descriptions, herein given, have been made from living specimens, except in a few special instances, which are, in each case, particularly stated.

As a rule, undetermined alcoholic specimens of Nemerteans, unaccompanied by notes on their forms and colors while living, cannot be identified with certainty unless they belong to genera containing very few and widely differing species. To distinguish the numerous species of *Amphiporus*, *Tetrastemma*, *Lineus*, etc., with alcoholic specimens alone, would be a hopeless task, at least in the present state of our knowledge of these groups. Possibly, when all the known species shall have been studied thoroughly by means of microscopic sections, it may be possible to distinguish many of the species by means of such sections of preserved specimens, but that will be a condition possible only in the distant future, and in any case would require much time and labor.

Exceptional cases are, however, not uncommon in which some prominent feature may be preserved in the alcoholic specimens sufficiently well to enable the species to be recognized with certainty. Thus, among the *Enopla*, the stylets of the proboscis are frequently characteristic in form or number. The ocelli, often visible in alcoholic specimens, may also be characteristic. In a few cases, even the characteristic colors may be preserved many years in alcohol, and still better in glycerine. I have specimens of *Amphiporus angulatus* (*Stimpsoni*), preserved in alcohol twenty years ago, in which the dark purple color of the body and the characteristic white patches on the sides of the head are still very distinct. These specimens have, however, been kept in dark drawers; those that were exposed to light faded many years ago.

In consequence of the difficulty or impossibility of identifying alcoholic specimens, I have, in this article, made very little use of a

large part of the vast collection of American Nemerteans preserved in the Museum of Yale University, and including those collected by myself and others during the explorations carried on from 1871 to 1887 by the United States Fish Commission, under the direction of the late Commissioner, Professor S. F. Baird.

These collections include several thousands of specimens, filling more than a thousand bottles and jars. They represent very fully the Nemertean and Planarian fauna of the coast, from Cape Hatteras to Labrador, and from high-water mark to 2000 fathoms. Fortunately I personally identified and labelled when captured a large number of those specimens that belonged to described species, and made copious descriptions and sketches of most of the unfamiliar forms that came, while still living, under my observation during all the sixteen seasons spent on the work of the U. S. Fish Commission, as well as during several summers (1864 to 1870) spent in independent researches in the waters of the Bay of Fundy and elsewhere. But there were many specimens, especially deep-water forms, that I did not see until they had been placed in alcohol. Most of those are entirely omitted from this paper. Probably they include a number of additional species.

Many of the general figures accompanying this article were made from life by Mr. J. H. Emerton and Mr. J. H. Blake, under my direction, for the U. S. Fish Commission. For the privilege of using these drawings for the present purpose, I am indebted to the late commissioner, Professor Baird, this article having been in preparation before his death. Other figures have been drawn by myself for this paper. Numerous figures, taken from my own field-notes and rough sketches, have been copied and put into shape by my son, A. H. Verrill, under my personal supervision. The latter are, therefore, quite as reliable as the former ones. A few anatomical figures (on Pl. XXXIX) have been copied from the works of McIntosh* and Hubrecht,† in order to illustrate more fully some of the differences between the orders and sub-orders of Nemerteans.

It was originally a part of my intention to have included numerous anatomical details of our native species, based on new preparations and studies, but various circumstances have compelled me to defer that portion of the subject to a future time. Such details are, however, less essential in the case of our Nemerteans than they

* A Monograph of the British Annelids. Part I. The Nemerteans. Ray Society, 1873.

† Voyage of the Challenger, vol. xix.

otherwise would have been, because many of our native species are closely allied to, and several others are identical with, some of those that have been well studied anatomically by McIntosh and other European writers.

Nemerteans are almost universally present on our shores, between tides at all levels, from near high-water (*Lineus socialis*) downward. They are also to be found, by dredging, at all depths down to 1000 fathoms or more, but are much more abundant in shallow water (1 to 60 fathoms) than at greater depths. They occur on all kinds of bottoms, but are usually more abundant in soft and partially organic mud than elsewhere. But in rather shallow water, on some hard bottoms overgrown with ascidians, hydroids, and sponges they are often very abundant, especially in the Bay of Fundy. The littoral Nemerteans occur in greater numbers and of more numerous species on the rocky shores of the Bay of Fundy, and especially in Eastport harbor, than in any other localities where I have collected them.

On sandy shores, also, there are nearly always several species living buried in the sand, to be found easily by the use of a spade. These sand-dwelling forms include the largest species of *Cerebratulus*, which are, perhaps, the largest of all Nemerteans.

NEMERTINA.

The Nemertinea may be characterized as follows:

Smooth, ciliated, often bright colored, and mostly marine worms, destitute of external paired appendages, usually with a long and somewhat flattened body, often almost linear; without definite body-cavity. Muscular walls of body thick and complex, not segmented.

Head not very distinct from the body; mouth ventral, beneath the head, or subterminal, without teeth or jaws.

Intestine large, usually straight and furnished with many short, lateral, saccular, often lobed appendages; anus posterior.

A long, tubular, dorsal proboscis is contained in a special muscular sheath, which is filled with a corpusculated fluid and situated above the intestine but entirely separated from it. The proboscis can be protruded by eversion from a special aperture at the front of the head.

Two pairs of cephalic ganglions are present; they are united transversely by an upper and a lower commissure, between which pass the proboscis and its sheath. Most species have ciliated pits or sacs connected with the posterior ganglions by ducts leading from

fossæ or grooves on the sides of the head. They are probably olfactory organs. Two large lateral nerves run back from the lower cephalic ganglions; often there is also a smaller median dorsal nerve trunk, and in many there is a continuous nervous plexus between the muscular layers of the body-wall.

Vascular system closed; a main longitudinal vessel runs along each side and usually a median dorsal one is situated above the intestine; the blood is usually colorless, rarely red.

A paired nephridial system, consisting of ducts and tubules variously arranged, is usually present in the œsophageal region.

The sexes are almost always separate and nearly all the species are oviparous. Reproductive organs are very simple and similar in both sexes, consisting of simple saccular ovaries or spermaries, situated along the sides of the body, usually between the lateral saccules of the intestine. External genital openings are mere pores in the body-wall.

Development is usually direct, but sometimes with a metamorphosis through a *Pilidium*, or free swimming larval form, very peculiar in structure. (Plate XXXIX, figures 1 to 6).

Order I, ENOPLA.

Enopla M. Schultz; McIntosh, Brit. Annelids, Part I, Nemerteans, pp. 36, 43, 134.
Hoplonemertini Hubrecht; Carus, Fauna Mediterraneæ, p. 163, 1884.
Hoplonemertea Hubrecht; Voy. Challenger, vol. xix, p. 15.

Proboscis divided into three distinct regions (Plate XXXIX, figures 7, 8, 9); the first is evertible and tubular; the middle region (woodcut 1), is furnished with a hollow muscular bulb and a complex armature, consisting of a central calcareous stylet (C), or a toothed plate, usually accompanied by two or more lateral chambers containing small, pin-like, free spines or stylets (figures 7, 7*a*, and woodcut 1, D, D′). The central cavity of the bulb and the lateral styliferous chambers communicate with the anterior evertible chamber of the proboscis by means of ducts. Proboscis-pore is either terminal, at the end of the snout, or subventral.

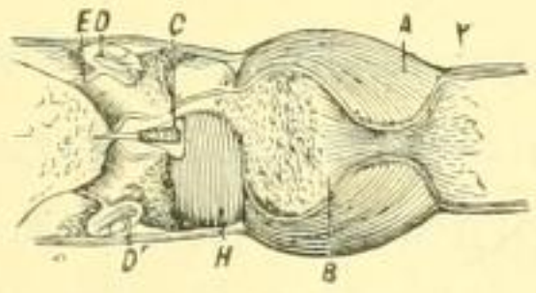

Fig. 1. Armature of proboscis of *Amphiporus lactifloreus;* A, muscular bulb; B, its cavity; C, central stylet; D, D′, lateral stylet-sacs: E, duct of D; H, muscular band, (after McIntosh).

The mouth is small and inconspicuous when contracted, situated beneath the end of the snout and in front of the cephalic ganglions, often in close connection with the proboscis-pore.

Lateral longitudinal cephalic slits are wanting and are generally replaced by shallow, transverse or oblique, ciliated grooves or fossæ, connected by narrow ducts with small sacs (probably olfactory in function) that connect them with the posterior ganglions.

Cephalic ganglions rounded, the upper or anterior ones closely united to and largely covering the lower ones. Lateral nerves arise from the posterior ends of the inferior ganglions and run back within the inner muscular layer of the body-wall.

Ocelli various, often numerous; sometimes wanting.

Three large, longitudinal vascular trunks are well developed; a vascular loop in the head.

Intestine large and straight, sacculated. Muscular walls of the body consist mainly of two layers, an outer circular, and an inner longitudinal one.

The young, so far as known, undergo no marked metamorphosis.

The species are chiefly marine; a few fresh-water and terrestrial species are known.

Family, Amphiporidæ McIntosh (restr.)

Body moderately elongated. Proboscis with a thick, tubular, evertible anterior portion, its walls consisting of about seven layers, the inner surface (or outer when protruded) thickly covered with papillæ; middle region furnished with a simple central stylet and generally two or four lateral chambers containing pin-shaped stylets, but the lateral sacs are sometimes wanting; posterior region tubular, with two muscular layers, an outer circular and an inner longitudinal layer. Œsophagus with a dilated and plicated anterior portion in the head.

The family *Tetrastemmidæ* Hubr. is here included. I can find no characters that seem to me sufficient to warrant even a sub-family distinction between *Tetrastemma* and *Amphiporus*.

On the other hand, I would separate *Drepanophorus* Hubr. as a separate family, Drepanophoridæ, characterized by having the central armature of the proboscis in the form of a lamina or plate, bearing several stylets or denticles; by the numerous styliferous sacs; and by the presence of lateral cæcal sacs connected with the sheath of the proboscis.

Amphiporus Ehrenberg, 1831, McIntosh, *non* Dies., *nec* Œrsted.

Ommatoplea Ehr., Symbolæ Physicæ, 1831.
Omatoplea Diesing, Syst. Helm., vol. i, p. 248, 1850.
Polystemma Ehr., 1831; Œrsted, Naturhist. Tidssk., iv, p. 579, 1844.
Polia Quatr. (*pars*), Ann. des Sci. Nat., vi, p. 201, 1846, *non* Delle Chiaje, 1841.
Cosmocephala Stimpson, Prodromus, in Proc. Acad. Nat. Sci., Philad., vol. ix, p. 165 [21, sep. copy], 1857.
Polina Stimpson, op. cit., p. 165.
Ophionemertes Verrill, Amer. Journ. Sci., vol. vii, p. 45, 1873; Proc. Amer. Assoc., 1873, p. 389, 1873.

Body only moderately elongated, in some species slender, in others stout; usually strongly convex dorsally and with rounded sides.

Head often distinct from the narrowed neck, but in other cases of the same breadth as the body and without any definite limitation.

Transverse or oblique ciliated fossæ or shallow grooves, two of them connected with the ciliated sensory ducts, are, apparently, always present, though often very indistinct; usually there is a pair at the back of the head and nearly in line with, or just behind, the posterior ocelli and the ganglions; the other pair, situated in front of the ganglions, is usually less distinct and may be easily overlooked, and is perhaps absent in some species. One or both pairs of fossæ may meet on the dorsal line in certain species.

Ocelli usually numerous, variously arranged; perhaps the most common or typical arrangement is that of two anterior groups and two posterior or cerebral clusters, but either pair may be lacking, or the two groups may blend, and sometimes no ocelli are visible.

Proboscis-pore terminal, or sometimes sub-terminal, just under the tip of the snout. Proboscis large and long. Central armature a simple, sharp stylet with thick base; lateral stylet-sacs usually two, each with two to four, or more, pin-shaped stylets.

Mouth far forward, usually united with the proboscis-pore, and therefore not visible in contraction.

The numerous species belonging to this genus* were distributed

* Many authors, of whom a few are indicated in the synonymy, have used *Ommatoplea* Ehr. as the name of this genus, and on many accounts it seems to me that it would have been better to have continued that usage. McIntosh, in his monograph, has, however, seen fit to change the name to *Amphiporus* (of the same date) for reasons that are, to say the least, of questionable validity,—mainly because somebody *may* hereafter discover that the "type" of *Ommatoplea* is of a different genus, though he gives no reason for supposing that to be the case. In this instance long usage

among a large number of genera by the earlier writers, especially by those who did not observe the armature of the proboscis, or did not consider it of importance.

In general, it is impossible to distinguish the species of this genus from other genera without an examination of the proboscis and its armature. Hence, no doubt, there are many still unrecognized species of the genus that were formerly described under other genera, from various foreign countries. I believe, however, that all the species hitherto described or mentioned as found on our coast are included in the following list, together with several that appear to be undescribed.

Œrsted adopted *Polystemma* for this genus, and placed under it two typical species; *P. roseum* and *P..pulchrum.* At the same time he restricted *Amphiporus* to the genus named *Nemertes* (new sense) by McIntosh, giving its essential character (a small proboscis) and naming *A. Neësii* as the type.

Subgenera of Amphiporus.

The genus may be conveniently divided into several groups or subgenera based primarily on the arrangement of the ocelli and nerves, as follows:

I. Ocelli form four or more distinct groups; the two cerebral groups are distinct from the anterior ones.—*Ommatoplea*, subgenus.

1*a*. Anterior ocelli do not form curved rows parallel with the lateral margins of the head.

Amphiporus angulatus (Fabr.).
A. multisorus V., sp. nov.
A. heterosorus V., sp. nov.
A. tetrasorus V., sp. nov.

1*b*. Anterior groups of ocelli form curved rows parallel, at least in part, with the sides of the head.—*Polystemma* Œrs.; *Polina* Stimp.

A. roseus (Müller).
A. lactifloreus (Johnst.).
A. ochraceus V.
A. glutinosus V.
A. griseus (Stimp.).

would have justified him in not making the change before there was any proof of the necessity for doing so.

The change having been made in so important a work, has been generally adopted by later European authors, and I have, therefore, followed their example in this article, for uniformity of nomenclature in this group is at present of paramount importance.

II. Only two distinct groups of ocelli, anterior or sub-lateral; cerebral groups obscure or wanting.—*Cosmocephala* Stimp.

2*a*. Only anterior groups of ocelli are evident.

A. frontalis V., sp. nov.

2*b*. Only median lateral groups of ocelli are present; or else the median and cerebral groups are blended.

A. mesosorus V., sp. nov.

III. Ocelli form only elongated lateral rows more or less parallel with the sides of the head; cerebral groups are not distinct from the others. Body slender.—*Ophionemertes* Verrill.

A. cruentatus V.

A. virescens V.

A. agilis V.

IV. Only a single pair of anterior ocelli are present.---*Dichilus* Stimp.

A. bioculatus McInt.

V. Ocelli indistinct or absent.—*Naredopsis* Verrill, sub-gen. nov.

A. cæcus V., sp. nov.

VI. Ocelli doubtful, forming at least a pair of antero-lateral groups (perhaps others that are not observed).

A. thallius V., sp. nov.

VII. Cerebral groups of ocelli(?) alone observed (perhaps anterior ocelli overlooked).—*Nareda* Girard.

A. superbus (Gir.)

Amphiporus.

Analytical Table of species based on the arrangement of the ocelli.

A. Ocelli present.

B. Ocelli numerous, arranged in groups.

C. Ocelli arranged in four groups; two cerebral, near the ganglions, and two anterior or antero-lateral.

D. Anterior clusters of ocelli transverse, at the front margin of the head; posterior groups roundish.

a. Anterior groups transversely oblong or partly double. *A. angulatus.*

aa. Anterior groups each divided into three subordinate clusters. *A. multisorus.*

DD. Anterior clusters are not transverse at the front margin.

b. Anterior clusters subdorsal, not parallel with the margins of head.

c. Anterior clusters are triangular with the acute angle backward. *A. herosorus.*

cc. Anterior clusters are oblique rows parallel with the posterior ones. *A. tetrasorus.*

bb. Anterior clusters lateral or sublateral, curved or crescent-shaped, anteriorly partly parallel with the margins of head.

e. Posterior groups form round or angular close clusters.

f. Anterior groups are large, composed of several rows posteriorly, and nearly blend with posterior groups. *A. roseus.*

ff. Anterior groups are more simple, distinctly separated from the posterior clusters, composed of one or two rows, and regularly curved. *A. lactifloreus.*

ee. Posterior groups of few ocelli, which do not form close clusters.

g. Posterior groups consist of one, two, or rarely three, oblique pairs of ocelli on each side.

h. Posterior pairs usually two on each side, convergent backward. *A. ochraceus.*

hh. Posterior pairs of ocelli divergent backward. *A. glutinosus.*

gg. Posterior groups linear, each of about four ocelli. *A. griseus.*

CC. Ocelli arranged in only two distinct clusters.

a. Clusters transverse, short, in front of ganglions.

b. Clusters transverse, near front margin of head. *A. frontalis.*

bb. A large angular cluster on each side of the middle of the head. *A. mesosorus.*

aa. Clusters of ocelli elongated, lateral, parallel with the margins of the head.

c. Ocelli forming a simple row on each side of head. *A. cruentatus.*

cc. Ocelli in double or triple rows.

d. Ocelli in two or three nearly parallel rows extending back of ganglions. *A. virescens.*

dd. Rows of ocelli broad, terminating at the ganglions. *A. agilis.*

BB. Ocelli two only, near the front of head. *A. bioculatus.*

AA. Ocelli wanting or indistinct. *A. cæcus.*

Species not included in the above table :

Amphiporus thallius. Ocelli doubtful ; only front groups observed.

Amphiporus (?) *superbus.* Ocelli doubtful ; apparently two cerebral groups only.

Amphiporus angulatus (Fabr.) Verrill.

Fasciola angulata O. Fabr., in O. F. Müller, Verm. Terrest. et Fluv., i. pp. 58, 1774.

Planaria angulata O. Fabr., in Müller, Zool. Danic., Prod , p. 221, 1776. (Communicated by O. Fabricius, t. Müller).

Planaria angulata O. Fabr., Fauna Grœnlandica, p. 323, 1780.

Omatoplea Stimpsonii Girard, in Stimpson, Invert. of Grand Menan, p. 28, pl. 2, fig. 18, 1853.

Amphiporus Stimpsoni Verrill, Notice of Recent Addit. to Mar. Invert., Part I, in Proc. National Mus , vol. ii, p. 184, 1879; Check List Marine Invert. Atlantic Coast, p. 12, 1879; Bulletin U. S. Nat. Museum, No. 15, p. 143, 1879 (from Cumberland Gulf).

Amphiporus Fabricii Levinsen, Bidrag til Kundskab om Grœnlands Turbellariefauna, p. 38, 1879, from Vidensk. Meddel. fra den naturh. Foren. i Kbhvn., 1879–80, p. 200.

PLATE XXXIII, FIGURES 1, 1*a*, 2.

Body large and stout, only moderately elongated in extension ; back convex, sides well rounded, lower surface flattened. The body is very changeable in form and can contract into a short, thick,

oblong mass; the posterior end is often the broadest part, but frequently in extension the breadth is nearly uniform throughout most of the length; posterior end obtuse. Head usually more or less distinctly defined, often broader than the neck, oblong or ovate in form, rounded or obtuse in front, nearly always with a conspicuous, pale, angular spot on each side. Ocelli numerous, arranged in two frontal clusters on the white marginal area, and in two dorsal groups; each of the anterior or frontal ones consists of numerous small ocelli arranged in two or more close rows forming an oblong or crescent shaped cluster close to the antero-lateral margin of the head; in some cases each of these clusters is double, consisting of a larger, outer or lower group and an upper, smaller one; but these subordinate clusters are usually more or less blended; the dorsal groups are smaller and of fewer ocelli, rounded, and situated at the postero-dorsal part of the head, close to the ganglions, and usually on, or just in front of, a narrow whitish line across the neck which marks the position of the transverse fossæ. Proboscis large, covered with small papillæ. Color of body, above, and middle of head usually deep purple, madder-brown, or purplish brown, sometimes plum-color, chocolate-brown, reddish brown, and orange-brown; sides and lower surface much paler brown, often flesh-color or pinkish. The head is whitish in front and is almost always conspicuously marked with two large angular spots or patches of whitish or flesh-color on the sides above; most frequently these spots are broad, triangular or trapezoidal, with the apices directed toward the median line above, but separated by a wide dorsal stripe of dark color like that of the body; in other cases the apices of these spots are more truncated, giving a broad, somewhat squarish form, the shape varying with the extension of the head; a little back of the spots a narrow angulated white line, corresponding to the transverse fossæ, crosses the neck, but it is sometimes absent; in front of the angular spots there is usually another, more conspicuous, white line or narrow band across the dark pigment of the head, but this is sometimes interrupted dorsally and is then represented by a narrow triangular spot of white on each side of the head; proboscis, when protruded, reddish.

Length up to 100 to 150^{mm}; diameter 6 to 8^{mm} or more.

Massachusetts Bay to Gulf of St. Lawrence, Labrador, Cumberland Gulf, and Greenland. Very common and of large size at low-water mark, under stones, at Eastport, Me., and Grand Menan, N. B. I have also dredged it in numerous localities off Nova Scotia; in the Bay of Fundy; off the coast of Maine; Casco Bay; off Cape

Ann; off Cape Cod, etc., in 4 to 150 fathoms; and in the Gulf of St. Lawrence, 15 fathoms.

This large and conspicuous species is generally easily recognized by its clear, dark purplish or chocolate-brown color above, with pale margins and a trapezoidal or triangular white spot on each side of the head, and usually with a narrow white line across the neck; and by the pinkish or flesh-colored lower surface. Ocelli in two or more rows in an elongated group on each antero-lateral margin of the head, and a pair of small sub-dorsal clusters on the transverse white nuchal band.

The *Planaria angulata* of Otho Fabricius was, without doubt, based on this species; but his description being very brief, writers have hesitated in regard to this identification. His description of the characteristic white angular spots on the head, the color, and the habits could, however, apply to no other known species. The re-discovery of this species on the coast of Greenland by Levinsen, and its abundance in Cumberland Gulf, renders it quite certain that Fabricius had this species before him. Hence I have considered it necessary to restore his name.

This species and some of the others herein described, e. g. *A. frontalis*, evidently belong to the group for which Dr. Stimpson instituted the genus *Cosmocephala*. Among the characters given, the clusters of ocelli are said to be arranged on the antero-lateral margins of the head. The cerebral clusters may, perhaps, have been overlooked in at least one species. Dr. Stimpson has described two North Pacific species that are evidently closely allied to *A. angulatus*, viz:

Amphiporus Beringianus (*Cosmocephala Beringiana* St.) This was dredged in Bering Straits, in 5 fathoms. It closely resembles a light-colored variety of *A. angulatus* and may be identical with it.

Amphiporus Japonicus (*Cosmocephala Japonica* St.) was from Simoda, Japan, low water, among rocks. It differs more from our species than does the preceding. It is brown above, with a pale median line, with irregular pale spots on the head, and triangular cervical spots of white; clusters of ocelli are antero-lateral.*

* Prodromus, in Proc. Phil. Acad. Nat. Sci., ix, p. 165, 1857. The extensive collections of invertebrates made by Dr. Stimpson on the North Pacific Exploring Expedition were nearly all destroyed in the great Chicago fire by which the Museum of the Chicago Academy of Science was burned. His original notes and drawings were burned at the same time. His colored figures of the Turbellaria and Nemerteans, which I had the pleasure of examining not long before the fire, were numerous and excellent. Had he been able to publish his figures subsequent writers would have found it easy to identify his new genera and species, briefly described in the Prodromus.

Amphiporus multisorus Verrill, sp. nov.

PLATE XXXIII, FIGURE 3.

Body moderately long, versatile. Head rather wider than the body, rather short, rounded in front, separated from the body by a slightly curved transverse fossa on each side. Front ocelli form six small rounded, submarginal clusters; three clusters each containing 3 or 4 ocelli, are on each side of the front of the head, arranged parallel with the margin; the posterior ocelli form two roundish, subdorsal clusters, each containing 6 to 8 ocelli, situated near the posterior part of the head, just in front of the pink ganglions.

Color of body, salmon or flesh-color, paler beneath.

Length, in extension, 25 to 35^{mm}; diameter, 3 to 5^{mm}. Described from life.

Eastport, Me., at low water mark, and in 12 fathoms, 1870.

This species, in the form of the body and arrangement of the ocelli, is closely allied to *A. angulatus*, of which I formerly supposed it a pale variety. The very pale colors, total absence of the white patches on the head, and peculiar grouping of the anterior ocelli are characters that seem to warrant its separation as a distinct species, at least until intermediate specimens be discovered.

Amphiporus heterosorus Verrill, sp. nov.

Amphiporus roseus (*pars*) Verrill, Notice of Recent Addit. to Mar. Invert., Part I, in Proc. National Mus., vol. ii, p. 183, 1879. (*non* Müller.)

PLATE XXXIV, FIGURES 7, 17.

Body rather stout, rounded, obtuse at each end, versatile. Head obtuse, usually rather wider than the body. Ocelli numerous, arranged in a pair of roundish clusters on the posterior part of the head, and in a pair of triangular clusters at the front; these triangular clusters, having their bases at the anterior margin of the head, extend upward and backward to near the middle of the head and end in an acute apex formed by a few ocelli, larger and more distinct than the rest. The posterior groups are smaller, wide apart, and distinctly separated from the anterior ones. A pair of shallow transverse fossæ, on the posterior part of the head, runs upward in line with the posterior groups of ocelli. Anterior fossæ were not noticed. Proboscis clavate in extension, large and long, equal to more than half the length, and about one-half the diameter of the body, finely papillose toward the end, and light brownish red in color.

Color of body, above, cherry-red, clear reddish brown, or light chocolate-brown; the sides and ventral surface flesh-color; a dark, medial, longitudinal line on the head.

Length, in extension, 30^{mm} to 50^{mm}; diameter 3^{mm} to 5^{mm}; length of proboscis, in extension, 25^{mm}; diameter 1·5^{mm} (No. 5).

The specimens described above, from life, were taken off Cape Ann, Stat. 136 (U. S. F. C.), in 26 fath., sand, 1878. Eastport, Me.; Bay of Fundy; Gulf of Maine; Casco Bay; Massachusetts Bay; off Cape Cod; common in 10 to 200 fathoms, on muddy and sandy bottoms.

Amphiporus tetrasorus Verrill, sp. nov.

PLATE XXXIV, FIGURE 6.

Body very changeable, in extension roundish, rather thick, tapering but little, obtuse at both ends. Head as wide as body, usually obtuse or subtruncated in front, separated from the body by conspicuous transverse fossæ which curve upward and forward on each side; on the under side of the head these fossæ run forward, on each side, to the mouth. Ocelli numerous, forming two oblique, oblong, nearly parallel clusters on each side, the posterior ones just in front of, and parallel with, the transverse fossæ.

Color of body, above, chocolate-brown, darker medially; head, in front of eyes, white; body, beneath, whitish.

Length, 25 to 30^{mm}; diameter, 2^{mm}. The specimen described above, from life, was dredged at Station 132 (U. S. Fish Com.), off Cape Ann, Mass., in 45 fathoms, mud, July, 1878.

Amphiporus lactifloreus (Johnston) McIntosh.

Planaria lactiflorea Johnston, Zool. Journal, vol. iii, p. 489, 1828.

Nemertes lactiflorea Johnston, Mag. Zool. and Bot., vol. i, p. 535, pl. XVII, f. 2 and 3, 1837.

Borlasia alba W. Thompson, Ann. Nat. Hist., vol. xv, p. 320 (with woodcut), 1845.

Polia mandilla Quatrefages, Ann. des sc. nat., 3^{me} sér., Zool, tom. vi, p. 203, tab. 8, figs. 1 and 1*a*, and tab. 9, fig. 2, 1846.

Nemertes mandilla Diesing, Syst. Helm., vol. i, p. 274, 1850.

Omatoplea mutabilis Diesing, op. cit., p. 262, 1850.

Omatoplea rosea Johnston, Catalogue Brit. Mus., p. 23, plate II*a*, f. 2, 2*, 2**, 3, and 3*, 1865.

Omatoplea alba Johnston, op. cit., p. 23, 1865.

Amphiporus lactifloreus McIntosh, British Annelids, Part I, Nemerteans, p. 156, plate 1, figs. 1 and 2, 1873; Jensen, Turbellaria ad Lit. Norvegiæ, p. 80, 1878.

Amphiporus lactifloreus Verrill, Notice of Recent Addit. to Mar. Invert., Part I, in Proc. National Mus., ii, p. 184, 1879.

PLATE XXXIX, FIGURES 7, 7*a*.

Body rather elongated, roundish above and on the margins, flattened beneath, of nearly uniform breadth from the head to near

the posterior end. Head often somewhat expanded, a little flattened, obtuse or subacute in front according to state of extension. Ocelli form, on each side of head, a nearly simple submarginal row on the antero-lateral part, and behind the ends of each of these rows there is a small cluster of about three or four ocelli on each side, near the ganglions.

Color dull white, grayish, or pale flesh-color, often with a darker stripe along the back due to the proboscis-sheath; along the margins, especially beneath, the lateral sacs of the alimentary canal are often visible. Length 50 to 75^{mm}; diameter 4 to 6^{mm}, in extension. Eastport, Me., and Grand Menan, N. B., at low-water mark, under stones.

This species, which is here referred, with some doubt, to the European form, is not uncommon on the shores of the Bay of Fundy.

Amphiporus roseus (Müller).

Fasciola rosea O. F. Müller, Verm. terrest. et fluv. hist., i, 2, p. 58, 1774.
Planaria rosea Müller, Zool. Danic. Prodr., p. 221, No. 2679, 1776; Zool. Danic., vol. ii, p. 31, tab. 64, fig. 1 and 2, 1788.
Nemertes pulchra Johnston, Mag. Zool. and Bot , vol. i, p. 536, pl. XVII, fig. 6, 1837.
Polystemma roseum Œrsted, Kroyer's Nat. Tidss., vol. iv, p. 579, 1837.
Polystemma pulchrum Œrsted, op. cit., p. 580, 1837.
Omatoplea rosea (*pars*) Diesing, Syst. Helm., vol. i, p. 251, 1850.
Omatoplea pulchra Diesing, op. cit., p. 252, 1850.
Ommatoplea pulchra Johnston, Catalogue Brit. Mus., p. 24, pl. II*a*, fig. 6 and 6*, 1865.
Amphiporus pulcher McInt., British Annelids, Part I, Nemerteans, p. 158, pl. I, fig. 3; PL. XIV, fig. 11, 1873.

PLATE XXXIV, FIGURES 5, 5*a*, 5*b*.

Body rather stout, not much elongated, tapering somewhat to both ends. Head usually broader than the body, ovate in extension, obtuse in front, separated from the body by a slightly marked, curved, transverse groove or fossa on each side. Ocelli numerous, arranged somewhat in four groups, the anterior pair lateral or submarginal, the posterior subdorsal; the anterior clusters form long, crescent-shaped groups or nearly simple rows on each side, running somewhat parallel with the antero-lateral margins of the head, but curving inward posteriorly, so that their posterior ends nearly meet on the median dorsal surface; the two posterior groups, which are opposite the hinder portion of the crescents and nearer the postero-lateral margins of the head, have an irregular roundish or ovate

form and are often almost united to the front groups by a few ocelli scattered between them.

Color of body, above, clear orange-red, paler beneath.

Length of the specimen described above, from life, 18 to 20^{mm}; breadth 5^{mm}. Massachusetts Bay to Bay of Fundy, in various localities, low-water to 112 fathoms. The specimens above described were taken at station 38, 1877, in 112 fathoms, off Grand Menan.

Amphiporus ochraceus Verrill, Check List Invert., 1879.

Cosmocephala ochracea Verrill, Invert. of Vineyard Sound, etc., pp. 31, 336, pl. XIX, figs. 95, 95*a*, 1873.

PLATE XXXIII, FIGURES 5, 6; PLATE XXXIX, FIGURE 8.

Body elongated, moderately slender, somewhat flattened, but thick, with the margins rounded, obtuse at both ends, or subacute posteriorly; broadest and often swollen anteriorly; gradually and

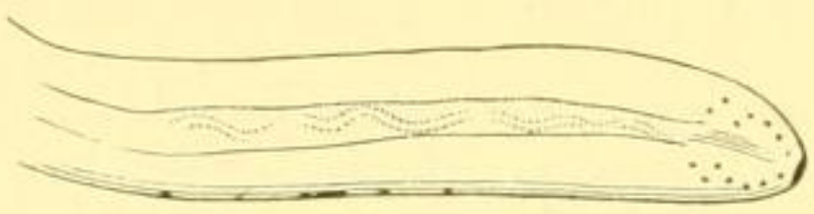

Fig. 2. *Amphiporus ochraceus.* Head and part of body, to show ocelli, enlarged.

slightly tapering posteriorly; the integument is translucent and the internal organs show quite distinctly; lateral (saccular) organs voluminous, extending nearly the whole length of the body along each side, and showing through as dull yellowish white mottlings. Head usually ovate, slightly wider than the body, obtuse; a slight fossa or groove, usually appearing as a whitish line on each side, runs obliquely across the ventral and lateral surface of the head, diverging from the mouth and curving somewhat forward and upward at the sides; another, less distinct, is situated farther forward on each side of the head. Proboscis-pore small and inconspicuous in contraction; mouth, small. Ocelli numerous, but varying somewhat in number; the anterior ones form a submarginal curved row along each side of the head, anteriorly, but curve inward farther back; just back of these, on each side, there are usually four distinct posterior ocelli, standing two by two, obliquely. Color dull yellowish, or yellowish white, often tinged with deeper yellow or orange anteriorly, with the median line lighter; the position of the cephalic ganglions is shown by faint reddish spots between the posterior groups of ocelli.

Length, 50^{mm} to 70^{mm}; breadth, 2·5^{mm} to 3^{mm}.

The proboscis is large and thick (Pl. XXXIX, fig. 8). The central stylet (Pl. XXXIII, fig. 5*a*) has a rather narrow, oblong shaft, rounded at the base, and with broad basal alæ; the two lateral sacs usually contain only two stylets each.

Common between tides and in tide pools, under stones and creeping among algæ, hydroids, bryozoa, etc., on the piles of wharves and other similar places. Also dredged frequently in 2 to 20 fathoms, on stony or shelly bottoms, off New Haven, Conn.; Thimble Islands; Noank, Conn.; Newport, R. I.; Woods Holl, Mass.; also dredged at numerous other localities in Long Island Sound and Vineyard Sound. North of Cape Cod it is less abundant, but I have dredged it at many stations, at moderate depths, in Massachusetts Bay. It also occurred between tides on the north shore of Cape Cod, at Provincetown and Barnstable, Mass.

Amphiporus glutinosus Verrill.

Polina glutinosa Verrill, Invert. Animals of Vineyard Sound, etc., p. 337, plate xix, fig. 97, 1873.

PLATE XXXV, FIGURE 5.

Body rather slender and elongated in extension, usually broadest in the middle and tapering to both ends, but quite versatile in form; head not distinct, usually obtuse; posterior end narrower, usually obtuse or slightly emarginate; integument soft, secreting a large quantity of mucus; the lateral organs extend close to the head. Ocelli numerous, variable in number, usually eight or ten on each

Fig. 3. *Amphiporus glutinosus.* Outline, enlarged.

side, arranged in three pairs of short, oblique, divergent rows, two to four in each; proboscis-pore moderately large terminal; no lateral fossæ were observed. Color dull yellow or pale orange-yellow, sometimes brighter orange, especially anteriorly; posteriorly usually lighter, with a faintly marked dusky or greenish median line.

Length, 25^{mm} to 30^{mm} in extension; breadth, 1·3^{mm} to 2^{mm}. Great Egg Harbor, N. J., to New Haven, Conn., and Wood's Holl, Mass.; low-water mark to 6 fathoms, usually among hydroids and bryozoa.

Amphiporus griseus (Stimp.) Verrill.

Polina grisea Stimp., Prodromus, in Proc. Philad. Acad. Nat. Sci., vol. ix, p. 164, 1857.

Body rather long, a little depressed, sub-cylindrical in extension, pale gray in color. Head distinct, ovate, or subcordate, narrower than the body, acute in front. Anterior clusters of ocelli larger, elongated, partly submarginal on the antero-lateral margin of the head; ocelli ten in each cluster. Posterior clusters cervical, small, linear, with four ocelli in each.

Length 0·8 inch; breadth 0·04 inch.

In the harbor of Norfolk, Va., sublittoral, among algæ in muddy places.

The above is a translation of Dr. Stimpson's Latin diagnosis. The species appears to be closely allied to *A. glutinosus*.

Amphiporus frontalis Verrill, sp. nov.

PLATE XXXIV, FIGURES 1, 1*a*, 1*b*, 8.

Body large, versatile in form, rather elongated, convex above, but somewhat depressed in extension, of nearly uniform breadth to near the ends, which are obtuse. Head in extension usually broader than the neck and separated by a slight constriction, usually longer than broad, but it may shorten into short ovate or broad rounded forms; front margin often emarginate. A well-marked, but shallow, oblique, transverse, ciliated fossa at the posterior border of the head, on each side, curves inward and usually somewhat forward, but does not reach the middle line; in some states of contraction these fossæ curve backward; underneath, the fossæ run very obliquely backward and inward, when the head is extended. Near the front of the head, on each side, a short curved fossa runs inward and curves forward, nearly parallel with the posterior ones, beneath the head they curve inward and backward but they recede in a V-shaped curve on each side of the head. Ocelli rather large and conspicuous, blackish, arranged in a single irregular cluster, or double row, of six to eight or more, on each side of the front and near the margin of the head. Mouth close to the proboscis-pore.

Color translucent white, or pale gray, or yellowish, with a darker dorsal band; sides of body mottled with pale pink or yellowish, due to the internal organs.

A variety taken at Eastport, Me., at low water, 1868, was translucent pale salmon, or flesh-color, mottled laterally with purplish and yellowish, due to the internal organs, while the median dorsal

region was greenish, apparently due to the contents of the intestine. Ocelli about 10 in each cluster.

Length, in extension, 100^{mm}; diameter 3^{mm}.

Length 25 to 125^{mm}; breadth about 3 to 5^{mm}. An individual 5 inches long can contract to less than 2 inches.

Eastport, Maine, low water, 1868 and 1870.

Amphiporus mesosorus Verrill, sp. nov.

PLATE XXXIV, FIGURE 9.

Body not much elongated, rather thick, well-rounded. Head of the same breadth as the neck, obtuse in front. Posterior transverse fossæ rather shallow and indistinct. Ocelli numerous, forming a large, irregular, somewhat triangular cluster on each side of the middle of the head, the apex of the groups pointing backward toward the ganglions. In some cases these clusters seem to consist of two rather roundish cerebral groups, which blend with two short, triangular lateral groups.

Color above, bright red; beneath, flesh-color. Length 50^{mm}; breadth 3^{mm}.

Massachusetts Bay, off Salem, Aug. 13, 1877, station 30 (three specimens).

Amphiporus cruentatus Verrill, Proc. U. S. Nat. Mus., vol. ii, p. 184, 1879.

PLATE XXXIII, FIGURES 7, 8, 8*a*; PLATE XXXV, FIGURE 3; PLATE XXXIX, FIGURE 9.

A species peculiarly characterized by having red blood, so that the longitudinal vessels appear distinctly red through the translucent integument. Body soft, flaccid, versatile, in full extension slender, tapering to both ends, but capable of becoming thicker and obtuse or even swollen posteriorly, and of contracting into a short stout form. Head not very distinct, scarcely broader than the neck, snout strongly ciliated. Ocelli about 8 to 12 on each side of the head, in a simple, interrupted, longitudinal, sublateral row, the most anterior ocellus distinctly the largest. Two slight transverse grooves on each side of the head, apparently not extending across the dorsal side, the anterior ones curving forward in front of, and the posterior ones behind the ganglia. Proboscis long, densely covered with elongated, conical papillæ; a simple central stylet, with two small, pin-shaped lateral ones on each side (Pl. XXXIX, fig. 9).

Color light flesh-color or yellowish white with conspicuous bright red median and lateral blood-vessels.

Length 25^{mm} to 40^{mm}.

Vineyard Sound, 4 to 10 fathoms; off Newport, R. I., 3 to 8 fathoms. Not very common.

Amphiporus virescens Verrill, Proc. Nat. Mus., p. 183, 1879.

Nemertes, sp. undet. (*c*) Verrill, Invert. Vineyard Sd., p. 335, 1873.

PLATE XXXIII, FIGURES 4, 4*a*, 4*b*, 4*c*, 4*d*, 4*e*.

Body, in extension, broadest anteriorly, rather depressed, long, slender, tapering gradually to the rather attenuated posterior end. Active in its movements. Head changeable in form, rather large, in expansion usually ovate, broader than the body, depressed, and obtusely rounded in front. A pair of faintly marked, nearly transverse fossæ runs up on each side of the posterior part of the head, crossing the rows of ocelli; farther forward and parallel with these there is another pair of similar furrows that cross the eye-patches, and beneath the head curve forward to the mouth. Ocelli numerous, forming a long lateral cluster on each side of the head; anteriorly each cluster consists of three or more rows, but backward the interior rows cease, finally leaving only the outer row, which extends back beyond the head and neck. Proboscis in partial extension clavate and covered with prominent papillæ; central stylet with an oblong shank, which in one mounted specimen is light greenish blue, together with the transverse, pigmented band near it.

Color clear light green, varying in tint.

Length of largest specimen seen, about 40^{mm}. New Haven and Noank, Conn.; Newport, R. I.; Wood's Holl, Mass., etc. Common in shallow water among hydroids and ascidians, and on the piles of wharves between tides.

Amphiporus agilis Verrill.

Ophionemertes agilis Verrill. Am. Jour. Science, vii, p. 45, pl. 7, fig. 1, 1873; Verrill, Expl. of Casco Bay, in Proc. Amer. Assoc. for 1873, p. 389, pl. 2, fig. 4.

Amphiporus agilis Verrill, Notice of Recent Addit. to Mar. Invert., Part I, in Proc. National Mus., ii, p. 183, 1879.

PLATE XXXV, FIGURE 4.

Body versatile, slender and elongated in extension, slightly depressed, with the sides well rounded, thickest in the middle, tapering gradually to the slender, obtuse posterior end. Head somewhat separate from, and wider than, the anterior part of the body, changeable in form, often oval, sometimes sub-triangular, generally

longer than broad, narrowed anteriorly, obtuse or slightly emarginate, with a terminal proboscis-pore. Ocelli numerous, forming

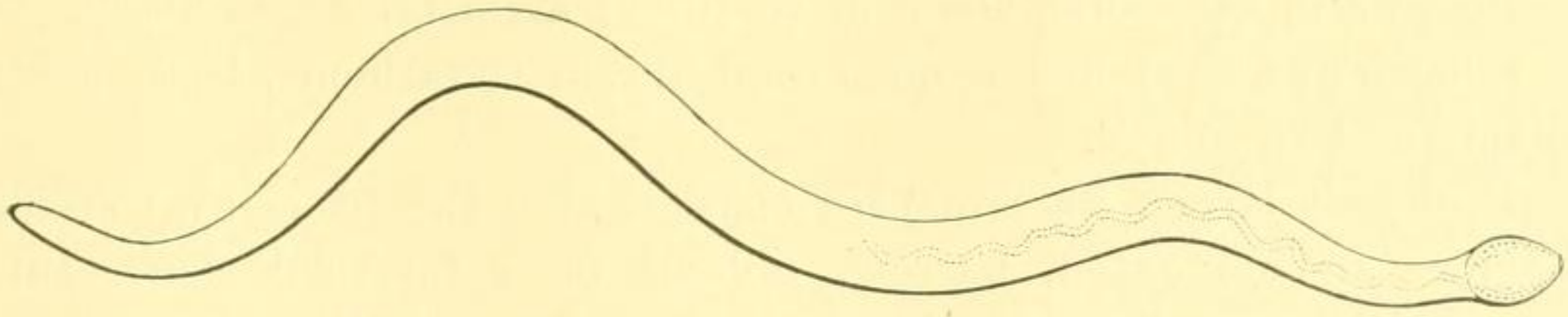

Fig. 4. *Amphiporus agilis.* Outline, enlarged.

a long, crowded, lateral row or group along each side of the head; the rows are simple and convergent anteriorly, posteriorly they become broader and double. Back of the ocelli there is a curved transverse groove or fossa, crossing the back of the head. No anterior fossæ were observed. Color pale ocher-yellow; median dorsal line slightly reddish; the internal lateral organs lighter yellow, giving a reticulated appearance to the sides.

Length 25^{mm} to 40^{mm}; diameter 1·5^{mm} to 2^{mm}. Described from life (No. 546).

Casco Bay, 20 to 65 fathoms; Bay of Fundy, 10 to 90 fathoms; Massachusetts Bay and off Cape Cod, 12 to 60 fathoms.

This species is very active and restless. It creeps with a rapid gliding motion, frequently moving its head from side to side, and in confinement is apt to creep above the edge of the water and perish by drying up. It secretes mucus abundantly and forms tubes of that material. It also creeps on the surface of the water, back downward, like most of the species of *Tetrastemma*, which it closely resembles in habits.

Amphiporus bioculatus? McIntosh.

PLATE XXXIV, FIGURES 3, 4, 15.

Body rarely more than 1·5 inches long, soft, changeable in form, in extension usually rather short and thick, roundish, tapering only slightly toward the ends, which are usually obtuse; the posterior region is sometimes broader; head not wider than the body, not distinctly defined, in extension tapering to the front end, which is usually subacute; ocelli two, forming a pair, close together and near the front margin of the head. A pair of small, rather faint, anterior transverse fossæ passes upward and forward on the sides of the head, just back of the eyes, usually showing only as pale lines, apparently not meeting dorsally.

Color dark orange-red, varying to pale orange and salmon, with paler margins and ventral surfaces and usually with darker brownish mottlings along the sides posteriorly, due to the internal organs;

the large proboscis-sheath and proboscis can often be seen indistinctly along the median dorsal region.

Length, in extension, about 35 to 40^{mm}; diameter 2·5 to 3·5^{mm}.

Length of a specimen from station 811, in 19 fathoms, 18 to 20^{mm}; diameter 1·25 to 2^{mm}.

Proboscis large; its armature consists of a slender central stylet having an elongated, narrow, oblong or cylindrical shaft, surrounded by a small dark-colored basal expansion. Below the stylet there is a dark pigmented transverse band. Described from living specimens.

Long Island Sound, near New Haven, etc.; Fisher's Island Sound; and Vineyard Sound, in 1 to 10 fathoms, not uncommon. Noank, Conn., in harbor mud, 1874. Off Block I., 19 fath., sand, (Sta. 811).

Amphiporus cæcus Verrill, sp. nov.

Nemertes?, sp. undet. (*a*), Invert. of Vineyard Sound, etc., p. 335, 1873.

PLATE XXXIV, FIGURES 2, 2*a*, 2*b*, 2*c*.

Body soft, oblong, flattened, obtuse at both ends, the edges rounded. Head not distinctly separated from the body and of the same breadth; a faint whitish groove crosses the neck, receding in the middle above, and extends around on each side to the ventral surface, on which it advances in the middle, or runs directly across, according to the state of contraction. No ocelli. The cephalic ganglions can usually be seen through the integument of the head, especially on the lower side, as reddish spots.

Color bright orange-red; lighter orange-yellow along the sides; usually with a median dorsal stripe of darker red.

Length, in extension, 35 to 40^{mm}; diameter 2·5 to 3^{mm}. Described from living specimens.

North of Block Island, 18 to 20 fathoms, Aug. 6, 1874.

Amphiporus cæcus Young.

Body very slender. Head acute. Ocelli none. Proboscis with a central stylet having a narrow oblong shaft and expanded base, much as in that of *A. ochraceus;* lateral stylets not observed, perhaps wanting.

Color pale yellowish white, with the head red.

Length about 6 to 7^{mm}.

Station 812, in 28 fathoms, sand. Off Block Island, 1880.

Amphiporus thallius Verrill.

Amphiporus sp., Verrill, Bulletin U. S. Nat. Mus., No. 15, p. 143, 1879 (with description).

Body, as preserved in alcohol, thick, not very long, somewhat depressed, tapered a little to both ends, which are obtuse. Head not very distinct, of the same width as the body; transverse fossæ at back part of head not very distinct, running back obliquely on each side, so as to form a V-shaped line on the middle above. Ocelli minute, arranged in a small roundish cluster on each side, on the pale antero-lateral margins.

Color, in alcohol, dark bluish green above; under surface and margins of head yellowish white. In life "bright pea-green" (Kumlin). Length, in alcohol, 25 to 30^{mm}; diameter 4 to 5^{mm}.

Cumberland Gulf, N. lat. 66°, October 4, 1887; Arctic Island, at low water, Sept. 13, 1877 (Kumlin coll.).

The very peculiar and strongly marked color, which persists for years in alcoholic specimens, appears to be characteristic of this species.

Amphiporus (?) superbus Verrill.

Nareda superba Girard, in Stimpson, Invert. Grand Menan, p. 28, pl. 2, fig. 17, 1853.

PLATE XXXIV, FIGURE 16.

This species was dredged off Grand Menan in 40 fathoms by Dr. Wm. Stimpson. The description by Girard was evidently based on the drawing furnished him by Dr. Stimpson, and could not have furnished anything more than the external appearance. I have reproduced the original figure, somewhat reduced by photography. The original description is as follows:

"NAREDA Grd."

"Body elongated, subcylindrical. Head obtusely triangular in front, neck slightly contracted; one pair of rounded ocelli."

"*N. superba* Grd.—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 fathoms, in the Hake Bay."

The only character mentioned which could have been considered as of generic value is the presence of two eyes (?) on the white

nuchal band. But it is much more probable that those spots represented either the cephalic ganglions, which usually show themselves in that position in this group, or else clusters of small ocelli.

In the latter case there may also have been small anterior ocelli that were overlooked. Either supposition is consistent with its supposed relation to the known species of *Amphiporus* with many of which it agrees in form.

Although I have spent part of several summers dredging in the region of Grand Menan, and have dredged even in the same locality where this species was obtained, I have never met with a Nemertean that could be referred to the same species with certainty, even after making allowances for errors in the original drawing. The nearest approach to it that I have seen, is a red variety of *A. angulatus* in which the angular pale spots on the sides of the head are nearly obsolete, and the front ocelli inconspicuous. I have, therefore, reproduced the original description and figure.

Tetrastemma Ehrenberg, 1831.

Polia (*pars*) Quatr , Ann. des sci. nat., vol. vi, 1846.
Œrstedia Quatr., op. cit , p. 221; Dies., Syst. Helm., vol. i, p. 247 (*non* Hubrecht).
Tetrastemma Diesing, Syst. Helm., vol. i, p. 256, 1850; Stimpson, Prodromus, in Acad. Nat. Sci. Philad , p. 163 [19], 1853.
Nemertes (*pars*) Dies., Syst. Helm., vol. i, p. 269, 1850.

Body rather small, moderately elongated, often nearly terete. Head in some species wider than neck, but in many species of the same breadth. Transverse fossæ usually two on each side of the head, more or less oblique. Ocelli four, arranged in a quadrangle. Proboscis with a central stylet and two lateral chambers, each usually containing two to four stylets.

A terrestrial species of *Tetrastemma* (*T. agricola*) has been described from the Bermudas by Moseley. Fresh water species of the same, or a closely allied genus, are also known.

Tetrastemma candidum (Fabr.) Œrsted.

? Fasciola candida O. Fabr. in O. F. Müller, Verm. terrest. et fluv. hist., I, ii, p. 71, 1774.
? Planaria candida O. Fabr. in O. F. Müller, Zool. Dan. Prodr., p. 223, No. 2704, 1776; O. Fabricius, Fauna Grœnlandica, p. 327, 1780.
Planaria quadrioculata (*pars*) Johnston, Zool. Jour., vol. iv, p. 56, 1829.
Nemertes quadrioculata Johnston, Mag. Zool. and Bot., vol. i, p. 535, pl. XVII, fig. 4, 1837.
Tetrastemma varicolor (*pars*) Œrsted, Kroyer's Naturhist. Tidss., iv, p. 575, 1837; Diesing, Syst. Helm., vol. i, p. 257, 1850.

Tetrastemma grœnlandicum Diesing, op. cit., p. 259.

Tetrastemma candida McIntosh, British Annelids, Part I, Nemerteans, p. 167, pl. II, figs. 2, 3, 1873 (*non* Diesing, Syst.): Levinsen, Grœnlands Turbell., p. 39 [200], 1879; Verrill, Amer. Jour. Sci, vol x, p. 40, 1875; Check List, 1879.

PLATE XXXIII, FIGURES 9, 10, 10*a*; PLATE XXXV, FIGURES 9, 10.

Body very contractile, in extension slender, elongated, somewhat depressed, tapering backward and often attenuated toward the posterior end. Head in usual extension rather wider than the body. Ocelli rather large, conspicuous, reddish brown, nearly in a square, but when the head is fully extended, the two pairs are farther apart than the distance between those of a pair.

Color variable, usually pale green, greenish white, or yellowish white, translucent, and generally with indistinct lateral grayish mottling, due to the internal organs; sometimes the intestinal area is decidedly greenish, while the sides are pale yellow; at other times the median region is whitish and the sides pale green. Several specimens, taken at Eastport, Me., in South Bay, 8 to 10 fathoms, mud, 1868, were clear cream color above, whitish below.

Length in extension 25 to 32^{mm}; diameter 1 to 2^{mm}.

Common at many localities between tides, among algæ, hydroids, and bryozoa from New Haven, Conn., to the Bay of Fundy. Also dredged at moderate depths, 1 to 14 fathoms, in many localities.

This species is very active; it creeps rapidly with a gliding motion. The relatively larger size of the head, more conspicuous eyes, and lighter colors, as contrasted with the following species, are its most distinctive characters.

It seems to me very doubtful whether the *Planaria candida* of Fabricius was this species. The large size and the habits given by him, and lack of mention of the eyes are against that view. His species may have been *Amphiporus lactifloreus*, a Greenland species.

Tetrastemma candida. Variations.

Several specimens of the variety figured on plate XXXIII, figs. 10, 10*a*, were taken on the piles of the wharves at Gloucester, Mass., July 24, 1878. These were probably not full grown. The body was 8 to 12^{mm} long, in extension, slender, very changeable, usually of nearly uniform breadth to near the ends. Head obtuse and usually a little wider than the body, but very changeable in shape; when extended the ocelli were farther apart longitudinally than transversely, but when the head contracted, as in progression, the two pairs of ocelli were brought near together, as shown in the

figures. The form and direction of the two pairs of rather indistinct, transverse cephalic fossæ also varied greatly with the changes in the shape of the head. The two lateral stylet-sacs of the proboscis contained three stylets each.

Color of body, above, pale yellowish green, or pale brown; head with an opaque, flake-white spot in front of the eyes; along the margins of the body the internal organs produce series of brownish, irregular, transverse spots or blotches, varying in depth of color; alternating with these spots, and so interrupting the marginal dark bands, there are small, rounded whitish spots, probably due to the ovaries.

Tetrastemma elegans Verrill.

Tetrastemma elegans Verrill, Amer. Journ. Sci., vol. x, p. 40, 1875.

? Hecate elegans Girard, Proc. Boston Soc. Nat. Hist., vol, iv, p. 186, 1852.

PLATE XXXIV, FIGURE 10.

Body, in extension, longer and more slender than most species of the genus, depressed, broadest in the middle, tapering both ways. Head ovate, broader than the neck, obtuse or emarginate in front; lateral fossæ not very distinct. Ocelli conspicuous, nearly in a

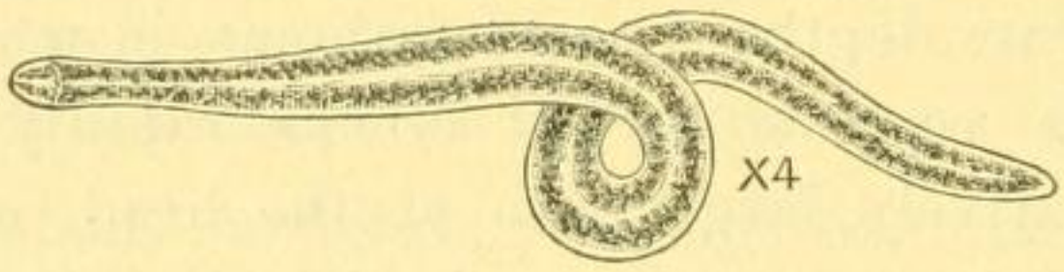

Fig. 5. *Tetrastemma elegans*. Dorsal view.

square, the front pair rather nearer together than the others. Color above, striped with two broad brown lateral, and a wide median, yellow stripe; the median stripe is clearly defined, clear light yellow and occupies about a fourth of the breadth of the back; it extends to the front of the head, becoming narrow on the neck and then expanding on the middle of the head; a narrow ring of light yellow surrounds the neck, just behind the head; the two stripes of dark brown are well defined, but have irregular margins and are varied in color by paler specks; lower surface and margins of body and head pale yellow.

Length 20^{mm}; breadth 1 to 1·5^{mm}. Described from life.

Noank, Conn., among eel-grass; Fisher's Island Sound, 2 to 8 fathoms; Wood's Holl, Mass., on piles of wharf.

A paler variety occurs in which the lateral bands are lighter brown, interrupted by yellowish spots, and the dorsal stripe is less clearly defined.

Tetrastemma vermiculus (Quatr.) Stimpson.

Polia vermiculus Quatrefages, Ann. des sc. nat., ser. III, Zool., vol. vi, p. 214, 1846; Voyage en Sicilie, vol. ii, p. 126, pl. XIV, figs. 12, 13, 1849.

Nemertes vermiculus Diesing, Syst. Helm., vol. i, p. 270, 1850.

Tetrastemma vermiculus Stimpson, Proc. Acad. Nat. Sci. Philad, vol. ix, p. 163 (19), 1857; Diesing, Revis der Turbell., p. 290, 1862.

Tetrastemma vermicula McIntosh, British Annelids, Part I, Nemerteans, p. 169, Plate III, fig. 3, 1873.

Tetrastemma vermiculus Verrill, Notice of Reçent Addit. to Mar. Invert., Part I, in Proc. National Mus., ii, p. 184, 1879; Check List, 1879.

PLATE XXXIII, FIGURES 11 to 11*c*; PLATE XXXIV, FIGURES 11, 12; PLATE XXXV, FIGURES 8, 11.

Body versatile, rather slender in extension, obtuse at both ends; sometimes tapered to the posterior end, but more often of nearly uniform diameter. Ocelli conspicuous, the two pairs rather far apart when the head is extended, those on the same side farther separated than those of a single pair, and connected by a dark line of pigment, which is rarely absent.

Color rather variable; above, often pale yellowish, or pale salmon, or translucent yellowish gray, more or less specked or spotted, especially along the sides, with brown, often leaving a paler, wide, rather indefinite dorsal stripe; ventral surface and front of head pale.

Length, in extension, about 20^{mm}; breadth 1^{mm}. Described from life.

Many specimens taken at Wood's Holl in the mud of Little Harbor, July 25th, 1881, and August 4th, 1882, varied from dull orange-yellow to bright greenish yellow, more or less covered with specks of brown, especially on the sides, yet not forming a definite dorsal stripe, but with a darker brownish, often indistinct stripe on each side of the head between the eyes.

Length up to 18 to 20^{mm}.

Young—several young specimens of this species were taken together in a tide-pool, in 1878 (No. 12).

Body slender, of nearly the same width throughout. Ocelli conspicuous, the two pairs more widely separated than usual when the head is extended; the front ones a little larger than the others. Color translucent pale yellow, bright salmon, and flesh-color, usually with a white median spot in front of the anterior ocelli, and sometimes, also, with other white specks along the back; frequently an irregular brownish band runs along each side of the back; median line paler. In many of the specimens a faint longitudinal line of

dark brown pigment specks runs between the ocelli on each side. In one example the median region, posteriorly, was green probably from the contents of the intestine showing through the integument.

Gloucester, Mass., at Ten Pound Island, in a tide-pool at low-water, among algæ.

This European species is common among hydroids, bryozoa, ascidians, etc., between tides, on rocks, piles of wharves, and in tide-pools, from Long Island Sound to the Bay of Fundy. I have, also, often dredged it in 2 to 12 fathoms, at various localities on hard bottoms. It is especially abundant among ascidians in Vineyard Sound, in 6 to 10 fathoms. Very common at Noank, Conn., in the harbor, on muddy bottoms among eel-grass. Common in similar places and on piles of wharves, at Wood's Holl, Mass., and Newport, R. I.

Tetrastemma vermiculus, variety catenulatum nov.

PLATE XXXIV, FIGURE 12; PLATE XXXV, FIGURE 11.

Form and size essentially as above described. Ground-color, above, light salmon, pale yellow, or yellowish gray, thickly covered along the sides with irregular specks, spots, or blotches of brown, which at more or less irregular intervals extend upward toward or across the middle line, interrupting the median dorsal light stripe, which is often thus divided into a series of irregular oblong or elliptical spots; sometimes there is also a row of small brown spots along the median line; middle of head pale, often with flake-white specks; stripe of dark color, more or less distinct, between the two eyes of each side; lower surface pale yellow or yellowish white. Length up to 18^{mm}; diameter 1^{mm}. Described from life. Specimens of this marked variety are common in the harbor at Wood's Holl, Mass.

Other specimens, from the same locality, were noted as follows:

Body very changeable, often, in extension, narrow or sub-acute at both ends and more or less swollen in the middle, at one or more places, at other times nearly cylindrical or terete. Color pale yellowish or grayish green, with a darker central line on the pale dorsal stripe and with irregular, transverse, lateral markings. Or specks of darker brown are scattered over the back, and are often arranged in imperfect lateral stripes, leaving a paler, wide, more or less irregular and interrupted median stripe; lower surface pale. Ocelli reddish brown, forming nearly a square. Usually a line of dark pigment connects the two ocelli of the same side (No. 857).

Tetrastemma dorsale (Abildgaard) McInt.

Planaria dorsalis Abildgaard, Zool. Danic., vol. iv, p. 25, tab. 142, figs. 1–3, 1806.
Tetrastemma fuscum Œrsted, Kroyer's Naturhist. Tidss., iv, p. 575, 1844.
Œrstedia maculata Quatr., Ann. Sci. Nat., ser. III, vol. vi, p. 222, pl. VIII, fig. 2.
Tetrastemma marmoratum Claparède, Beobach. über Anat. u. Entwicklung., etc., p. 24, pl. v, fig. 14, 1863 (variety).
Tetrastemma variegatum Johnston, Catalogue Brit. Mus, pp. 20 and 289, 1865.
Tetrastemma dorsalis McIntosh, British Annelids, Part I, Nemerteans, p. 172. pl. I, fig. 4; pl. III, fig. 4, 1873; Verrill, Check List, 1879.
Tetrastemma dorsale Jensen, Turb. ad Litoria Norvegiæ, p. 81, pl. VIII, figs. 9 to 12, 1878.

PLATE XXXIV, FIGURES 13, 14.

Body only moderately elongated, sub-terete, usually nearly cylindrical in extension, with both ends obtuse. Head not wider than the body, with two rather indistinct transverse fossæ on each side. Ocelli forming nearly a square; in full extension more distant longitudinally than transversely. Proboscis-pore a little below the end of the snout. Proboscis large, when protruded more than three-fourths the length of the body, thickly covered with acute papillæ.

Color variable; generally brown or dull reddish, with a well defined light dorsal stripe; or else variegated or mottled with two or more shades of brown, with or without the dorsal stripe.

Length up to 20^{mm}; diameter 1·5 to 2^{mm}.

Variations.—Among the variations noted in life, are the following:—

Several examples were taken together at stations 310 to 313, off Cape Cod, in 15 to 21 fathoms, 1879.

In these the general color above was brownish, with a conspicuous pale, flesh-colored dorsal stripe, bordered with dark brown on each side; the brown lateral stripes were freckled with white specks; a pale line crosses the neck behind the eyes; front of the head, margins of the body and tip of the tail pale flesh-color. Pl. XXXIV, fig. 13.

Length 12 to 18^{mm}; diameter 1·5 to 2^{mm}.

Other specimens had the following characters:

Body slender, 10^{mm} long; 1^{mm} broad. Color cinnamon-brown, specked with darker brown, and with a pale median line. Ocelli conspicuous, black. When the head is extended the two pairs are more distant than the space between those of the same pair. Proboscis large, more than three-fourths as long as the body, thickly covered with acute, conical papillæ, and protruded from a large pore, which is sub-ventral. Two slight transverse fossæ are seen on each side of the head.

Broad Sound, Casco Bay, July 22, 1873 (No. 724).

Tetrastemma dorsale, variety marmoratum (Clap).

PLATE XXXIV, FIGURE 14.

Body terete, somewhat elongated in extension, obtuse at both ends. Proboscis large, protruded from the sub-terminal pore, thickly covered with papillæ. Color pale olive-brown, or chestnut-brown, irregularly mottled and blotched with darker brown.

Length 18^{mm}; diameter 1·5^{mm}. Described from life (No. 735).

Portland, Me., in 2 to 3 fathoms, harbor mud, July 28, 1873.

A paler colored race, probably closely related to this variety, was taken in the harbor of Eastport, Me., in 12 fathoms, in 1872 (No. 507). The body was changeable in form, usually nearly cylindrical, and obtuse at both ends. Ground-color pale yellow or salmon, thickly blotched and mottled with dark brown, or greenish brown; some specimens had an inconspicuous ring of yellowish white around the neck. Length 15 to 18^{mm}; diameter 1·25 to 2^{mm}.

Tetrastemma dorsale, variety unicolor Verrill, nov.

A specimen taken in Eastport Harbor, off Friar's Head, in 18 fathoms, August 20, 1870, agreed, with this species in form but differed so much in color that it probably ought to be considered as representing a distinct variety, at least:—

Body moderately slender, slightly depressed, with the sides rounded. Head obtuse, four distinct black ocelli. Color, above, uniform dark fuscous brown; lower surface paler.

Another specimen taken in 1879, according to the notes made from life, probably belongs to the same variety:—

Body moderate in extension, broadest at or behind the middle, tapering to both ends, not very slender. Ocelli well developed, the two pairs, when the head is extended, wider apart than the distance between those of the same pair. A very distinct transverse fossa, on each side of the head, runs upward and backward just in front of the posterior ocelli, but the two do not meet on the middle line.

Color of the body, above, clear brown, the margins, head, and under surface paler.

Length 8^{mm}; breadth 1^{mm}.

Station 331, off Cape Cod, in 28 fathoms, 1879.

Tetrastemma vittatum Verrill.

American Journal of Science, vol. vii, p. 45, pl. VII, figs. 3, *a*, *b*, 1874; Proc. Amer. Assoc. for Adv. of Science for 1873, p. 389, pl. II, figs. 7, 8, 1874; Verrill, Notice of Recent Addit. to Mar. Invert., Part I, in Proc. National Mus., ii, p. 185, 1879 (not *Œrstedia vittata* Hubr.)

PLATE XXXV, FIGURES 6, 7.

Body rather short and stout, up to 2 or 3 inches in length, soft, changeable, in extension nearly cylindrical but often a little flattened beneath, tapering slightly anteriorly, or sometimes both ways, usually obtuse at the posterior end.

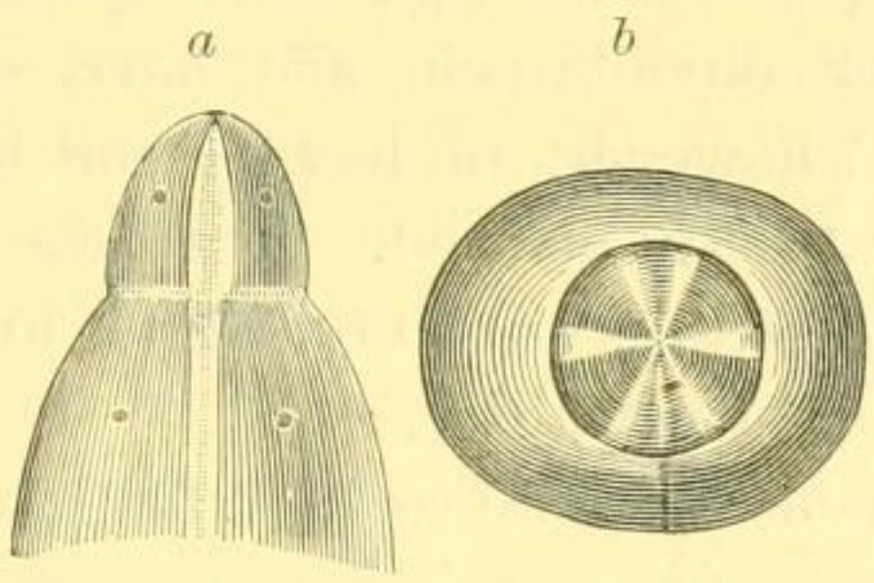

Fig. 6. *Tetrastemma vittatum*; *a*, head, dorsal view; *b*, front view, much enlarged.

Head usually slightly narrower than the body, with a transverse groove or constriction in front of the posterior eyes; front end obtuse, conical, or rounded. Ocelli four, small, rather indistinct in dark colored specimens; the anterior ones are nearer together than the posterior, which are far back behind the transverse groove, which extends across, beneath, and crosses the median line above. Proboscis-pore terminal.

Color of body, above, dark or light olive-green, dull yellowish green, or greenish brown, or even greenish black, often with two yellowish or light green dorsal stripes and sometimes with one median light stripe; beneath paler, mottled laterally. Color of head, in advance of the transverse groove, various shades of olive-green and dark green, white at the tip, and with six longitudinal whitish or pale greenish stripes, which converge to the end; two of these stripes are dorsal, two are ventral, and one is lateral on each side; the green line between the two dorsal stripes extends back on the body. Internal organs show through the integument as irregular, short, transverse blotches or bars of lighter color along the sides beneath.

Length in extension usually about 25 to 30^{mm}; diameter 3 to 4^{mm}; unusually large examples have been taken as much as 75^{mm} long, 6^{mm} broad. Described from life.

Long Island Sound, Vineyard Sound, Massachusetts Bay, Casco Bay, Bay of Fundy, etc., low-water mark to 25 fathoms, common on muddy bottoms. Noank, Conn., in harbor mud, among eel-grass; Wood's Holl, Mass., harbor mud.

This species is sluggish in its habits and creeps very slowly.

Tetrastemma vittatum. Variations.

Several specimens of this species were taken together at station 310, off Cape Cod, in 21 fathoms, 1879.

These show great variation in the color of the body, which, in some was flesh-color, in others light olive-green, dark olive, light greenish brown, dark olive-brown, and dark smoky brown. All these varieties agree, however, in having the head greenish with the six light vittæ distinctly marked. In all the specimens the four ocelli were detected, but they are so indistinct in the dark specimens that they must be sought with care.

The largest specimens were 50 to 75^{mm} long; diameter up to 6^{mm}.

Tetrastemma roseum Verrill, sp. nov.

Body round and soft, in extension about 1·25 inches long. Head obtusely conical; a transverse shallow groove close to the end of the snout; the part beyond the groove is capable of withdrawing under the portion behind it. Ocelli obscure; two behind the groove and (apparently) two very minute ones in front of it. Color clear bright rosy red.

Length about 30^{mm}; diameter 3^{mm}.

Station 826, off Block Island, in 22 fathoms, 1880.

This species was met with only once, and then circumstances prevented a careful study of its structure. In the form of the body and characters of the head and cephalic grooves it resembles *T. vittatum* V., and if the front ocelli were correctly noted, would appear to be closely allied to it and might even be thought to be a plain red variety, were not that species very constant in its color markings, the longitudinal vittæ being very characteristic.

Emplectonema Stimpson.

Prodromus, in Proc. Philad. Acad. Nat. Sci., vol. ix, p. 164 [20] 1857.

Amphiporus Œrsted, Kroyer's Tidds., iv, p. 581, 1844, (? *non* Ehr., *non* McIntosh).

Nemertes McIntosh, Nemerteans, p. 176, 1873 (*non* Cuvier, 1817, *non* Œrsted, 1844, *non* Diesing, 1850, *nec* White, 1850).

Macronemertes Verrill, Amer. Jour. Sci., vol. vi, p. 439, 1873.

Body much elongated in extension, sometimes almost filiform, very contractile, rounded or a little flattened. Head not very distinctly defined; in some cases with a pair of longitudinal or oblique, shallow, submarginal fossæ on the upper side; in other cases (*E. gracilis*) without evident fossæ.

Ocelli variously arranged, often numerous and in several clusters, both anterior and cerebral.

Proboscis relatively small, especially the anterior portion, which is much shorter than in *Amphiporus*. Mouth usually (always ?) separate from the proboscis-pore.

For this genus the earliest available name seems to be that given by Stimpson, who named as type *E. camillea* (Quatr. sp. = *E. Neësii* Œrsted sp.), which is also the type of the genus *Nemertes* of McIntosh. The latter name could not be retained in this sense, even if the genus had not received a prior name, for *Nemertes* had already been used for a genus of insects by White in 1850, in addition to its prior use for several distinct genera of Nemerteans. Had not Stimpson's generic name been available, *Macronemertes* would have been next in order.

Emplectonema giganteum Verrill.

Macronemertes gigantea Verrill, Amer. Journ. Sci., vol. vi, p. 439, pl. 7, figs. 2, *a*, *b*, 1873; Expl. of Casco Bay, in Proc. Amer. Assoc. for 1873, p. 390, pl. 2, figs. 5, 6, 1873.

PLATE XXXV, FIGURE 2. PLATE XXXVIII, FIGURES 12, 12*a*.

Size large. Body much elongated, very contractile; in extension, subterete, a little depressed, thickest anteriorly, gradually tapering posteriorly, becoming very slender and considerably flattened toward the end. Integument very soft, secreting a large quantity of mucus. Head not distinct from the body and of the same diameter, obtusely rounded in front, with a terminal proboscis-pore; upper surface with two shallow, indistinct, sublateral, longitudinal fossæ, often becoming more distinct in alcohol; below with two rather indistinct, obliquely transverse grooves or fossæ.

Ocelli numerous, but not very distinct, because deeply buried in the integument; they are numerous, arranged in four or more clusters; a pair of large oval or subtriangular clusters on the antero-lateral border of the head, each of which may be divided into an upper and a lower group, the upper part running backward; a pair of smaller lateral clusters farther back; and a pair of small rather indistinct clusters on the dorsal surface, between the longitudinal fossæ.

Color, when alive, deep salmon or bright orange-red, flesh-color below.

Length of the largest examples, 2 to 3·5 meters, or about 7 to 12 feet, in extension; diameter, anteriorly, 6 to 8^{mm}, or ·30 of an inch.

When preserved in alcohol this species soon loses all its color, contracts greatly in length, and becomes quite hard; sometimes the body is considerably flattened, but in most cases it retains its subterete form except toward the posterior end. The head often shows the shallow, dorso-lateral, longitudinal fossæ (not slits) and the two large anterior groups of ocelli can usually be seen indistinctly as dark rounded patches beneath the thick outer integument. The small proboscis is often protruded a short distance, its pore being then rather small and slightly below the tip of the snout. The mouth is not visible in the preserved specimens, but my original sketches, made from life, show what I then supposed to be the contracted mouth beneath the head, distinct from the proboscis-pore.

In some horizontal sections of the head the anterior ocelli form an upper pair of transverse groups nearer the front than the sides of the head, while two smaller clusters, lower down in front, seem to be nearly separate from the upper ones. In some specimens these large anterior groups are formed of four or five transverse horizontal rows, of which the upper row runs back to a small lateral cluster of ocelli. The œsophagus has a large plicated anterior portion in the head. The mouth appears to open decidedly behind the proboscis-pore.

In sections of the body the intestine, blood-system, and muscular layers are nearly as in *Amphiporus*, but the muscular layers are unusually thick.

One specimen, taken August 12, 1873, contained large eggs, arranged in about six rows of sacs, above and at the side of the intestine, on each side. The armature of the proboscis has not been observed, but in other respects the proboscis agrees with that of the allied species; the length of the anterior region is about twice the diameter of the body; the posterior portion is long and slender.

Off Cape Elizabeth, 68 fathoms, soft mud, August 12, 1873; Gulf of Maine, 88 fathoms, mud, station 45, 1874; off Martha's Vineyard, 192 fathoms, fine sand and mud, station 869, 1880; off Martha's Vineyard, 229 fathoms, sandy mud, station 925, 1881; off George's Bank, 852 fathoms, gray mud, station 2531; off Block Island, 156 fathoms, fine mud and sand, station 2537; off Block Island, 131 fathoms, fine sand, station 2544, 1885. (U. S. Fish Commission).

Family, Drepanophoridæ Verrill, nov.

Amphiporidæ (*pars*) authors.

Proboscis-sheath provided with cæcal appendages. Central armature of proboscis a lamelliform plate bearing a number of small stylets on its edge. Lateral stylet-sacs more than two; often numerous, containing small nail-shaped stylets.

Drepanophorus Hubrecht.

Body and head nearly as in *Amphiporus;* mouth-opening separate from the proboscis-pore. Proboscis large. Musculature of the body-wall as in *Amphiporus.*

Drepanophorus Lankesteri Hubrecht.

Voyage of the Challenger, vol. xix, pp. 18, 50, pl. i, fig. 22; pl. ix, figs. 1, 2, 10; pl. x, figs. 2, 4; pl. xii, fig. 5; pl. xiv, figs. 9, 10; pl. xv, fig. 13, 1887.

This species was described from alcoholic specimens, destitute of the proboscis. Its external features are, therefore, entirely unknown. Its anatomy was, however, carefully worked out by means of sections.

It is peculiar in having numerous well marked transverse nervous commissures connecting the lateral nerve-trunks anteriorly.

The cæcal appendages of the proboscis-sheath are also unusually well developed, with thicker walls than in most species, and they sometimes anastomose distally.

Ocelli are present, but their arrangement was not stated. Genital sacs are numerous, apparently in four rows, subventral.

For other details reference should be made to the original description and figures.

Off Nova Scotia, near Le Have Bank, 45 fathoms.

I have observed a single, small, and probably immature, specimen of Drepanophoridæ on the New England coast, but do not deem it wise to name it. This was translucent yellowish white in color.

Order II, ANOPLA.

Anopla Max Schultze, 1852; McIntosh.

Proboscis unarmed, long, slender, tubular, and not divided into three distinct regions; its walls may contain three to five layers; inner surface, when retracted, papillose.

Head with or without lateral slits or ciliated pouches.

Ocelli variously arranged; often wanting.

Mouth ventral, situated behind the ganglions.

The muscular walls of the body often consist of three layers: outer longitudinal, middle circular, and inner longitudinal (Pl. xxxix, figs. 17 to 21). In some cases the outer longitudinal layer is lacking (figs. 15 and 16).

Two or three main vascular trunks; the vessels generally not so well defined as in the Enopla, and often having in part the character of wide lacunæ, especially anteriorly.

Œsophagus entirely behind the brain, usually large, long, plicated, and surrounded by a vascular network, or by lacunæ. (Pl. xxxix, fig. 22, *r'*, *r*).

Lateral nerve-trunks arise from the outer sides of the lower ganglions, and are situated between the muscular layers of the body-walls, but they vary in position in the different families. Usually there is a nervous plexus outside of the circular muscular layer. (Pl. xxxix, figs. 17, 20, *n*).

The species are almost all marine; a few inhabit brackish water.

Suborder I, RHAGADOCEPHALA Diesing, 1850 (emended).

Schizonemertini Hubrecht; Carus, Faunæ Med., p. 160.
Schizonemertea Hubrecht, Voy. Challenger, xix, p. 37.

Head with a deep, longitudinal, ciliated slit, or fossa (probably olfactory in function), on each side, terminating posteriorly in a deep pit or duct running inward to the posterior ganglions. (Pl. xxxix, fig. 22, *f*, *d*, *d'*).

Mouth large, behind or opposite the posterior ends of the lateral slits and cephalic ganglions. (Wood-cut 8).

Lateral nerve-trunks situated between the outer longitudinal and the circular muscular layers of the body-wall. (Pl. xxxix, figs. 19 to 21). A median dorsal nerve is also usually distinctly developed.

Three large, longitudinal, vascular trunks, which are usually connected by numerous transverse vessels around the intestine, especially posteriorly.

Œsophagus large, prolonged backward, plicated, and provided with a vascular system, probably having a respiratory function. (Pl. xxxix, figs. 20, 22).

Many of the species of this group develop directly from the eggs, without a marked metamorphosis, but certain species of *Micrura* (perhaps all) have a peculiar, free-swimming larval form known as *Pilidium* (Pl. xxxix, figs. 1 to 6, and wood-cut 7). The embryology of the closely related genus, *Cerebratulus*, is apparently unknown.

The species are almost exclusively marine and are found in deep water as well as between tides. Many are fossorial in their habits,

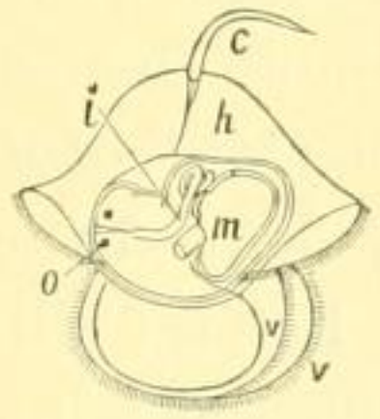

Fig. 7. Pilidium of *Micrura*, much enlarged: *c*, apical cilium; *h*, cephalic lobe; *m*, mouth; *i*, intestine; *v*, bands of cilia; *o*, young nemertean developing in the interior, showing its head with two ocelli.

living in sand or mud, or beneath stones. Some of the large flat species of *Cerebratulus* leave their burrows and swim with an undulatory, eel-like movement at the surface of the sea at night.

Family, Lineidæ McIntosh.

Body simple, generally much elongated in extension, very contractile, usually thickest in the region of the œsophagus, and becoming

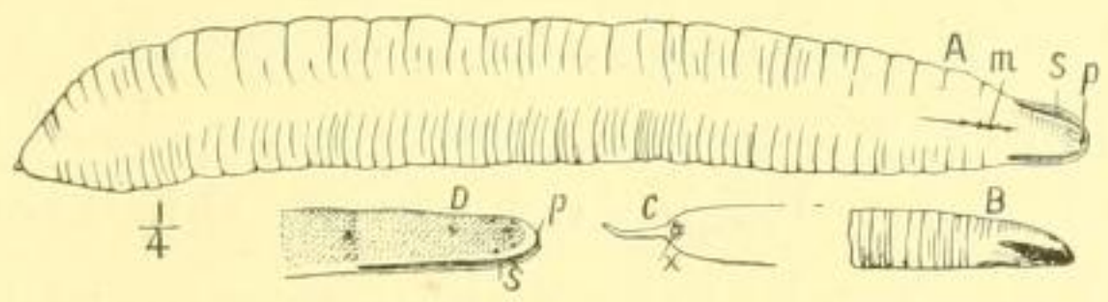

Fig. 8. *Lineidæ*. A, *Cerebratulus luridus*, ventral side; *m*, mouth; *s*, one of the olfactory slits or cephalopori; *p*, proboscis-pore. B, head of the same, side view. C, tail; *x*, anus. D, head of *Lineus* viridis, young, enlarged; *s*, one of the cephalopori; *p*, proboscis-pore.

more or less flattened farther back, where the saccular appendages of the intestine and the reproductive glands occupy the sides. Head simple, with elongated lateral olfactory slits or cephalopori.

Lineus Sowerby, 1806.

Lineus Sowerby, British Miscel., p. 15, pl. 8, 1806.
Borlasia Oken, Lehrbuch, p. 365, 1815; Blainville, Dict. Sci. Nat., 57, p. 575, 1828; Johnston, Catal., p. 21, 1865.
Nemertes Cuvier, Regne Anim., vol. iv, p. 37, 1815; Dies. (*pars*), op. cit., p. 264.
Lineus Œrsted, Naturh. Tidsskr., iv, p. 576, 1844.
Meckelia (*pars*) Diesing, Syst. Helm., vol. i, p. 265, 1850.
Notospermus Diesing, op. cit., vol. i, p. 260.
Lineus Stimpson, Prodromus, p. 160, 1851.
Cerebratulus (*pars*) Stimpson, Prodromus, p. 160, 1857.
Poseidon Girard, Proc. Boston Soc. Nat. Hist., iv, p. 185, 1852.
Nemertes Verrill, Invert. Vineyard Sound, etc., 1873.

Body very contractile, in extension elongated, slender, tapering, and often attenuated toward the posterior end, rounded or slightly depressed anteriorly, generally somewhat broader and more depressed in the middle region, but without the conspicuous flattening back of the œsophageal region seen in *Cerebratulus.* No anal papilla. Head elongated, not very distinctly defined; often a little wider than the neck, but not constantly so. Lateral slits elongated and deep, running close to the terminal proboscis-pore, but usually not joining it. Mouth, in ordinary states, rounded or elliptical and not very large, but capable of great extension when feeding. Ocelli small, usually arranged in a simple row along the lateral margins of the head, sometimes absent.

The several European species of this genus have been referred by authors to a great number of different genera, of which I have indicated only a part. The first three names cited in the synonymy were all given to the same species (*L. marinus* = *L. longissimus*) of Europe and are, therefore, exact equivalents. The two later names should, therefore, have been dropped entirely from the nomenclature of the group. Unfortunately several different writers have tried to restrict both *Borlasia* and *Nemertes* to groups entirely different from that to which they were originally given, and have thus introduced great confusion. Each attempt of this kind has, hitherto, been a failure for in most instances the new groups thus named have been found to have had other and earlier names. One of the latest reapplications of *Nemertes* to a newly constituted group was by McIntosh (Nemerteans, p. 176). He applied it to a genus of *Enopla*, in a wholly new sense. *Nemertes* of McIntosh, 1879, is, however, antedated by *Nemertes* of White, 1860, applied to a Crustacean, and therefore it could not be retained, even if the nemertean genus, so named, had not already received other names.

The use of *Borlasia* by McIntosh, in a wholly new sense, seems also to be untenable.

Lineus viridis (Fabr.) Johnston.

Planaria viridis O. Fabricius in O. F. Müller, Zool. Dan. Prod., 2684, 1776; O. Fabricius, Fauna Grœnlandica, p. 324, 1780; Müller, Zoölogia Danica, ii, p. 35, pl. 68, figs. 1 to 4, (from Greenland specimens sent by Fabricius to Müller).

Planaria Gesserensis Müller, Zoöl. Danica, ii, p. 32, pl. 64, figs. 5 to 8, 1788.

Nemertes olivacea Johnston, Mag. of Zoöl. and Botany, vol. i, p. 536, pl. 18, fig. 1, 1837; Diesing, Syst. Helm., i, p. 273, 1850.

Nemertes obscura Desor, Boston Journal of Natural History, vol. vi, pp. 1 to 12, plates 1 and 2, 1848 (embryology).

Polia obscura Girard in Stimpson's Marine Invertebrates of Grand Manan, p. 82, 1853 (no description).

Nemertes viridis Diesing, Sitzungsberichte der kais. Akad. der Wissenschaften, vol. xlv, p. 305, 1862.

Borlasia olivacea Johnston, Catalogue British Non-parasitical Worms, p. 21, pl. 2^b, fig. 1, 1865; McIntosh, Trans. Roy. Soc. Edinb, vol. xxv, pt. ii, p. 371, 1869.

Lineus viridis Johnston, Catal., pp. 27, 296, 1865.

Nemertes viridis Verrill, Marine Invert of Vineyard Sound, etc., p. 334 [628], 1873.

Lineus Gesserensis McIntosh, Hist. British Annelida, Part I, Nemerteans, (Ray Society) p. 185, pl. iv, fig. 2; pl. v, fig. 1, (red var.); pl. xviii to xxii, (anatomy); pl. xxiii, (green var., embryology), 1873.

Lineus viridis Verrill, Check List Marine Invert., p. 12, 1879; Notice of Recent Addit. to Mar. Invert., Part I, in Proc. National Mus., ii, p. 185, 1879.

PLATE XXXVII, FIGURES 5 to 5*b*; PLATE XXXVIII, FIGURES 6 to 6*d*; PLATE XXXIX, FIGURES 18, 22.

Body soft, very contractile and changeable; in full extension elongated and moderately slender, in large examples six to eight inches long and about one-fifth of an inch in diameter; usually thickest in advance of the middle, tapering gradually to the rather slender caudal portion, and decreasing less toward the head; not unfrequently the body is dilated in two or more places at the same time, the swollen parts moving continually; in extension the body is usually somewhat flattened, but the dorsal surface is decidedly convex and the sides well-rounded; it is often crossed by faint, light-colored, irregularly spaced wrinkles. In contraction the body becomes short and thick, oblong, swollen and almost saccular at times.

Head, in extension, rather large, depressed, usually wider than the neck, short, ovate-spatulate, or elongated, according to the degree of extension; the snout is blunt, often emarginate, and bears three small ciliated papillæ; proboscis-pore terminal, rounded, or in the shape of a short vertical slit; lateral fossæ long and very deep, with wide, thin, pale margins, above and below, the anterior ends of the slits reaching close to the proboscis-pore.

The ocelli are arranged in a simple row on each side of the head, close to the edge of the dorsal pigmented region; they vary in number and size according to the age, the large specimens often having six or eight on each side, while the small ones have but three or four, and the very young ones have only a single pair; usually the anterior ocelli are slightly larger than the others.

The mouth is situated opposite to, or a little behind, the posterior ends of the lateral fossæ; it is ordinarily small and elliptical, with a distinct, lighter colored border, but it is capable of great dilation

when the creature is engaged in swallowing some annelid nearly or quite as large as itself.

The color, in life, is variable; the most common variety is dull green, or olive green, varying to dark smoky green or greenish black, darkest anteriorly, and with the under surface and caudal portion somewhat paler; region of the cephalic ganglions and lateral pits usually reddish; front and margins of head pale or whitish; on many specimens faint pale transverse lines or rings can be seen, if carefully examined; at times a row of small whitish spots, corresponding to the genital pores, can be seen on each side. Other specimens occur, often living with green ones, in which the general color of the body is brown, greenish brown, reddish brown, or clear red with the margins of the head and lower surfaces flesh-color or reddish.

Some of these forms differ so much in appearance from the common dark green variety that it would be convenient to distinguish them by variety names, using, in this sense, some of the numerous names applied by the early writers when they were supposed to be distinct species, viz :

Var. *olivaceus* (Johnston). The typical green and olive-colored variety.

Var. *fuscus*. The brown and reddish brown variety.

Var. *rufus* (Rathke). The distinctly red variety.

Var. *obscurus* (Desor). The smoky green and blackish variety.

Specimens intermediate in color between all these are, however, of frequent occurrence.

The length, in extension, is sometimes 150^{mm} to 200^{mm}; the diameter 2^{mm} to 4^{mm}; in contraction the body becomes much shorter and stouter, large specimens often being only 30^{mm} or 40^{mm} long and 4^{mm} to 6^{mm} broad.

In alcoholic specimens the body is usually thickened and rounded anteriorly, more slender and somewhat flattened farther back, often acute at the posterior end; head obtusely rounded or sub-truncate, with a small terminal proboscis-pore and two lateral slits, which are short and extend forward very near to the proboscis-pore. Mouth small and round, situated slightly behind the posterior ends of the lateral slits; ocelli not apparent. When placed in alcohol the body usually contracts so violently that it breaks up into segments, especially posteriorly, and the proboscis is often completely ejected.

The extruded proboscis is long, slender toward the base, clavate toward the end, the terminal portion transversely wrinkled.

This common littoral and shallow water species is found on the American coast from Long Island Sound to Labrador, Cumberland Gulf, and Greenland. It is also common on the coasts of Great Britain as far south as the Channel Islands (McIntosh), and on all the northern coasts of Europe.

South of Cape Cod, I have collected it near New Haven, Conn., and at the Thimble Islands; Noank, Conn.; Newport, R. I.; Wood's Holl, Mass.; and at various other localities. North of Cape Cod it is more abundant and larger. Among the localities where I have taken it are Provincetown and Barnstable, Mass.; Salem and Gloucester, Mass.; Casco Bay; Mount Desert Island; Eastport, Me.; Grand Menan Island; Halifax, N. S.; Gulf of St. Lawrence, etc.

It is particularly abúndant and large at Eastport, Me., and at all localities about the Bay of Fundy, where the shore is composed of rocks.

This species is active and restless in confinement. It creeps rather rapidly and is prone to climb out of the water and perish by drying up. It is a voracious feeder and lives largely upon annelids. I have observed it in the act of swallowing a full grown scaly annelid, (*Lepidonotus squamatus*), which was considerably greater in diameter than the thickest part of its own body. A specimen of this kind, with the *Lepidonotus* half swallowed, is preserved in the museum of Yale University.

The eggs are deposited in great abundance on our shores under stones near low-water mark, in midsummer. They are contained in more or less cylindrical masses of a translucent, dull greenish, jelly-like substance, made up of numerous capsules, (Plate XXXVIII, fig. 6*c*). These cylinders are usually from 3^{mm} to 5^{mm} in diameter, and 40^{mm} to 50^{mm} in length, and are usually coiled in a spiral or ring-like form. The eggs are in several rows. In those clusters taken at one date, in July, at Eastport, Me., I have found eggs in all stages of development, while in some of them the recently hatched young were still present. (Pl. XXXVIII, fig. 6*d*).

I have adopted the name, *viridis*, given to this species by Otho Fabricius, who communicated the first published descriptions and figures to Müller, as stated both by him and by Müller. That this is the species observed on the shores of Greenland and described by Fabricius there can be no reasonable doubt. His brief description is quite as correct and characteristic as the descriptions of such animals were wont to be at that time, and his figures, published by Müller in the Zoölogia Danica, represent the worm fairly well when

partially contracted; nor could they be referred to any other Greenland species.

The lateral slits of the head of this species are spoken of on p. 325 of the Fauna Grœnlandica, and are also distinctly shown in the figures. Fabricius speaks of his *viridis* as common on the shores of Greenland among the roots of algæ. I have personally examined good specimens of this species recently taken on the coast of Greenland in the same situations. There can be no doubt of their identity with the true *viridis*. Therefore there is not the slightest reason why his characteristic name should not be used, in preference to *Gesserensis*,* of much later date.

Although the latter name has been adopted by many recent writers on European nemerteans, the ordinary rules of priority, as well as justice to the very meritorious author of the Fauna Grœnlandica, should compel a change in this respect.

Fabricius and Müller, in the same works, described another Greenland form under the name of *rubra*. I am of the opinion that this was simply the red variety of *L. viridis*, for the two varieties occur together everywhere on the northern coast of America. Levinsen, however, has referred the *rubra* to *L. sanguineus*, and has given the latter as a Greenland species. If both species actually inhabit Greenland his view may be correct, for there is nothing in the original description to indicate that it belongs to one rather than to the other of these two species, if it really belonged to either.†

Indeed these two reputed species are so much alike that I am myself in doubt whether they are really distinct. There is no special diagnostic character given by McIntosh unless it be the somewhat narrower head in *L. sanguineus*. The shape of the head in this genus is so changeable and variable that, in practice, little reliance can be placed upon this as a diagnostic character. The ocelli are supposed to differ slightly in size and number, but they also vary in both forms. Hence it seems to me not improbable that a more extended study of the variations will compel us to consider *L. sanguineus* only a lighter red variety of *L. viridis*. In this article I have, however, followed most European writers in keeping them separate, although I confess that with scores of living specimens of both

* Levinsen, in his recent paper on the Turbellaria of Greenland, also records the typical form, under the name of *L. Gesserensis*, as a native of that coast.

† Fabricius mentions neither ocelli nor cephalic slits in this species. Therefore it may not have been a *Lineus*. The necessary doubt concerning its true relations should prevent the application of the name to any species.

forms before me, I have always found it difficult to draw any clear line of separation between them.

Lineus sanguineus (Jens Rathke).

Planaria sanguinea Jens Rathke, Skrivter af Naturhist. Selsk., vol. v, i, p. 83, 1799.
Planaria octoculata Johnston, Zoöl. Jour., vol. iv, p. 56, 1829.
Nemertes (*Borlasia*) *octoculata* Johnston, Mag. Zoöl. and Bot., vol. i, p. 537, pl. 18, fig. 2, 1837; Œrsted, Kroyer's Naturhist. Tidss., iv, p. 579, in note, 1837.
Nemertes sanguinea Œrsted, Entw. Plattw., p. 92, 1844.
Borlasia octoculata Johnston, Catalogue Brit. Mus., pp. 21, 287, 290, pl. II*b*, fig. 2, 2*, 1855.
Lineus sanguineus McIntosh, British Annelids, part I, Nemerteans, p. 188, pl. v, fig. 2, 1873.

PLATE XXXVIII, FIGURES 10, 10*a*.

Body strongly convex or well rounded above, flatish beneath, rather long, in extension often 8 to 10 inches long and .25 inch broad, but it is capable of contracting to less than one-fourth this length, and then becomes about .35 of an inch in diameter. Head elongated, usually not so wide as the body, often acute in front when extended, but it changes much in form and may become much shorter and obtuse in contraction; lateral cephalic slits, moderately long and deep, bordered by narrow pale lips, above and below. Ocelli small, but very distinct, blackish, usually 4 to 8 in a row on each side, arranged at the upper margin of the white lateral borders of the head. Mouth rather large, usually round or oval, with corrugated white lips, but capable of great extension when swallowing large prey.

Color of body, above, dark red, bright red, or clear reddish brown, usually darker medially; beneath, pale salmon, flesh-color, or light yellowish red; snout and margins of head whitish; the red color of the middle of the head slightly emarginate or notched at its anterior end.

Eastport, Me., at Dog Island, low-water, under stones, 1868, (No. 2). Also taken at various other localities at Eastport and Grand Menan, between tides, in 1870 and 1872, common.

Under *L. viridis*, on a previous page, I have spoken of the close relationship of the red variety of that species to *L. sanguineus*, and have given reasons for doubting the status of this as a distinct species—at least as they occur on our northern coasts. It may be possible that we do not have the real European *L. sanguineus*, but we have an abundance of specimens that agree in all respects, so far

as I can see, with the descriptions and figures given by McIntosh and others.

The character upon which McIntosh puts the most stress is the greater narrowness of the head, said to be chiefly due to the narrower lips of the cephalic slits in the present species, as compared with *L. viridis* (*Gesserensis*). But as the length and breadth of the head and of the margins of the slits are constantly changing during the motions of the living worms, it is not easy to make sure of such differences. The lighter and brighter red color of the body, and the greater distinctness of the ocelli in *L. sanguineus* are also supposed to be characteristic.

It is found chiefly under stones from half-tide to low-water mark, and at moderate depths (1 to 25 fathoms) on stony and muddy bottoms. Many specimens are often found living gregariously, curled up together, under one stone.

Lineus socialis (Leidy) Verrill.

Nemertes socialis Leidy, Marine Invert. Fauna of Point Judith, R. I., and New Jersey, p. 11 [143], 1855; Verrill, Invert., Vineyard Sd., etc., p. 334 [628].

Lineus communis Van Beneden (?); Verrill, Notice of Recent Addit. to Mar. Invert., Part I, in Proc. National Mus., ii, p. 185, 1879.

PLATE XXXVII, FIGURES 8, 8*a*; PLATE XXXVIII, FIGURES 7, 7*a*.

Body very long and slender, subterete, attenuated posteriorly, in full extension almost linear, up to 8 to 10 inches long, with the diameter about .04 inch. Head very long, flattened, obtuse; lateral cephalic slits very much elongated. Mouth placed far back from the front of the head. Ocelli very small, often obscured by the dark color of the head, in large specimens four to six or more in a row on each side of the head, the front pair larger than the others and usually separated by a slightly greater interval; very young ones have only a single pair. Color, above, usually dark olive-green, greenish brown, greenish black, or smoky brown, and more rarely reddish brown, the anterior parts often darkest; indistinct, rather distant, pale transverse lines are often present, and occasionally there is a darker median dorsal stripe; front margin of the head paler and slightly translucent; lower surface of the body usually similar in color to the back but of a paler shade, most frequently dull green or greenish ash.

Length of large specimens, in extension, 250^{mm}, diameter 1^{mm} to 5^{mm}.

This is a strictly littoral species. It is common from New Jersey to the Bay of Fundy. It occurs abundantly and usually gregarious-

ly under stones, among living mussels, between the roots of grasses and algæ, etc., from near low-water mark nearly up to high-water mark of medium tides. I have collected it at Great Egg Harbor, N. J.; New Haven, Conn.; Noank, Conn.; Newport, R. I.; Wood's Holl, Mass.; in the harbors of Provincetown, Barnstable, Salem, and Gloucester, Mass.; Portland and Eastport, Me., etc.

This species is very gregarious, a large number usually living coiled up together in a tangled mass, from which, however, the individual worms can easily disengage themselves when disturbed. It occurs nearly up to high-water mark where other nemerteans are not found.

Superficially this species resembles, in color and general appearance, the young of *L. viridis* (dark green variety), but it is relatively much longer and more slender, and has a much longer and narrower head, with decidedly longer lateral slits, and the mouth is placed much farther back.

Lineus arenicola Verrill.

Tetrastemma (?) *arenicola* Verrill, Invertebrate Animals of Vineyard Sound, etc., p. 335, pl. xix, fig. 98, 1873.

PLATE XXXVIII, FIGURES 5, 5*a*.

Body subterete, long, slender, slightly depressed, of nearly uniform width ; the head is very versatile, usually sub-conical or lanceolate, flattened, occasionally becoming partially distinct from the body by a slight constriction at the neck. Ocelli four, those in the anterior pair nearer together. The lateral fossæ are long, and deep slits on the sides of the head. Mouth small, often sub-triangular, situated just back of the posterior ends of the lateral fossæ. Body deep flesh-color or pale purplish.

Length about 100^{mm}, in extension.

Savin Rock, near New Haven, Conn., in sand at low-water mark.

This species has not been taken except in the original locality. It appears to be very rare in our waters. Possibly it is a southern species that does not ordinarily live so far north.

Lineus pallidus Verrill.

Lineus pallidus Verrill, Notice of Recent Addit. to Mar. Invert., Part I, in Proc. National Mus., ii, p. 186, 1879.

PLATE XXXVII, FIGURES 9, 9*a*.

Body long and very slender in extension, subterete, attenuated posteriorly. Head elongated, usually obtuse and wider than the

body, but very changeable. Ocelli absent. Lateral (cephalic) fossæ long and deep. Mouth situated far back from the anterior end. Color usually whitish or pale ocher-yellow, usually becoming reddish toward the head, and with a rather indistinct pale dorsal line; anteriorly there are usually two pale dorsal spots in front of which the head is yellowish.

Length, in extension, 100^{mm}; breadth 0·5 to 0·75^{mm}.

Off Cape Ann, Mass., 45 fathoms, mud, 1878.

Lineus dubius Verrill.

Lineus dubius Verrill, Notice of Recent Addit. to Mar. Invert., Part I, in Proc. National Mus., ii, p, 186, 1879.

PLATE XXXVII, FIGURES 4, 4*a*.

Body very slender in extension, and attenuated posteriorly. Head elongated, narrow, usually pointed; lateral slits of moderate length; ocelli *white*, inconspicuons, forming a lateral row of about twelve, extending back on each side of the head beyond the posterior ends of the lateral fossæ, usually the four anterior ones on each side are separated by a little space from those that follow, but all are nearly in a simple row. Color, above, light green to dark olive-green.

Length of the largest specimens observed, 50 to 75^{mm}.

Gloucester, Mass., under stones, between tides, 1878.

Lineus bicolor Verrill, sp. nov.

PLATE XXXVII, FIGURES 8, 8*a*, 8*b*.

Body rather small, in extension elongated, thickest and somewhat depressed in the middle, tapering to both ends, and decidedly attenuated posteriorly; sides rounded. Head elongated, flattened, rather wider than the neck, in usual extension. Lateral olfactory slits long and deep, with thin margins. Mouth usually elliptical, situated behind the ends of the olfactory slits. The ocelli are arranged in a simple row of about 4 to 7 on each side of the head, the front pair largest. Color, above, along each side of back a broad stripe of olive-green, yellowish green, or brownish green, separated by a median dorsal, well defined, broad stripe of pale yellow or yellowish white, usually becoming clear white on the head, where it expands and blends with a white frontal area in advance of the eyes; the margins of head are also white. Lower surface pale greenish or yellowish white.

Length in extension, 35 to 45^{mm}; diameter, 1 to 1.5^{mm}. Described from life.

Long Island Sound to Vineyard Sound, in 2 to 24 fathoms; Bartlett's Reef, 22 fathoms, 1874. Usually taken on shelly or stony bottoms among algæ, ascidians, and hydroids; common, especially in Vineyard Sound. The specimen figured was taken at Wood's Holl, July 14, 1875.

DOUBTFUL SPECIES.

Lineus truncatus (Hubr.) Verrill.

Cerebratulus truncatus Hubrecht, Voyage of the Challenger, vol. xix, pp. 37, 50, pl. 1, figs. 11, 12, 1887.

This species was described from imperfect alcoholic specimens, so that its external form and color in life are entirely unknown.

In the contracted specimens the head is short, flattened, truncated in front; the cephalic slits are short and run forward close to, but do not join, the proboscis-pore; the mouth is small, rounded, and only a short distance back from the front.

Off Nova Scotia in 75 and 85 fathoms; also off Bermuda. (Challenger Exp.)

The small mouth, rounded body, and general appearances of the specimens, as figured, indicate that it belongs to *Lineus* or *Micrura*, and not to *Cerebratulus*, as here defined. There is nothing in the description to distinguish it from *Lineus viridis*, which often contracts into the same form.

Micrura Ehrenberg, 1830.

Micrura (*pars*) McIntosh, Nemerteans, p. 196.
Cerebratulus (*pars*) Hubrecht.

Body, head, and proboscis nearly as in *Lineus;* body elongated, terete or somewhat flattened; the posterior regions usually not much flattened, nor very different in form from the region of the proboscis. Cephalopori or olfactory slits well defined. Ocelli sometimes present, but often wanting. Posterior end of the body provided with a median slender cirrus, above the anus.

This genus, as here defined, differs from *Lineus* in little else than the presence of a well marked contractile anal cirrus, which may often be distinguished even in alcoholic specimens. From *Cerebratulus*, which also has the anal cirrus, it differs in the form and muscular structure of the body posteriorly, which is not very flat and thin, nor adapted for swimming, as in the latter.

Some of the flat species included in this genus by McIntosh, I should, therefore, transfer to *Cerebratulus*, especially his *M. fusca* (*non* Fabr. sp.)

Hubrecht has united *Micrura* and *Cerebratulus* without regard to the form of the body and the muscular structure of the body-walls, which seem to me important characters, involving wide differences in habits.

The species of *Micrura* are fossorial in their habits and do not swim at the surface, so far as I have observed, and, indeed, the form and structure of the body are not adapted for swimming.

Some of the species of *Micrura*, if not all, have a Pilidium-stage in development. The embryology of many of the species has, however, not been traced. Nor have any of the several species of Pilidium-larvæ found on our coast been reared till the adult characters could be determined. On Plate XXXIX, I have figured two distinct kinds of these larvæ that are common at Wood's Holl, Mass., in summer. One or both probably belong to some of our species of *Micrura*, but as the larval form of *Cerebratulus* is unknown, one of them may belong to that common genus. The young nemertean seen in the interior of one species (fig. 5, *w*), has already two distinct ocelli, which would indicate that it belongs to a species like *M. affinis*, which has ocelli when adult.

Micrura affinis Verrill.

Poseidon affinis Girard in Stimp., Marine Invert. of Grand Manan, p. 28, 1853.

Nemertes affinis Verrill, Amer. Journ. Sci., vol. vii, pp. 39, 412, 1874; Proc. Am. Assoc., for 1873, pp. 351, 363.

Micrura affinis Verrill, Proc. U. S. Nat. Mus., vol. ii, p. 186, 1879; Check List, Invert., p. 12, 1879.

PLATE XXXVI, FIGURE 1; PLATE XXXVII, FIGURES 6, 6*a*.

Body elongated in extension, somewhat depressed, but with rounded sides, of nearly uniform breadth through most of the length, but somewhat tapered posteriorly, and terminated by a slender, pointed, pale anal papilla or cirrus, about one-half as long as the diameter of the body. Head scarcely wider than the neck, elongated, flattened, usually obtusely rounded anteriorly, but changeable. Lateral olfactory slits long and deep, with thin white margins in front, uniting with the proboscis-pore. Mouth of moderate size situated opposite the ends of the slits. Ocelli rather large, black, conspicuous, variable in number, forming a single row, usually of four to six on each side at the edges of the white marginal areas; the front ocelli are

usually distinctly larger than the others. Color, above, usually clear bright red, varying to dark red and reddish brown, rarely to greenish brown; often crossed by indistinct, transverse, pale lines, as in *Lineus viridis*; front and margins of head white; under surface light flesh-color or pinkish, often showing by translucency the intestinal cæca or pouches along the sides in the form of transverse gray blotches.

Length up to 125 to 150^{mm}; diameter, 2 to 4^{mm}. Described from life.

Very common from off Cape Cod and Massachusetts Bay to Nova Scotia, in 8 to 150 fathoms or more, on shelly and stony bottoms. It is particularly common in the Bay of Fundy, the harbor of Eastport, Me., and the other cold waters of that region, where it is also often found at low-water mark under stones. It has also been frequently dredged in 12 to 50 fathoms south of Cape Cod, and off Nantucket and Martha's Vineyard, in the cold area.

This species, in some of its red and brown varieties, closely resembles the red and brown varieties of *Lineus viridis*, from which it cannot be distinguished when living without a careful examination. The presence of the caudal cirrus is easily diagnostic, when the specimen is perfect, but when mutilated, as often happens, the difficulty is much increased. The ocelli in this species are usually larger and more distinct than in *Lineus viridis*.

Micrura dorsalis Verrill, sp. nov.

PLATE XXXVIII, FIGURES 4, 4*a*.

Body depressed, rather large and thick, length up to 6 inches in ordinary extension; in contraction it becomes short and thick, and may even contract itself into a ball; the margins are well rounded and the body tapers toward both ends. The anterior region of the body for about a sixth to a tenth of the whole length, often becomes in partial contraction rounded and narrower than the rest of the body. Head obtusely pointed or bluntly rounded in front, not distinct from the body and of the same breadth. Cephalopori moderately long, somewhat oblique longitudinal slits on the sides of the head, extending nearly to the proboscis-pore. Ocelli, none. Mouth small, rounded, nearly opposite the hind end of the cephalopori.

Color pale ocher-yellow with an orange tinge anteriorly, with a darker medial stripe above and below, and having pale mottlings indistinctly showing through on each side due to the internal organs.

Length 160^{mm}; diameter 5^{mm}. Described from life.

The type-specimen, described above, as now preserved in alcohol, has a stout body, thickest anteriorly, tapering to the hind end, which terminates in a small, whitish caudal papilla. The sides are everywhere rounded. Head short, thick, subconical, blunt, not distinct from the body; proboscis-pore terminal, in the form of a short vertical slit; lateral cephalic slits moderately long, joining the proboscis-pore in front, so as to divide the tip of the snout into four parts. Mouth small, rounded, opposite the posterior ends of the cephalic slits.

Length in alcohol, 64^{mm}; diameter 3^{mm}; length of cephalic slits 3^{mm}.

Eastport, Me., at Clark's Ledge, extreme low-water mark, under stones, 1870.

Micrura rubra Verrill, sp. nov.

PLATE XXXVIII, FIGURES 3, 3*a*, 9, 9*a*.

Body moderately large, subterete and elongated in extension, up to 3 inches long, rather more slender posteriorly. Head obtuse or rounded in front; proboscis-pore a vertical terminal slit; cephalic slits or cephalopori long and deep, in front joining the proboscis-pore so as to divide the tip of the snout into four small lobes; the slits extend back as far as, or beyond, the mouth, which is ordinarily a small elliptical opening. No ocelli.

Color, above, light orange red to bright red, indistinctly mottled along the sides with brownish red, due to internal organs.

Length 62 to 75^{mm} in extension; diameter 2·5^{mm}. Described from life. (No. 722).

In alcohol the specimens above described are much contracted, thick and short, stoutest anteriorly, tapered, but scarcely flattened posteriorly. Ovaries filled with eggs commence some distance back of the head. Cephalic slits moderately long and deep, joining the proboscis-pore in front. Prosboscis, as ejected, coiled in a spiral, moderately long and rather thick, tapering to both ends.

Off Casco Bay, July 16, 1873.

A curious specimen (Plate XXXVIII, fig. 3, 3*a*), probably of this species, was taken in the Bay of Fundy. It had, apparently, been broken and was in the act of reproducing the hinder part of the body.

Body round, cylindrical in extension, very changeable in shape; posterior end abruptly narrowed into a small, round caudal portion terminating in a small papilla. Head obtusely rounded or obliquely

conical with an oblique lateral cephalic slit on each side; mouth small, opposite the posterior ends of the slits. No ocelli.

Color nearly uniform deep flesh-color. The salmon-colored ovaries show through slightly, especially posteriorly, as transverse spots.

Length about 25^{mm}; diameter 2·5^{mm}.

Bay of Fundy, off Head Harbor, Campo Bello Island, 40 fathoms, mud, Aug. 27, 1870. (Catal. No. 117).

Micrura albida Verrill.

Micrura albida Verrill, Notice of Recent Addit. to Mar. Invert., Part I. in Proc. National Mus., ii, p. 186, 1879.

Body slender, thickest and nearly round anteriorly, gradually tapered and somewhat flattened posteriorly, with a small, slender caudal papilla. Head flattened, narrow, obtuse, narrower than the body. No ocelli. Lateral fossæ rather short, extending beyond the mouth, not conspicuous. Color whitish, or pale yellowish, often becoming light red toward the head; posteriorly often with grayish or clay-colored internal mottlings along the sides, due to the reproductive organs. Very sluggish in its motions.

Two specimens from 140 fathoms, off Cape Ann, apparently of the same species, were milk white above, with fine specks of opaque white, the ganglions showing as red spots; they had a narrow but distinct ring of blue around the body, behind the head.

Length, 50 to 125^{mm}; diameter 2·5 to 3^{mm}.

Common in the Gulf of Maine and Massachusetts Bay, on muddy bottoms, in from 30 to 140 fathoms.

It is sluggish in its movements and constructs translucent tubes of tough mucus.

Micrura inornata Verrill.

Micrura inornata Verrill, Notice of Recent Addit. to Mar. Invert., Part I, in Proc. National Mus., ii, p. 186, 1879.

PLATE XXXVII, FIGURE 7.

Body subterete, moderately elongated, thickest anteriorly or in the middle, gradually tapered to the somewhat flattened tail; caudal filament white, very slender and acute, sometimes as long as the diameter of the body, but usually less. Head obtuse, often as wide as the body or wider, somewhat flattened. Lateral fossæ long, deep, curved, extending to opposite the mouth, the latter not being very far back. No ocelli. Color above, bright cherry-red, varying to dark red, the middle of the head brightest; tail pale.

Length of largest specimens observed, about 75^{mm}; breadth, 1·5 to 2^{mm} in extension. Described from life.

Massachusetts Bay and Gulf of Maine, 45 to 110 fathoms, mud.

Resembles the young of *Cerebratulus luridus V.*, which occurs with it.

Cerebratulus Renier, 1804.

. *Meckelia* Leuckart, Breves Anim., p. 17, 1828 (t. Rathke); Diesing, Syst. Helm. vol. i, p. 266, 1850.

Serpentaria Goodsir, Ann. Nat. Hist., vol. xvi, p. 377, 1835.

Cerebratulus (*pars*) and *Meckelia* Stimpson, Prodromus, p. 160, 1857.

Cerebratulus McIntosh, British Annelids, Part I, Nemerteans, p. 194, 1873.

Cerebratulus (*pars*) Hubrecht, Voy. Challenger, vol. xix, p. 37, 1887; Carus, Fauna Medit., p. 160.

Body large, elongated, much flattened along the middle and posterior portions and adapted for swimming by having the margins produced and thin, mainly owing to the unusual development of the longitudinal muscular layers, which are greatly thickened, especially the outer layer, which, as seen in transverse sections, forms a more or less triangular band, much thicker than elsewhere, (Plate XXXIX, fig. 19, *l*). Transverse muscular bundles running from the upper to the lower sides of the inner surface of the body-wall (fig. 19, *t'*) are also unusually well developed so as to aid in giving an undulatory motion to the margin while swimming.

Anterior or œsophageal region large, with rounded margins (fig. 20). Cæcal appendages of intestine numerous and crowded, elongated, more or less forked and lobed at the outer ends, the divisions occurring partly horizontally, and showing well in sagittal sections.

Head versatile in form, usually without ocelli. Cephalic lateral slits or olfactory organs are large and deep. Mouth unusually large, oblong or oval, rather far back. Proboscis very long and slender; in section showing decussated muscular layers medially, above and below.

Anal papilla or cirrus often long and slender, delicate, contractile, often wanting owing to injury. It contains a continuation of the muscular layers of the body-wall.

Hubrecht has united *Micrura* to this genus, and in his report on the Nemerteans of the Challenger Exp. he proposes also to unite *Lineus* with it.

Such a wholesale massing together of these groups seems to me unnecessary and undesirable, and is, apparently, only thought of because of the difficulty of distinguishing the generic position of alco-

holic specimens—a difficulty that holds with quite as much force in many other groups of animals, which lose many of their characters by preservation in any known medium.

However, it seems to me that some of the large species referred to *Micrura* by authors really belong to *Cerebratulus*, especially those like *M. fusca* McIntosh (*non* Fabr. sp.)

The differences noted by McIntosh in the muscular layers of the proboscis appears to me of less importance than the special muscular structure of the body-wall which enables the species of *Cerebratulus* to swim actively at the surface, while the more slender and rounded species belonging to *Micrura* (restr.) and *Lineus*, so far as I have observed, are unable to swim, and do not voluntarily leave the bottom.

The broad, flattened form of the body with thin margins is the external expression of the internal musculature, adapting it to the undulatory swimming motion.

Cerebratulus lacteus (Leidy) Verrill.

Meckelia fragilis Girard, Nord Amer. Monatsb., 1851 (*non* Goodsir, sp.)

Meckelia lactea Leidy, Proceedings Academy Natural Sciences of Philadelphia, vol. v, p. 243, 1851, (young); Verrill, Invertebrate Animals of Vineyard Sound, p. 336 [630], 1873, (young), *non C. lacteus* Hubrecht, Mont. sp.=*Lineus lacteus* McIntosh.

?*Meckelia Lizziæ* Girard, Proc. Acad. Nat. Sci. Philad., vol. vi, p. 366, 1854.

Meckelia ingens Leidy, Marine Invertebrate Fauna of Rhode Island and New Jersey, p. 11 (143), 1855; Verrill, Invertebrate Animals of Vineyard Sound, p. 336 [630], Plate XIX, figures 96, 96a.

PLATE XXXV, FIGURES 1, 1*a*; PLATE XXXVI, FIGURE 2; PLATE XXXVII, FIGURES 1, 1*a*, 1*b*; PLATE XXXIX, FIGURES 19, 20, 21.

Body flat, large and very long when full grown, sometimes becoming fifteen to twenty feet long and upwards of an inch in breadth, very contractile and changeable in length, breadth, and form. While swimming the body is turned up edgewise and thrown into many undulations and the motion resembles that of an eel, but is less rapid. The anterior part of the body for some distance back of the head is, in usual extension, narrower and thicker than the rest, with the margins rounded; the body then expands rather rapidly in breadth and at the same time becomes more flattened while the margins become thin and pale, and throughout the rest of its length the body continues thin and flat, gradually decreasing in breadth and thickness toward the posterior end, which is usually obtuse, or slightly emarginate, but occasionally, or when perfect, terminates in

a slender anal papilla. The posterior end is, however, seldom seen entire, owing to its extreme fragility and its tendency to disrupt itself when irritated. When disturbed the middle region of the body often contracts, while the anterior becomes thick and swollen.

The increase in breadth of the body and enlargement of the marginal regions marks the commencement of the crowded lateral lobes of the stomach and the genital organs, which can usually be seen through the translucent integuments ; the cæcal lobes of the intestine usually appear as closely arranged, transverse, oblong spots, forming a regular row along each side, from their commencement nearly to the posterior end of the body, and usually having a slightly darker or more brownish tint than the central and marginal regions. The cæcal appendages, when seen from above or below, usually appear as simple, narrow, but often forked, and closely arranged lobes, but when examined in sagittal sections they are mostly lobed and forked horizontally. The genital organs are closely crowded between the cæcal pouches of the stomach, distally.

The head is exceedingly changeable in shape, according to its state of contraction or expansion, but is usually narrower and thinner than the adjacent part of the body. In full extension it is usually broad spear-shaped or rhomboidal, and more or less pointed at the apex, while marked lateral constrictions separate it posteriorly from the body, but in another moment it may contract to a broad rounded form, or it may even become deeply emarginate in front, with rounded lateral lobes, or it may change to a very narrow and elongated form with a sharp point. Ocelli are wanting.

The lateral cephalic slits are large and deep, extending the entire length of the head, and running forward close to and a little above the proboscis-pore, those of opposite sides not uniting together except by a very shallow furrow ; they do not join the proboscis-pore, so that the snout is not four-lobed at tip, as in some allied species. Their margins are thin and mobile, often undulated or curled back so as to open the slits widely and expose the deep posterior pits, which, in life, are dull red within. Proboscis-pore large, terminal or subterminal.

Mouth very large, but variable in form as the head varies in shape, most frequently appearing as a long, narrow oval or oblong slit, its anterior end opposite the posterior ends of the lateral slits.

Proboscis exceedingly long, slender, round, whitish, and nearly smooth. When the worm is placed in alcohol or other irritating fluid the proboscis is usually ejected entirely without eversion (Pl.

xxxv, fig. 1*a*); in large specimens it is four feet or more long, and 3 or 4^{mm} in diameter at the large end.

Color of small and moderate-sized specimens is translucent milk-white, cream-color, pale flesh-color, and occasionally pale salmon or pale pink, with the margins paler and more translucent ; larger individuals are generally deeper flesh-color, cream-color, light salmon or ocher-yellow, and occasionally dull gray ; the cæcal appendages of the intestine and the reproductive organs appear as a more opaque yellowish or pale brownish band along each side, near the pale margins ; the lateral nerve-trunks are reddish.

Length of ordinary adult specimens, in extension, 500 to 1200^{mm}; breadth in middle 15 to 22^{mm}; some specimens are more than double these sizes.

Common, burrowing both in sand and mud at and above low-water mark, and in shallow water down to several fathoms in depth, from Florida to Massachusetts Bay, and locally found on the coast of Maine.

It is particularly abundant near low-water mark on the sheltered sandy shores of the New Jersey estuaries ; Long Island Sound ; Buzzard's Bay ; Vineyard Sound ; Cape Cod ; and at Annisquam, Mass., north of Cape Ann. I have taken a number of well grown examples at Quahog Bay, on the coast of Maine, where it is associated with a colony of other southern species. I have not found it in the Bay of Fundy, where it is replaced by a closely allied arctic species (*C. fuscus*). Its southern range is not well determined, but I have seen specimens from Fort Macon, North Carolina, and others from St. Augustine, Fla., and Charleston, S. C., (W. R. Coe).

The largest specimen hitherto obtained I personally dug from the sand at low-water mark at Great Egg Harbor, N. J., April, 1872. This one, when extended, was 22 feet long and nearly an inch in breadth, in the middle. It could contract, however, to less than 6 feet in length, becoming, at the same time, much broader, thicker, and firmer. This gigantic specimen is, apparently, the most bulky nemertean that has ever been described, though species of *Lineus* far exceed it in length.

When preserved in alcohol it contracts very firmly and shows very plainly the contrast between the form of the anterior and middle regions of the body, the latter being decidedly flat with thinner margins. The head takes various shapes.

In alcoholic specimens the mouth is usually large and open. Sometimes numerous small whitish papillæ, probably containing the

genital pores, can be seen a short distance from the margin, both above and below; sometimes there are several in each transverse row; at other times only two or three are visible.

In transverse sections the great thickening of the interior longitudinal muscular layer in the marginal areas is strongly marked. (Pl. XXXIX, figure 19.)

The earliest name of this species that can be retained is apparently *C. lacteus* (Leidy), which was given to the white specimens that I now regard as the young of this species. I have adopted this name for the species, notwithstanding that *Lineus lacteus* (Mont.) McIntosh is now referred to *Cerebratulus* by Hubrecht. That the latter belongs to *Cerebratulus*, as here defined, I do not think possible.

A large species (*C. Pocohontas*) from Charelston, S. C., very briefly described by Girard under the name of *Meckelia Pocohontas*,* appears to be very similar to our species in size (3 feet long), form, and color, but he states that the snout is split vertically [by the proboscis-pore], indicating that the cephalic slits join the proboscis-pore in front, so that the snout, as he states, is four-lobed at the tip, which is not the case in our species. *C. Lizziæ*, from the same place, described in few words, at the same time (op. cit. p. 367), agrees with our species in respect to the color, snout, and slits, and may be identical with it.

C. striolenta (*Leodes striolenta* Girard, loc. cit.) also from Charleston, appears to be a typical *Cerebratulus*, but it is a very distinctly marked species, having a pink body, longitudinally striped, and with dark longitudinal blotches on the head; margins pale; length six inches; no ocelli.

Cerebratulus Leidyi Verrill.

Meckelia rosea Leidy, Proc. Acad. Nat. Sci. Philad., vol. v, p. 244, 1851; Verrill, Invert. of Vineyard Sound, etc., pp. 336, [630] 1873.

? Renieria rubra Girard, Proc. Acad. Nat. Sci. Philad., vol. vi, p. 366, 1854.

Cerebratulus roseus Verrill, Check List Invert., p. 12, 1879, (*non C. roseus* (D. Ch.) Hubrecht).

PLATE XXXVIII, FIGURES 2, 2*a*.

Body elongated, rather slender in extension, rounded in the œsophageal region, decidedly flattened and wider farther back, but not so much so as in *C. lacteus* and allied species, nor do the margins become so broad and thin. Caudal papilla of moderate length, slender, white, often absent, owing to injury.

* Proc. Acad. Nat. Sciences, Philad., vol. vi, p. 366, 1854.

Head versatile, in extension decidedly long and narrow, often narrower than the body, regularly tapered to the acute tip.

Mouth large, elongated, with slightly crenulated white lips; its anterior end is about opposite the posterior ends of the lateral slits.

Lateral cephalic slits long and deep, with thin, translucent margins, often curved back so as to show the large interior cavity; in front they run very close to the proboscis-pore, which, in contraction, appears as a sub-terminal vertical slit. Proboscis very long and slender, pale pink in color. No ocelli. Cephalic ganglions large, showing through the integument as dark red spots.

Color of body dull red, or rose-color, or pale purplish, somewhat lighter beneath; usually with a lighter colored median line, and a red spot in the head corresponding to the ganglions; front of head and mouth area whitish; the closely arranged cæcal lobes of the intestine often show through the integument, especially beneath, as a pale brown band along each side. These cæcal appendages are numerous, and many of them are divided into two or three lobes distally.

Very common, burrowing in sand near low-water mark, from New Jersey to Cape Ann, Mass. It is abundant near New Haven, Conn.; Thimble Islands and Noank, Conn.; Newport, R. I.; and Wood's Holl, Mass.

This is a more strictly littoral species than the preceding. It seldom occurs much below low-water mark. The mucus that it secretes is more tenacious than that of most species, so that captive specimens often cover themselves quickly with adherent sand.

This species is generally found associated with *C. lacteus*, from which it can easily be distinguished by its decidedly red color, and its narrower and more slender body, without the very thin margins. It is also a more sluggish species and seldom swims freely. It is prone to break itself in fragments when captured.

It is unfortunate that the name *roseus*, which applies so well to this species, cannot be retained on account of the much earlier named Mediterranean species. I have, therefore, given it a new name in honor of Professor Leidy, who first described it.

It is quite probable, however, that *C. rubra* (=*Renieria rubra* Girard, op. cit., p. 366, 1854) is identical with this species. Girard's description is too brief and indefinite to determine this question. He describes *C. rubra* as uniform brick-red, paler beneath, and as lacking eyes; length 5 to 6 inches. Its form was nearly as in the present species. It was from Charleston, S. C., on sand-flats at Fort Johnson.

Cerebratulus fuscus (Fabr.) Verrill.

Planaria fusca Fabr., Fauna Grönlandica, p. 324, 1780.
Meckelia olivacea Rathke, Beitrage zur Fauna Norwegeus, p. 324, 1843 (from Acta Akad. Cæs. Leop. Carol. Nat. Cur., vol. xx, 1843).
Serpentaria fragilis Goodsir, Ann. Nat. Hist., vol. xv, p. 387, pl. 20, figs. 1 and 2, 1845.
Meckelia serpentaria Diesing, Systema Helm., vol. i, p. 266, 1850.
Gordius fragilis Dalyell, Pow. Creat., vol. ii, p. 55, pls. 6, 7, and 7 (*bis*), 1853.
Meckelia serpentaria Leuckart, Archiv. fur Naturges., ii, p. 187, 1859.
Serpentaria fragilis Johnston, Catalogue Brit. Mus., p 28, 1865.
Cerebratulus angulatus McIntosh, British Annelids, part i, Nemerteans, p. 195, 1873.
Cerebratulus (?) sp. undeter. (*a*) Verrill, Report on Invert. Anim. of Vineyard Sound, p. 336 [630], 1874.
Cerebratulus fragilis (?) Jensen, op. cit., p. 85, 1878.
Cerebratulus grandis (Sars) Jensen, op. cit., p. 97, pl. 8, figs. 17–22.
Cerebratulas fuscescens Levinsen, Bidrag til kundskab om Grönlands Turbellarie-fauna, p. 40 [202], 1879.

PLATE XXXVII, FIGURES 2 TO 2*c*.

Body large, stout, rounded for a considerable distance back of the head, and thence broad and much flattened to the posterior end, the edges thin and usually pale in color. Head very changeable in form, often broad lance-shaped, with acute snout, changing quickly to ovate, rounded, or even emarginate forms. Ocelli wanting. Mouth large, oblong. Cephalic slits large and deep, moderately long; they do not meet in front, nor run into the proboscis-pore, but lie in a higher plane. Anal cirrus slender, easily detached.

Color, above, dull ash-gray, greenish gray, slate-color, clay-color, grayish olive, or dirty brown, paler below, and with paler margins, within which, on each side, a red line, showing through the integument, marks the position of the large lateral nerves. Sometimes the back is mottled with lighter, and darker gray or slate; mouth surrounded by white, reddish at the anterior angle.

Length up to two feet or more. A specimen taken at Todd's Head, Eastport, Me., under stones at low-water, Aug. 19, 1870, measured 400^{mm} in length, when moderately extended; breadth, in middle, 12 to 14^{mm}, but it could contract to less than 100^{mm} in length.

This is a northern and arctic species. I have taken it at Halifax, N. S.; Grand Menan, N. B.; Eastport, Me., under stones and in sand and gravel near low water mark, and beyond in shallow water to 20 fathoms or more. South of Cape Cod it occurs in 15 to 45 fathoms on bottoms of sand and mud in the cold areas swept by the

arctic current, as off Gay Head, in 19 fathoms, and off Block Island, in 29 fathoms. It is also found on the coasts of Greenland, northern Europe, and Scotland.

This species usually lives in burrows under stones, in muddy or sandy places, at and below low-water mark, but when disturbed it swims readily and rapidly with vigorous eel-like undulations of the posterior flattened portion of its body, which is carried with the greater diameter vertical while swimming. In this habit it agrees with *C. lacteus* and several other large species, but it is, perhaps, more active and more vigorous than *C. lacteus*, and somewhat less liable to disrupt its body when captured. Like *C. lacteus* it is occasionally taken at night in surface nets, showing that it is nocturnal in its habits and voluntarily leaves its burrows and swims free at the surface.

After long preservation in alcohol the slate-color of the body and the white margins are often distinctly visible. In some alcoholic specimens the small and slender anal papilla is still preserved, but it is so fragile that it is generally lost during capture or in the violent contractions caused by the alcohol.

Our species is probably identical with the European species named *C. angulatus* by McIntosh, who supposed his species to be the *Planaria angulata* of Fabricius (Fauna Grönlandica). The latter is, however, our *Amphiporus angulatus*, as stated on a former page.

Formerly* I supposed that the Greenland species named *Planaria fusca* by Fabricius might be the brown variety of *Lineus viridis*, but a more careful study of his description, in which the absence of ocelli, the presence of lateral cephalic slits, the rounded form of the anterior, and the distinctly flattened form of the posterior part of the body are mentioned, has convinced me that the species he had in hand was the common dark-colored, large, northern *Cerebratulus*, which has received many later names. His statement that it lives in sand on the shores confirms this view. Moreover, this same *Cerebratulus* has been recently recorded from the Greenland coast and referred to the Fabrician species by Levinsen, as quoted above. He, however, adopts the later emended form of the name, quite unnecessarily it seems to me. Hence I have restored the original name, first given by Fabricius to this species.

* Proc. U. S. Nat. Mus., vol. ii, p. 185, 1879.

Cerebratulus luridus Verrill.

Meckelia lurida Verrill, Report on Invert. of Vineyard Sound, etc., p. 336 [630], 1873.

Cerebratulus luridus Verrill, Check List Invert., p. 12, 1879.

PLATE XXXVI, FIGURE 3; PLATE XXXVII, FIGURE 3.

Body large, rather stout, very changeable in form, broad, flat, thin posteriorly, where the lateral cæca and reproductive organs are developed; these diminish anteriorly and do not extend forward into the narrower, rounder, and thicker portion which occupies nearly one-fourth the whole length. Head very changeable, often separated from the body by a constriction; in expansion often spade-shaped, obtuse, or pointed. Lateral cephalic slits very long and deep; in front they are connected together by a shallow furrow, above the proboscis-pore. Mouth large, usually in the form of a long slot, commencing about opposite the posterior end of the lateral slits. Proboscis long and slender. Caudal papilla small, slender, acute.

Color reddish brown to dark olive-brown, chocolate-color, or purplish brown, darkest anteriorly, and with pale margins; the cæcal lobes of the intestine show through the integument as dull brownish or ocher-yellow transverse bars; usually there is a brown or reddish median dorsal line, and a pale ventral line. Some dark specimens are marked with several narrow lighter reddish or purplish longitudinal lines. Young specimens are usually reddish brown or liver-brown with paler snouts.

Length 150 to 250^{mm}; breadth 8 to 12^{mm}. Described from life, (No. 723).

Off Gay Head, 19 fathoms, soft mud, 1871; off Buzzard's Bay, 25 fathoms; and off Block Island, 29 fathoms, sandy mud, 1871; Casco Bay, 10 to 68 fathoms, 1873; Massachusetts Bay, in many localities, 1877, 1878, 1879, in 10 to 100 fathoms; Bay of Fundy; off Halifax, N. S., etc., common; off Martha's Vineyard, 192 fathoms, 1883. Numerous specimens of various sizes from 1 to 8 inches long were taken in Cape Cod Bay, in 15 to 21 fathoms, soft mud, Aug. 29, 1879. The larger ones were filled with eggs.

DOUBTFUL SPECIES.

Cerebratulus medullatus Hubrecht, Voyage of the Challenger, vol. xix, pp. 39, 50, pl. xi, fig. 10; pl. xii, figs. 9, 10, 1878.

PLATE XXXIX, FIGURE 17.

This species was described from a mere fragment, without head or tail. It is said, however, to differ from other species in the structure of the body-wall, which is thinner than usual.

The inner glandular layer of the integument and the inner basement membrane are wanting, as distinct layers, so that the outer glandular layer and its basement layer are in contact with the outer-longitudinal muscular layer. The median dorsal nerve, or nervous thickening, is also unusually large and distinct, being from one-third to one-fourth as thick as the core of the lateral nerve-trunks.

Off Nova Scotia, in 85 fathoms.

This species is probably not a *Cerebratulus*, as here defined, but more likely belongs to *Lineus* or *Micrura*, and perhaps to some of the species described above.

Suborder II, GYMNOCEPHALA.

Holocephala Diesing, 1850, *non* Müll., 1835.
Gymnocephalidæ Kefferstein, Zeitsch. für wiss. Zool., xii, 1862.
Anopla (*pars*) McIntosh, Nemerteans, p. 203.
Palæonemertini Hubrecht; Carus.
Palæonemertea Hubrecht, Voy. Challenger, xix, p. 5, 1887.
Palæomertina Lang, Text-Book of Comparative Anat., p. 178, 1891.

Head without lateral slits, but sometimes having shallow transverse or oblique fossæ connected with small, ciliated (olfactory) pouches or ducts leading to the posterior ganglions; sometimes destitute of both fossæ and ciliated ducts. Mouth distinct, situated back of the ganglions.

Proboscis long and slender, more simple in structure than in the Rhagadocephala. Usually only two (lateral) longitudinal blood vessels are present.

Ocelli often numerous, variously arranged, sometimes wanting.

Lateral nerve trunks sometimes situated between the basal layer of the cutis and the external circular muscular layer; sometimes outside of the longitudinal muscular layer; and sometimes in the midst of the muscular layer of the body-wall; usually connected with a continuous nervous plexus.

In the classification adopted by Hubrecht and several other writers this group and the Rhagadocephala (or *Schizonertina*) are both raised to the same rank as the *Enopla*. To me they appear to be of subordinate value, as here indicated.

The species are all marine, and, so far as known, none of them undergo a marked metamorphosis.

Family, Cephalothricidæ McIntosh, Nemerteans, p. 208.

Body slender. Head elongated. Superior ganglions and commissure situated decidedly in front of inferior ones. Cephalic fossæ and pits wanting. Ocelli usually few or absent; sometimes numerous. Two longitudinal blood vessels.

Cephalothrix Œrsted, Kroyer's Tidss., iv, p. 573, 1844.

Astemma Œrtsted, Kroyer's Tidss., iv, p. 574, 1844 (t. McIntosh).

Body slender, terete or nearly so. Head terete, much elongated, tapering to a point in extension. Mouth small, situated far back.

Cephalothrix linearis (Rathke) Œrsted.

Planaria linearis Jens Rathke, Skrivter af Naturhist. Selsk., vol. v, p. 84, tab. 3, fig. 11, 1799.

Planaria filiformis Johnston, Zool. Jour., vol. iv, p. 56, 1829 (t. McIntosh).

Nemertes (*Borlasia*) *rufifrons* Johnston, Mag. Zool. and Bot., vol. i, p. 538, pl. xviii, figs. 4 and 5, 1837 (t. McIntosh).

Cephalothrix linearis Œrsted, Entw. Plattw., p. 82 (note under *C. cæca*), 1844 (t. McIntosh).

Cephalothrix bioculata Œrsted, Kroyer's Nat. Tidss., vol. iv, p. 573, 1844 (t. McIntosh).

Astemma filiformis Johnston, Catalogue Brit. Mus., p. 19, 1865.

Cephalothrix filiformis McIntosh, Rept. Brit. Assoc., 1867, Trans. Sect., p. 92, 1867.

Cephalothrix linearis McIntosh, British Annelids, Part I, Nemerteans, p. 208, pl. iv, figs. 4 and 5; pl. xviii, fig. 15; pl. xxi, figs. 2, 8, 13; pl. xxiii, figs. 12 to 16, 1873.

Plate xxxvi, figures 4, 5; plate xxxix, figures 10 to 13, 14, 15.

Body small, nearly terete, changeable; in extension very slender, elongated, often linear or hair-like, frequently coiled in a close spiral form, usually rather thickest in the middle and tapered both ways, but often with the posterior end thicker and obtuse. Head very long and round, in full extension tapering to a slender sharp tip, in contraction often circularly wrinkled; usually, in mature specimens, without distinct ocelli; sometimes dark specks of pigment, irregularly arranged, resemble imperfect ocelli. Young examples usually

have a pair of distinct ocelli. No cephalic slits nor fossæ. Mouth small, situated far back from the snout; and usually with slightly prominent lips.

Color pale yellow, flesh-color, or cream-color, varying to pale salmon and greenish white, often with the anterior region deeper salmon or reddish, or with a median red line; sometimes the posterior part of body is bright salmon; the head and anterior portions of body often show a whitish or drab median line, due to the proboscis; lower surface paler than the upper. Proboscis very long and slender; when exerted, covered with slender acute papillæ.

Length 50 to 75^{mm}; diameter ·5 to 1^{mm}.

Long Island Sound to Nova Scotia, at many localities, between tides under stones and in sand. Noank, Conn.; Newport, R. I.; Wood's Holl, Mass.; Portland, Me.; Eastport, Me.; Halifax, N. S., etc. Also common on the northern coasts of Europe.

This species often occurs gregariously, many individuals being intricately coiled up together in a mass, often mingled with numerous pale young ones, of various sizes.

Family, Carinellidæ McIntosh.

Body elongated, roundish, decreasing backward. Head broader than body, obtuse anteriorly. Mouth small, not far back. Cephalic shallow fossæ and olfactory sacs present. Ocelli often wanting.

Carinina Hubrecht, Voy. Challenger, vol. xix, p. 5.

"Closely allied to *Carinella*, from which it differs in the presence of a distinct posterior brain lobe, situated with the rest of the brain and nerve-stems in the integument, outside of the body musculature. A ciliated canal penetrates into this posterior brain lobe."

Carinina grata Hubrecht, op. cit., pl. I, figs. 1–3; plates II, III, IV; pl. VI, figs. 1–3; pl. XI, figs. 1, 2.

This species is known only from two alcoholic specimens, which were very fully studied anatomically.

Off the East Coast of the U. S. States in 1240 and 1340 fathoms.

Order III, BDELLOMORPHA.

Body short, stout, flattened, and leech-like in appearance, with a large rounded sucker or acetabulum at the posterior end, as in the leeches. Head indistinct. No ocelli. Anterior end emarginate, with neither lateral slits nor grooves. Mouth at the bottom of the anterior emargination.

Proboscis seldom protruded in captivity, small, slender, unarmed, but with a small special bulb and sac in the middle region; proboscis-pore close to the mouth, in the anterior notch.

Intestine not lobulated, slender, convoluted, longer than the body; anus at the base of the sucker. Reproductive organs voluminous, filling the larger part of the body. A median dorsal and two lateral blood-vessels, with numerous branches.

Muscular walls of the body consist of an external circular, and an internal longitudinal layer. Lateral nerve-trunks are not included in the muscular layers; they are united by a posterior commissure.

This singular group is united to the Enopla by some writers, mainly on account of the rudimentary bulb and sac in the proboscis, which certainly indicate some relationship. The simple, convoluted intestine and other peculiar features appear to me of ordinal value.

Family, MALACOBDELLIDÆ Semper.

Characters not distinguishable from those of the sub-order.

Malacobdella Blainville.

Dict. Sci. Nat., vol. xlvi, p. 270; Blanchard, Ann. des sci. nat., ser. 3, vol. iv, p. 364, 1845; op. cit., viii, p. 142, 1847; op. cit., vol. xii, pp. 267–276, pl. 5, 1849, anatomy.

Phylline Oken, 1815, (*non* Abilg, 1790).

This is the only genus of the order known. Therefore the generic characters are not distinguishable from those of the order.

Malacobdella obesa Verrill.

Report on Invert. of Vineyard Sound, etc., pp. 458 [164] and 625 [331], pl. XVIII, fig. 90, 1873.

WOOD-CUT, No. 9.

Body stout, broad, thick, convex above, flat below, broadest near the posterior end, narrowing somewhat anteriorly; the front end is broadly rounded, with a median vertical slit, in which the mouth is situated. Acetabulum large, rounded, about as broad as the body. Intestine convoluted posteriorly, visible through the integument.

Between the intestine and lateral margins, especially posteriorly, the skin is covered with small stellate spots, looking like openings, around which are large numbers of small round reproductive vesicles. Color yellowish white. Length, 30 to 40^{mm}; breadth, 12 to 15^{mm}.

Whole coast of New England; abundant in Massachusetts Bay. Parasitic in the branchial cavity of the long clam (*Mya arenaria*).

This species is closely related to *M. grossa* of Europe, and may prove to be identical with it. The latter occurs mostly in *Mya truncata* and *Cyprina Islandica*.

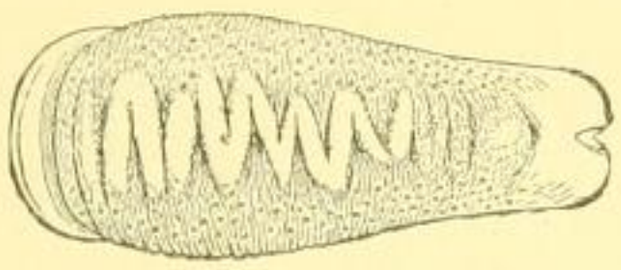

Fig. 9. *Malacobdella obesa*, dorsal view, nat. size.

Malacobdella mercenaria Verrill.

Malacobdella grossa Leidy, Proc. Acad. Nat. Sciences Philad., vol. v, p. 209 (*non* Blainville).

Malacobdella mercenaria Verrill, Report on Invert. of Vineyard Sound, etc., pp. 458 [164] and 625 [331], 1873.

PLATE XXXIX, FIGURE 20.

Body, in extension, elongated, oblong, with nearly parallel sides, or tapering slightly anteriorly; anterior end broad, obtusely rounded, emarginate in the center, but not deeply fissured. In contraction the body is broader posteriorly. Dorsal surface a little convex; lower side flat. Acetabulum round, rather small, about half the diameter of the body in the contracted state, but nearly as broad when the body is fully extended. The intestine shows through the integument distinctly; it is slender, and makes about seven turns or folds. Color pale yellow, with minute white specks beneath and on the upper surface anteriorly, giving it a hoary appearance; middle of the dorsal surface irregularly marked with flake-white; laterally reticulated with fine white lines.

Length in extension, 25^{mm}; breadth, 4^{mm}; in partial contraction, 18^{mm} long; 5 to 6^{mm} wide.

New Haven, parasitic in the branchial cavity of the round clam (*Venus mercenaria*), October, 1871. Philadelphia, in the same species of clam (Leidy).

Addenda to the Enopla.

I take this opportunity to describe two very remarkable new forms of pelagic nemerteans, of which several specimens were taken by the U. S. Fish Commission Steamer Albatross, in the region of the Gulf Stream. Whether they occurred at the surface or near the bottom I am unable to say, but their form and structure is eminently adapted to a purely pelagic mode of life. In form they somewhat recall *Sagitta*, though they are much larger and stouter. The internal structure is, however, entirely nemertean, and not very different from that of the typical Enopla. In that group, however, they should form at least a distinct family (*Nectonemertidæ*). They also have some affinity with *Pelagonemertes*, but differ from that genus widely in form, as well as in having a distinct head and caudal fin, lateral cirriform organs in one species, etc. The latter, moreover, has long, much subdivided intestinal diverticula, which is not the case with our new genera. The resemblance in the structure of the muscular walls of the body and the nervous system is quite marked.

Several forms occur among the few specimens of *Nectonemertidæ* hitherto obtained. Some of them are entirely destitute of the lateral arms or cirri of the neck, which in others are large and long and give them a very striking appearance. But as small specimens of *Nectonemertes* occur in which the lateral cirri are of small size, it is probable that they would be entirely absent in still smaller specimens of that genus. In the second genus (*Hyalonemertes*) they are probably never developed.

Although I have prepared many microscopic sections of two specimens of *Nectonemertes* of different ages, I have not yet had sufficient opportunity to work out several important parts of their anatomy,—especially the structure of the brain and certain special organs in the head, supposed to be sensory. But since there is, at this time, no opportunity to illustrate the details of the anatomy, I propose to describe here only the more prominent features, reserving details for another occasion.

Family, Nectonemertidæ Verrill.

Body with highly muscular striated walls, adapted for swimming actively, elongated, more or less flattened, and with a differentiated, muscular caudal fin; the dorsal and ventral surfaces are similar.

Proboscis with a distinct bulb and sac. Mouth far forward, close to the proboscis-pore. Intestine straight, with large lateral pouches,

which are often bilobed; anus at the posterior end of the caudal fin. Lateral nerves large, not included in the muscular walls of the body, united posteriorly. A median dorsal, and two lateral blood-vessels are well developed.

Muscular walls of the body are composed mainly of a thin, outer, circular layer and a thicker inner, longitudinal muscular layer, in which the fibers are arranged in distinct bundles, except in the thinner marginal regions. A pair of long, muscular, cirriform appendages is developed from the sides of the nuchal region in one genus.

Nectonemertes, gen. nov.

Body decidedly flattened and with thin borders along the sides; caudal fin usually broadest at the end and sometimes bilobed. Head separated from the body by a more or less distinct neck-like portion. Lateral cirriform appendages project from the neck or posterior part of the head, in the adult. Mouth near the front of the head, just below the terminal proboscis-pore.

Proboscis long, slender, with a small bulb and sac; its sheath extends nearly to the posterior end of body. Lateral lobes of the intestine exist nearly to the end of the intestine, even into the caudal fin.

Special sense organs,* imbedded in the integument of the lower side of the head, form a cluster on each side, their ends projecting as small papillæ. Eyes of the ordinary type are, apparently, wanting. Probably the species are transparent in life and swim actively, like *Sagitta*.

Nectonemertes mirabilis Verrill, sp. nov.

PLATE XXXVIII, FIGURE 1.

Description of the adult: Size large, up to 2 inches or more in length. Body rather elongated, decidedly flattened and with abruptly thinner marginal regions, smooth, with the walls somewhat translucent, longitudinally and transversely striated, elastic; in the middle region of the body the sides are nearly parallel; posteriorly it narrows rather rapidly to the base of the tail, and at this place, in some examples, the thin margin of the body forms a sort of fin or thin rounded lobe on each side.

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* The precise nature of these organs has not been ascertained, but they are probably special sense organs.

The tail gradually thins out to the end and at the same time increases in width by the development of the thin marginal regions, thus forming a true caudal fin, in form somewhat like that of a fish. Its posterior margin is emarginate in the largest specimens, with a distinct notch in the middle, where the anus is situated, but in other specimens it is truncate. The integument of the tail shows strong longitudinal muscular fibers toward its base, while the edges are thin and delicate.

The head is ovate in form, narrowest, but obtuse, in front, considerably flattened, and usually separated from the body by a distinctly narrower neck. From the back part of the head, or commencement of the neck, a long, tapering cirrus arises on each side. The cirri have a thick, roundish, muscular base from which they taper gradually to the long, slender, lash-like, often coiled tip. These organs seem to be mere extensions of the muscular walls of the body and are not hollow.

On the ventral surface of the head and occupying a large ovate patch on each side, there is a group of small acute papillæ, projecting slightly above the surface; they are arranged in three or four irregular rows, and are connected beneath the integument with pyriform organs which can be seen by transmitted light as opaque yellowish bodies.

The proboscis-sheath is well developed and extends back nearly to the base of the tail, where it is abruptly narrowed to a short muscular band that joins the wall of the body. The proboscis is long and slender, with a small roúnded muscular bulb* and a small saccular organ, much as in ordinary Enopla, though relatively smaller. When the proboscis is partially protruded, as is the case in one example, it is somewhat clavate distally and is covered with small papillæ. In transverse sections its structure is similar to that of the typical Enopla; its internal glandular layer is thick.

The intestine is large and straight; its lateral pouches are large, not much elongated, mostly bilobed distally, those in the tail becoming small and simple. The generative organs, in the form of rather large, round or ovate vesicles, occupy the lateral and ventral regions of the body-cavity, between and beyond the intestinal pouches.

In transverse sections the walls of the body are rather thin; the outer layer of circular muscular fibers is thinner than the inner

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*I have been unable to find any armature in the only specimen hitherto prepared for this purpose, but the stylets, if they existed, may have been destroyed by the acidity of the alcohol in which it was preserved.

layer, which is made up of longitudinal fibers arranged in bundles, so that its inner surface, in the sections, is strongly crenulated, or deeply furrowed; from the indentations between these bundles numerous strong vertical bands of muscular fibers extend from the dorsal to the ventral body-walls, between the internal organs. Toward the margins the muscular layers thin out rather abruptly, leaving the marginal portions thin and without longitudinal bundles. The general structure of the interior of the body-cavity is loose, with many spaces in the porous parenchyma, which is feebly developed, as compared with that of other nemerteans.

The lateral nerve-trunks are very large and quite interior to the muscular layers. They are situated ventrally, some distance from the edges, and near the commencement of the thin-walled marginal portion of the body. In transverse sections they are elliptical or rounded, with an excentric translucent fibrous core along the dorsal side, thus giving the cellular portion a thick-lunate or reniform shape. The lateral nerves are large and conspicuous even back to the caudal fin, where those of opposite sides unite.

The median dorsal blood-vessel and the two lateral blood-vessels are well developed and situated nearly as in typical Enopla. The lateral blood-vessels are subventral and only a short distance interior to the nerve-trunks.

There are no memoranda as to the color of the living specimens. All had been placed in alcohol when first seen by me. One that had been in alcohol only a short time was distinctly salmon, or pale orange, in tint; the others had lost all color, if they had any when living. They may have been white or colorless, and were doubtless translucent, like many other pelagic creatures. Even in alcohol some of them show considerable translucency,—nearly as much as the larger species of *Sagitta*.

The largest specimens, when first examined by me, were about 2·5 inches long and ·50 wide; subsequently they have contracted considerably by long preservation in strong alcohol.

The largest specimen now measures as follows: length 38^{mm}; breadth of body 9^{mm}; vertical diameter of body 2^{mm}; length of cirri 14^{mm}; length of head 4^{mm}; breadth of head 6^{mm}; breadth of caudal fin 4^{mm}.

Descriptions of immature specimens: A specimen from station 2076 is smaller and more slender than those described above. It has a narrower head and shows scarcely any constriction at the neck. The caudal fin is somewhat elliptical, being widest in the middle and

truncate at the end. Otherwise it agrees very well with the larger specimens. The cirri are, however, relatively shorter, their length being scarcely more than the breadth of the body, but they taper to slender tips, as do those of the adults. They are directed backward.

This specimen is somewhat translucent in alcohol and the thin, marginal bands are very distinct along the sides of the body and in the tail fin. The intestinal pouches, proboscis-sheath, and other internal organs show more or less distinctly, especially posteriorly. In the head there are about 20 sense organs (?) in each lateral cluster.

Length 35^{mm}; breadth of body 5^{mm}; length of head to base of cirri 4^{mm}; its breadth 4^{mm}; length of cirri 5^{mm}.

Perhaps this may be a male and the larger and flatter specimens females.

A specimen from station 2229 agrees in most respects with the fullgrown ones described above, except that it is smaller and has short nuchal cirri. In this the body is relatively narrower and less flattened than in the larger examples, but the head, caudal fin, and proboscis are nearly as described and figured. The nuchal cirri are, however, short, tapered, blunt, not much longer than half the breadth of the head, and stand out rather rigidly from the sides of the neck, and nearly at right angles with it.

This specimen is about 30^{mm} long; 7^{mm} broad; caudal fin $3{\cdot}5^{mm}$ broad; length of cirri 2^{mm}. It has been treated with hardening reagents for sections, and is therefore strongly contracted.

A single specimen was taken at each of the following stations by the steamer Albatross:

Station 2036, N. lat. 38° 52′ 40″, W. long. 69° 24′ 40″, 1735 fathoms. Adult.

Station 2076, N. lat. 41° 13′ 00″, W. long. 66° 00′ 50″, 906 fathoms. Young with small cirri.

Station 2229, N. lat. 37° 38′ 40″, W. long. 73° 16′ 30″, 1423 fathoms. Young with small cirri.

Station 2236, N. lat. 39° 11′ 00″, W. long. 72° 08′ 30″, 636 fathoms. Adult.

The specimen from Station 2236 is marked as having been taken in the trawl-wings. Many of the specimens of other groups, thus taken, undoubtedly came from near the bottom, but on the other hand, it is easy for any surface species to be taken in the same nets while the trawl is being lowered or when it is being taken in. Con-

cerning the other specimens there are no memoranda, but from their good condition it is more probable that they were all taken in the trawl-wings than in the trawl itself.

Hyalonemertes, gen. nov.

Body elongated, fusiform, somewhat flattened, having no evident constriction at the neck, nor marked marginal folds, except in the caudal fin. Cirri wanting. Head not differentiated from the neck. Caudal fin well developed.

Proboscis long and slender, with a distinct bulb and sac, and, apparently, having a small central stylet. Lateral pouches of the intestine numerous, short, not much divided. Walls of the body thicker and more gelatinous than in *Nectonemertes*, not showing transverse striations, but covered with fine granulations; inner muscular layer longitudinally striated.

Pyriform bodies not present in the head. Eyes apparently wanting. Neither ciliated grooves nor pits were noticed on the head.

Hyalonemertes Atlantica, sp. nov.

Body of the larger specimen moderately flattened, fusiform, about four times longer than broad, gradually tapered both ways; head blunt, flattened; caudal fin short, stout at base, a little broader toward the end, which is thin and slightly emarginate. Along the sides of the body the marginal fold is very narrow and indistinct, the edges being rounded; the folds become more evident posteriorly and form the borders of the caudal fin.

The integument appears somewhat soft and gelatinous, and is more translucent than in *Nectonemertes*, and not so firm. The whole surface is covered with minute soft granules hardly visible to the naked eye, but appearing, when magnified, something like fine shagreen; beneath the surface the longitudinal muscular striations can be seen. The granulation of the surface is finer and less distinct on the head. The proboscis is not protuded in this specimen. The small mouth is just below the end of the snout; near the upper margin there is a small round papilla.

Length of the larger specimen, from Station 2724, 38^{mm}; breadth of body 11^{mm}; breadth of caudal fin 6^{mm}.

Length of the smaller specimen, from Station 2428, 20^{mm}; breadth 3·5^{mm}.

The smaller specimen, just mentioned, is rather more slender than the larger one; its caudal fin is distinctly bilobed, with the lobes

well rounded at the end. The long slender proboscis is partially protruded, so as to show the bulb and sac in the exserted part, but not at the end; there appears to be a small stylet, but the mounted specimen is not sufficiently transparent to show its form; the exterior of the exsert proboscis is finely papillose. The large proboscis-sac extends back to about the posterior fourth; it is abruptly narrowed near the posterior end, and a band of muscular fibers near the end, on each side, binds it to the body wall. A single specimen was taken by the Albatross at each of the following stations:

Station 2428, N. lat. 42° 48′, W. long. 50° 55′ 30″, in 826 fathoms. Young.

Station 2724, N. lat. 36° 47′, W. long. 73° 25′ 00″, in 1641 fathoms. Adult.

EXPLANATION OF PLATES.

Plate XXXIII.

Figure 1.—*Amphiporus angulatus.* Dorsal view with the proboscis partially protruded, natural size; 1*a*, the same, ventral view of the head and anterior part of the body. Eastport, Me., low-water, Aug. 7, 1872.

Figure 2.—The same. Dorsal view of a specimen of the reddish brown variety, more enlarged. Massachusetts Bay.

Figure 3.—*Amphiporus multisorus*, sp. nov. Dorsal view of the head and anterior portion of the body; × 2. Eastport, Me.

Figure 4.—*Amphiporus virescens* V. Dorsal view; × 3. Noank, Conn., July 24, 1874; 4*a*, the same specimen, posterior end, more enlarged; 4*b*, the same, ventral view of the head, more enlarged; 4*c*, the same, dorsal view, more enlarged; 4*d*, the same, head with the slightly protruded proboscis; × 8; 4*e*, the same, nearly profile view of the head; × 8. Wood's Holl, Mass., July 13, 1875.

Figure 5.—*Amphiporus ochraceus* V. Dorsal view; × 4; 5*a*, the same, central stylet of the proboscis, much enlarged. Wood's Holl.

Figure 6.—The same. Head and anterior portion of another specimen more contracted; × 6. Eel Pond, Wood's Holl, July 19, 1875.

Figure 7.—*Amphiporus cruentatus* V. Dorsal view; × 3. Noank, Conn., July 14, 1874 (No. 740).

Figure 8.—The same. Dorsal view of a larger specimen; × 6; 8*a*, head of the same specimen, more enlarged. Wood's Holl.

Figure 9.—*Tetrastemma candidum.* Dorsal view of a greenish specimen; × 6.

Figure 10.—The same. Dorsal view of a specimen of the yellow variety; somewhat compressed under the microscope; × 3, low-water; 10*a*, the same specimen, showing variation in the form of the head owing to the different degree of extension. Casco Bay, low-water, 1873.

Figure 11.—*Tetrastemma vermiculus*, var. Dorsal view; × 7; 11*a*, 11*b*, other views of the head of the same specimen in different states of contraction; 11*c*, proboscis-armature of the same, much enlarged. Wood's Holl, on piles of wharf, July 24, 1875.

Figures 1, 2, and 10 are by J. H. Emerton; figures 3, 4*a* to 4*e*, and 11 to 11*c*, are by the author; the rest are by J. H. Blake. All are from living specimens.

Plate XXXIV.

Figure 1.—*Amphiporus frontalis*, sp. nov. Dorsal view; × 2; 1*a*, the same specimen, ventral view of the head. (No. 10) Eastport, Me., 86 fath., 1870; 1*b*, the same, dorsal view of the head of another specimen. This was pale salmon with pale purplish spots on the sides due to the ovaries; proboscis-sheath greenish. (No. 86) Eastport, Me., low-water.

Figure 2.—*Amphiporus cæcus*, sp. nov. Dorsal view; × 5; 2*a*, 2*b*, dorsal and ventral views of the head of another specimen (No. 721); 2*c*, extruded proboscis of the same specimen, enlarged.

Figure 3.—*Amphiporus bioculatus*. Dorsal view; × 5. Off Fisher's I., Conn., July 22, 1874. The ocelli are too much obscured by the color in printing.

Figure 4.—The same. Dorsal view of a younger specimen of the light colored variety, compressed under the microscope; × 10. Newport, R. I.

Figure 5.—*Amphiporus roseus*. Dorsal view; × 2; 5*a*, the same, head and anterior portion of body, dorsal view; × 4; 5*b*, the same, side view; × 4.

Figure 6.—*Amphiporus tetrasorus*, sp. nov. Dorsal view; × 3. Massachusetts Bay, 1878.

Figure 7.—*Amphiporus heterosorus*, sp. nov. Head and anterior portion of body, dorsal view; × 1½. Massachusetts Bay, 1878.

Figure 8.—*Amphiporus frontalis*, sp. nov. Dorsal view of a small specimen partly contracted; × 3. Off Witch Rock, Massachusetts Bay, September, 1877.

Figure 9.—*Amphiporus mesosorus*, sp. nov. Head and anterior portion of body, dorsal view; × 3. Massachusetts Bay, off Salem, August 13, 1877.

Figure 10.—*Tetrastemma elegans* V. Type specimen from life. Dorsal view; × 6.

Figure 11.—*Tetrastemma vermiculus*. Young, dorsal view; × 12.

Figure 12.—*Tetrastemma vermiculus*, var. *catenula*. Dorsal view; × 8. Noank, Conn.

Figure 13.—*Tetrastemma dorsale*. Dorsal view of head and anterior portion of body with protruded proboscis; × 8. Casco Bay, 1873.

Figure 14.—*Tetrastemma dorsale*, var. *marmoratum*. Dorsal view; × 3. The lighter and darker mottlings are not sufficiently distinct. Casco Bay.

Figure 15.—*Amphiporus bioculatus* (?). Very young, dorsal view; × 12; compressed under the microscope, while alive. Newport, R. I., September 1, 1880, station 851, 12½ fath. Color translucent white; eyes black.

Figure 16.—*Amphiporus* (*Nareda*) *superba*. Copy of the original figure.

Figure 17.—*Amphiporus heterosorus*, sp. nov. Head and anterior part of body, dorsal view; × 2.

Figures 2, 3, 10, 11 are by J. H. Blake; figures 4, 8, 13, 15 are by J. H. Emerton; the rest, except 16, are by the author. All are from living specimens.

Plate XXXV.

Figure 1.—*Cerebratulus lacteus*. Young, natural size; 1*a*, the same, ventral view of head and extruded proboscis, natural size. New Haven, Conn.

Figure 2.—*Emplectonema giganteum* V. Dorsal view of a specimen not full grown; ½ natural size.

Figure 3.—*Amphiporus cruentatus* V. Dorsal view; × 4.

Figure 4.—*Amphiporus agilis* V. Dorsal view; × 4.

Figure 5.—*Amphiporus glutinosus* V. Dorsal view; × 2.

Figure 6.—*Tetrastemma vittatum* V. Dorsal view; × 8; compressed under the microscope, while living.

Figure 7.—The same. Dorsal view of the variety with a single pale dorsal stripe; × 3.
Figure 8.—*Tetrastemma vermiculus.* Dorsal view; × 8. Wood's Holl, Mass., low-water.
Figure 9.—*Tetrastemma candidum* (?). Dorsal view of a very young specimen, much enlarged; compressed under the microscope, while living. Newport, R. I., sta. 851, 12½ fath., September 1, 1880.
Figure 10.—The same. Dorsal view of a somewhat older specimen. Savin Rock, Conn., October 18, 1887.
Figure 11.—*Tetrastemma vermiculus*, var. *catenula*; × 2.
Figures 1, 6, 8 are by J. H. Emerton; figures 3, 11, are by J. H. Blake; the rest are by the author. All are from living specimens.

PLATE XXXVI.

Figure 1.—*Micrura affinis.* Dorsal view; × 4. Off Martha's Vineyard, 1887.
Figure 2.—*Cerebratulus lacteus.* General view of a living specimen of the pinkish variety, natural size. Wood's Holl, July 17, 1875.
Figure 3.—*Cerebratulus luridus* V. Natural size. Noank, Conn., Aug. 8, 1874.
Figure 4.—*Cephalothrix linearis.* General view; × 8.
Figure 5.—The same. Dorsal view of the head and anterior portion of the body of a young specimen, much enlarged. Wood's Holl, Mass., August 19, 1881.
Figure 6.—*Dinophilus simplex*, sp. nov. Dorsal view, much enlarged; 6*a*, the same, ventral view of head and mouth, much enlarged. Newport, R. I.
Figures 1, 2, 3 are by J. H. Blake; 4, 5, 6 are by J. H. Emerton. All are from living specimens.

PLATE XXXVII.

Figure 1.—*Cerebratulus lacteus.* Pale variety, ½ natural size; 1*a*, the same, side view of head, in extension; 1*b*, the same, ventral view of head, in partial contraction.
Figure 2.—*Cerebratulus fuscus.* Dorsal view of head and anterior part of body in moderate extension; 2*a*, the same specimen in a state of contraction; 2*b*, 2*c*, ventral views of the same specimen in different degrees of extension. All natural size.
Figure 3.—*Cerebratulus luridus.* Natural size, but considerably contracted in length.
Figure 4.—*Lineus dubius.* Ventral view; × 2; 4*a*, dorsal view of the head, more enlarged. August 18, 1878.
Figure 5.—*Lineus viridis.* Green variety, natural size; 5*a*, the same, side view of head, natural size; 5*b*, the same, ventral view of head, more enlarged. Eastport, Me., low-water.
Figure 6.—*Micrura affinis.* Enlarged 1½; from Eastport, Me.; 6*a*, the same, posterior end of another specimen.
Figure 7.—*Micrura inornata* V. Dorsal view; × 2. Massachusetts Bay, sta. 135, 25 fath., 1878.
Figure 8.—*Lineus socialis.* General view of the light green variety; × 2; 8*a*, the same, side view of head and anterior part of body, more enlarged.
Figure 9.—*Lineus pallidus.* Dorsal view; × 2; 9*a*, the same, side view of head; more enlarged. Massachusetts Bay.
Figures 3, 5, 6, 9 are by J. H. Emerton; 1 and 8 by A. H. Verrill; the rest are by the author. All are from living specimens.

PLATE XXXVIII.

Figure 1.—*Nectonemertes mirabilis*, sp. nov. Dorsal view with proboscis partially extended; × 2. Atlantic Ocean, sta. 2036, 1883.

Figure 2.—*Cerebratulus Leidyi* V. Natural size; 2*a*, the same, ventral view of head. New Haven, Conn.

Figure 3.—*Micruru rubra*, sp. nov. Peculiar specimen, probably repairing mutilation of tail. Side view; × 1½; 3*a*, the same, ventral view of head.

Figure 4.—*Micrura dorsalis*, sp. nov. Dorsal view; × 1½; 4*a*, the same, ventral view of head, more enlarged. Type specimen. Eastport, Me.

Figure 5.—*Lineus arenicola* V. Dorsal view of the original specimen; × 1½; 5*a*, the same, ventral view of head.

Figure 6.—*Lineus viridis.* Red variety, dorsal view; × 1½; 6*a*, the same, side view of head; 6*b*, the same, dorsal view of a very young specimen having but four eyes; 6*c*, the same, a cluster of eggs, ⅔ natural size; 6*d*, the same, a young specimen just hatched, much enlarged.

Figure 7.—*Lineus socialis.* Young, ventral view, natural size; 7*a*, the same, dorsal view of the head and anterior part of the body, enlarged. August 12, 1880.

Figure 8.—*Lineus bicolor.* Dorsal view; × 5; 8*a*, 8*b*, the same, side and ventral views of head, more enlarged. Wood's Holl, Mass., July 14, 1875.

Figures 9, 9*a*.—*Micrura rubra*, sp. nov. Front and side views of the head; × 3. Eastport, Me.

Figures 10 and 10*a*.—*Lineus sanguineus.* Dorsal and ventral views of the head and anterior part of the body; × 3.

Figure 11.—*Lineus*, sp. (?) Young, dorsal view, much enlarged; 11*a*, another view of the front part of the same specimen. Vineyard Sound, among compound ascidians, 1881.

Figures 12, 12*a*.—*Emplectonema giganteum* V. Dorsal and ventral views of the head of the original type-specimen; × 2.

Figures 1, 6, 7, 11 are by J. H. Emerton; 8 to 8*b* are by J. H. Blake; 2 by A. H. Verrill; the rest are by the author. All are from living specimens.

Plate XXXIX.

Figures 1, 2, 3, 4.—*Pilidium*, sp. uudetermined. Different views; × 30. Wood's Holl, Mass., at surface, in day time, August 18, 1881. J. H. Emerton, from nature.

Figure 5.—The same; × 75; *a*, apical cirrus; *b*, apical plate; *b′*, nerve; *w*, head of developing nemertean with two eyes. J. H. Emerton, from nature.

Figure 6.—*Pilidium*, undetermined, sp. with golden yellow spots around the margins; taken with the preceding; *a*, cluster of apical cirri; *b*, apical plate; *b′*, nerve; *c*, *c′*, anterior and posterior lobes; *d*, *d′*, lateral lobes; *e*, œsophagus; *h*, *i*, developing nemertean; × 75. J. H. Emerton, from nature.

Figure 7.—*Amphiporus lactifloreus.* End of protruded proboscis, much enlarged; *s*, central stylet; *s′*, lateral stylets; *p*, posterior region of proboscis; *d*, bulbous region; *f*, saccular organ; 7*a*, one of the lateral stylet-sacs, more enlarged. After McIntosh.

Figure 8.—*Amphiporus ochraceus* V. Extruded proboscis, enlarged; *a*, anterior region; *s*, middle region with central and lateral stylets; *p*, posterior region. Camera-lucida drawing by the author.

Figure 9.—*Amphiporus bioculatus* (?). Middle portion of the proboscis, compressed under the microscope and much enlarged; *p*, commencement of the posterior region; *r*, muscular bulb; *s*, central stylet; *t*, one of the lateral stylet-sacs. Camera-lucida drawing by the author.

Figures 10, 11, 12.—*Cephalothrix linearis.* Different stages in the development of the larva, much enlarged; *c*, large cephalic cilia; *a*, region of the mouth; *b*, intestinal area. After McIntosh.

Figure 13.—The same, farther developed; *o*, ocelli, *h*, ganglions; *a*, mouth area; *d*, opening of cephalic ducts; *m*, one of the cephalic sacs; *i*, œsophagus; *p*, proboscis; *b*, intestine, imperfectly developed. After McIntosh.

Figure 14.—*Cephalothrix linearis.* Head, much enlarged, and seen as a transparent object; *m*, mouth; *p*, proboscis; *p′*, rhynchodeum; *v*, proboscis-sheath; *b*, lateral blood vessel; *g*, superior, *g′*, inferior ganglion; *n*, origin of lateral nerve. After McIntosh.

Figure 15.—The same. Part of a transverse section of the body-wall adjacent to one of the lateral nerves; *c*, external cuticle layer; *c′*, basement layer; *t*, outer, and *t′*, inner circular muscular layers; *l*, longitudinal muscular layer; *n*, lateral nerve. After Hubrecht.

Figure 16.—*Carinina grata* H. Section of a part of the body-wall corresponding to that in the preceding figure with the same lettering. After Hubrecht.

Figure 17.—*Cerebratulus medullatus* Hubr. Section of the body-wall in the region of the median dorsal line; lettering the same as in the two preceding figures, with the following additional ones; *nd*, median dorsal nerve; *n*, nervous plexus; *n″*, proboscis-nerve; *l′*, inner longitudinal muscular layer. After Hubrecht.

Figure 18.—*Lineus viridis.* Transverse section through the middle of the body; × 14; *p*, proboscis; *v*, proboscis-sheath; *b*, dorsal blood vessel; *b′*, one of the lateral blood vessels; *i*, cavity of intestine; *c*, external cuticular layer; *c′*, basement layer of cuticle; *l*, outer, and *l′*, inner longitudinal muscular layers; *t*, circular muscular layer; *t′*, transverse muscular bundles arising from *t*; *n*, nervous plexus; *n′*, lateral nerve; *ro*, reproductive organs. After McIntosh.

Figure 19.—*Cerebratulus lacteus.* Transverse section of the middle region of the body; × 8. Lettering the same as in figure 18. From nature by the author.

Figure 20.—The same. Transverse section in the region of the œsophagus; × 8. Lettering the same as in figures 18 and 19, with the following additional; *i′*, plicated wall of the œsophagus; *n″*, median dorsal nerve; *u*, *u*, nephridia. From nature, by the author.

Figure 21.—The same. Portion of the same section shown in figure 20, from the region of the lateral nerve; × 36. Letters the same as in figures 18 and 20. From nature, by the author.

Figure 22.—*Lineus viridis.* Head and anterior part of body viewed as a transparent object; *o*, ocelli; *f*, *f*, lateral cephalic slits; *g*, superior ganglion; *d*, interior of olfactory sac; *d′*, its duct; *n′*, lateral nerve; *m*, mouth; *e*, œsophagus; *p*, proboscis; *p′*, rhynchodeum; *v*, proboscis-sheath; *r*, *r*, blood lacunæ surrounding the œsophagus. After McIntosh.

Figure 23.—*Malacobdella mercenariæ.* Dorsal view; × 4. Newport, R. I., July, 1880, in *Venus mercenaria.* J. H. Emerton from life.

Figure 24.—*Tetrastemma dorsale.* Central stylet; × 200; 24*a*, one of the lateral stylets; × 350. After McIntosh.

Figure 25.—*Tetrastemma candidum.* Central stylet; × 150. After McIntosh.

ERRATUM.

Page 384, line 23, for *Nemertinea*, read *Nemertina.*

Page 405, line 31, for *candida*, read *candidum.*

XXIII.—Dinophilidæ of New England. By A. E. Verrill.

No representatives of this group have hitherto been described from this coast, so far as I am aware. Two species have been known to me for several years, but I have delayed publishing descriptions of them, hoping to be able to obtain additional specimens in order to make the figures and descriptions more complete. But since this group is supposed by many writers to be related to the Nemerteans, it seems to me desirable that our species should be put on record in this connection.

Both our species may be referred, provisionally, to *Dinophilus*, though they differ considerably in structure. One of them (*D. simplex*) may not be a true *Dinophilus*.

Family, Dinophilidæ Graff.

Dinophilus pygmæus, sp. nov.

Wood-cut 10.

Body very small, translucent, in extension long-ovate or nearly cylindrical, capable of contracting into a short-ovate or subglobular form, composed of five segments, exclusive of the head and tail; the posterior segments are usually the largest. Each segment is surrounded near its middle by a circle of rather long and strong cilia. The head is usually rounded in front, often nearly semicircular, and has a tuft or fringe of strong cilia around its front margin, and two transverse lateral tufts which are parts of two continuous preoral bands, one before and one behind the eyes. The eyes are rather wide apart, small, reniform, conspicuous.

The mouth is small and appears to be bilobed. The pharynx or œsophagus is short and swollen. On each side of the pharynx there is a small pharyngeal gland. The stomach is large, oblong-cylindrical, and occupies about three body-segments in ordinary extension; the intestine is narrow and terminates in an anal opening at the

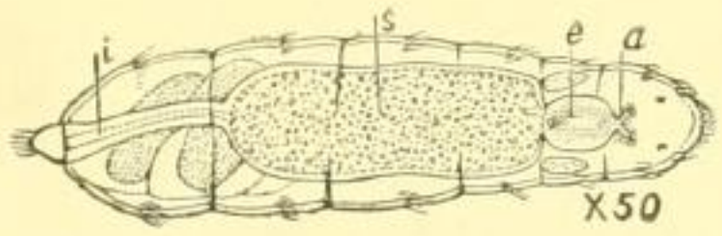


Fig. 10.—*Dinophilus pygmæus*, dorsal view, somewhat compressed; *a*, mouth; *e*, pharynx and pharyngeal glands; *s*, stomach; *i*, intestine.

base of the caudal segment, which is small, short-triangular, and terminated by a tuft of large cilia. In the posterior part of the body are two relatively large, ovate, opaque, reproductive bodies, but whether they were ovaries or spermaries I did not ascertain, so that the sex of the specimen described and figured is uncertain, but it is probably a female. Color whitish. Length ·7^{mm}; breadth, as compressed, ·16^{mm}.

Taken on the piles of a wharf at Wood's Holl, Mass., Aug. 10, 1883.

This species is closely allied to *D. gyrociliatus* of Europe. The latter has, however, six post-oral segments, and differs also in the form of the head, pharynx, and stomach. How much importance should be attached to these differences is uncertain, for they may be due largely to different conditions of the specimens examined. The two may eventually prove to be identical.

Dinophilus simplex, sp. nov.

PLATE XXXVI, FIGURES 6, 6*a*.

Body nearly smooth, distinctly segmented, in extension elongated and more or less cylindrical, the anterior part usually broadest, composed of four evident segments, exclusive of the large head and abortive tail. Segments well defined, but without any conspicuous bands of cilia. Head-segment large and long, subtriangular in front, and often pointed, but sometimes rounded. Eyes nearly lateral, small, but conspicuous. Mouth simple, elongated, situated between, or a little in front of the eyes. Stomach long and not much enlarged; intestine nearly as wide as the stomach, terminating in a nearly terminal anal pore. The tail segment appears to be rudimentary or abortive. The sex was not ascertained. Color pale yellow. Newport, R. I., Aug., 1880.

The affinities of this species are somewhat uncertain. The pharynx and stomach differ considerably from a typical Dinophilus. Reproductive organs were not observed.


1a

1

4b


4

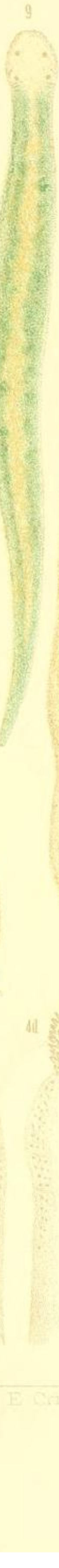

11

10a


8


8a

2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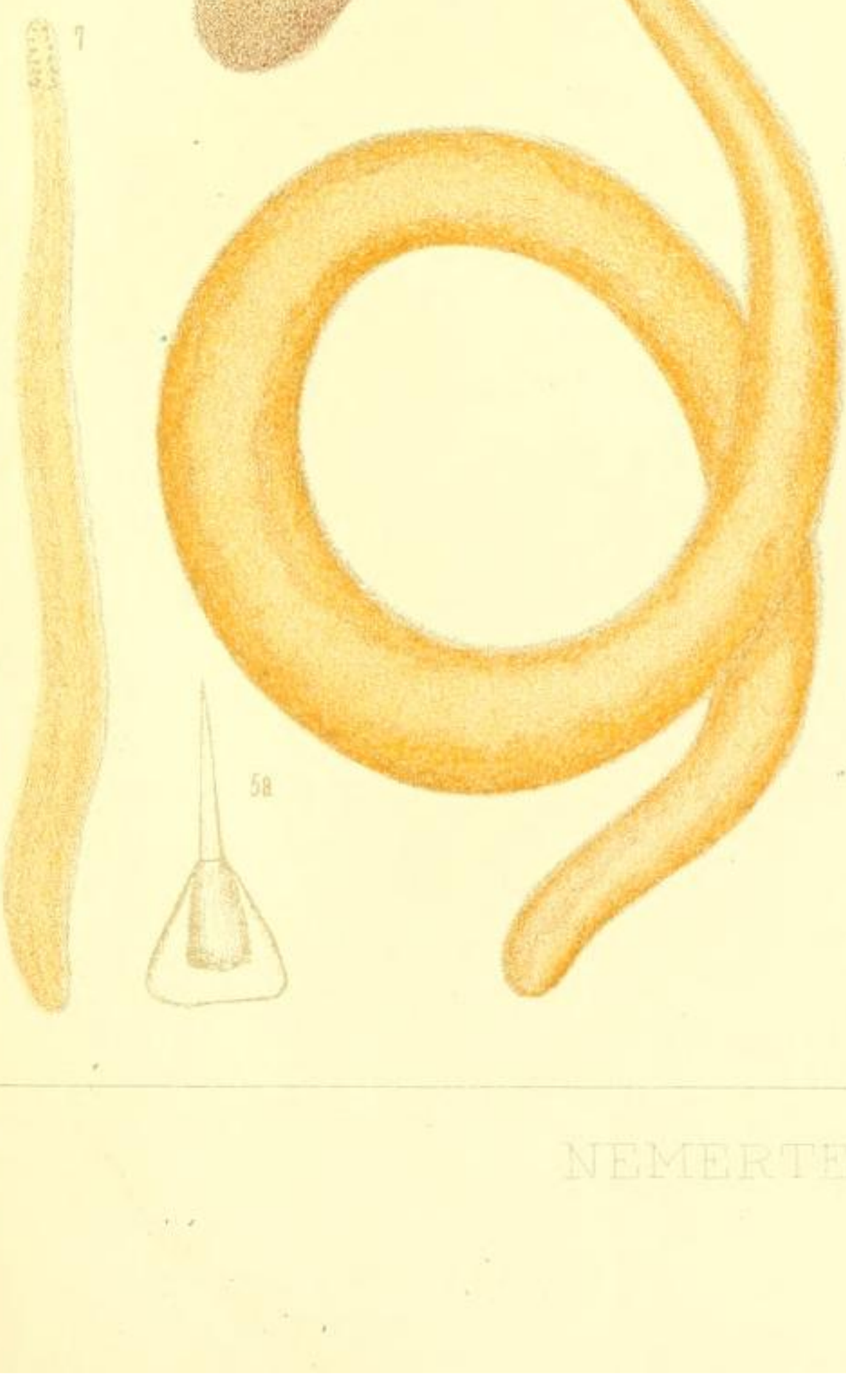
4a

11a

11b

11c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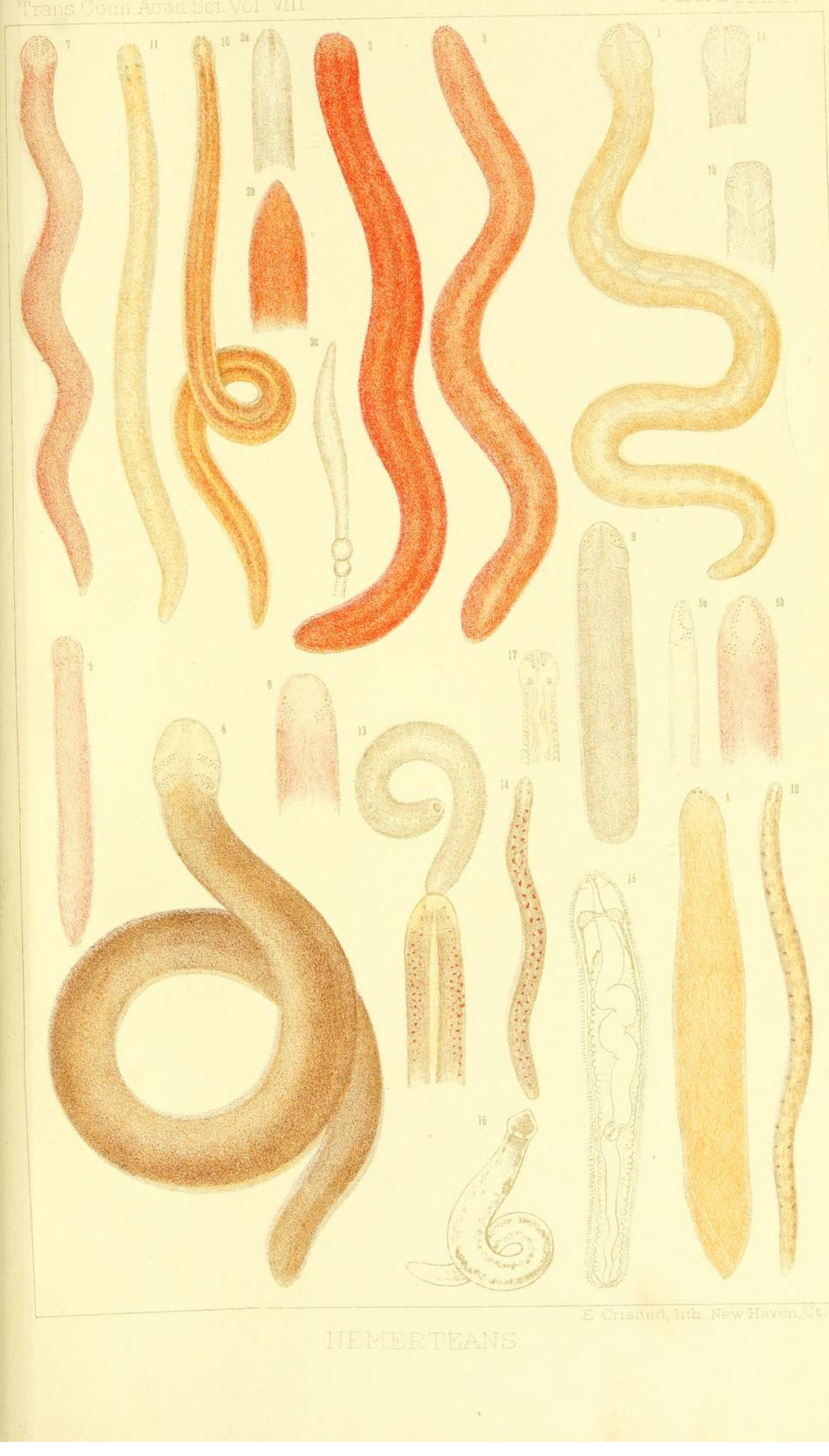
5a

4d

4e


4c

E. Crosand, lith., New Haven, Ct.



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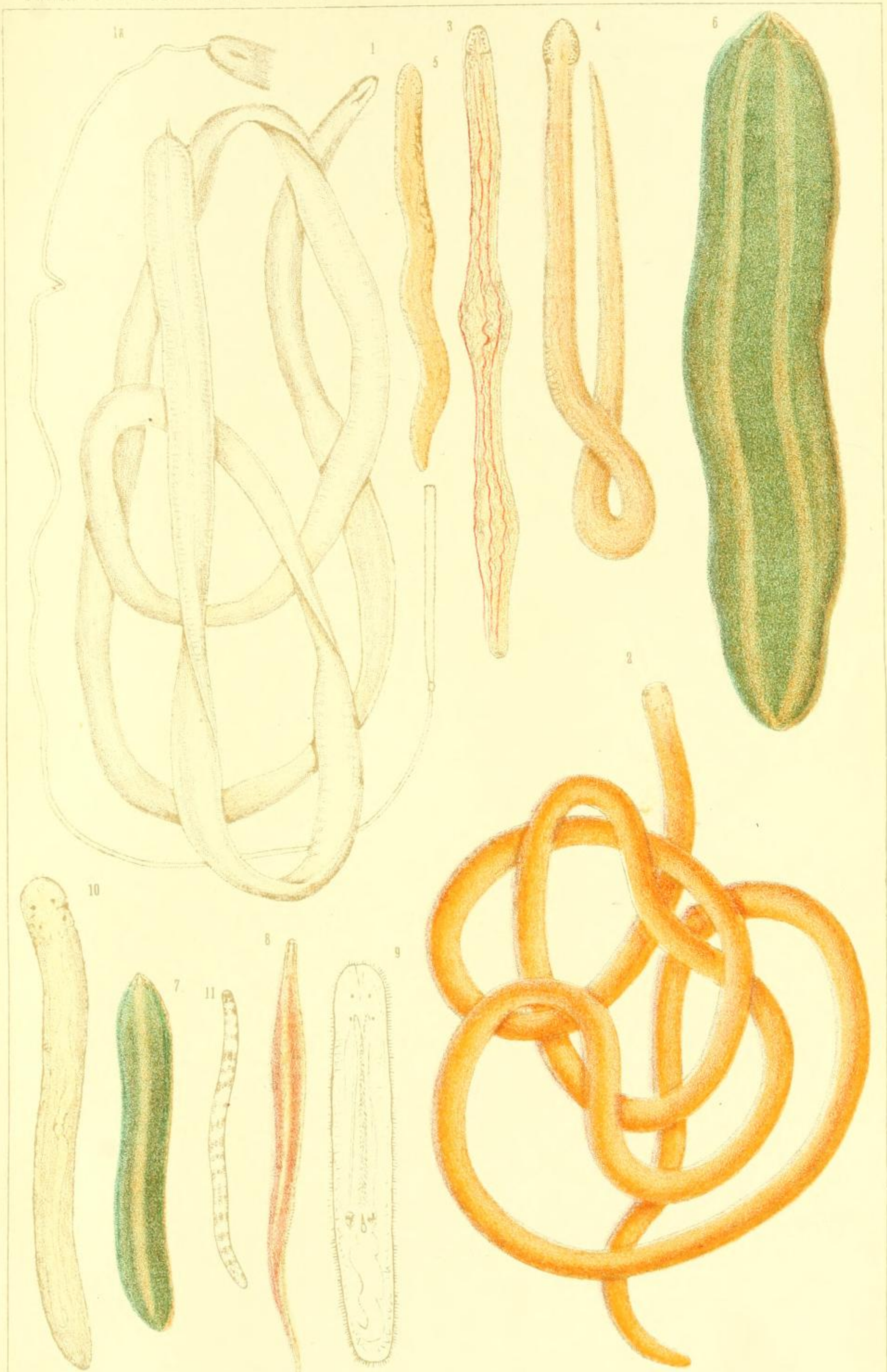
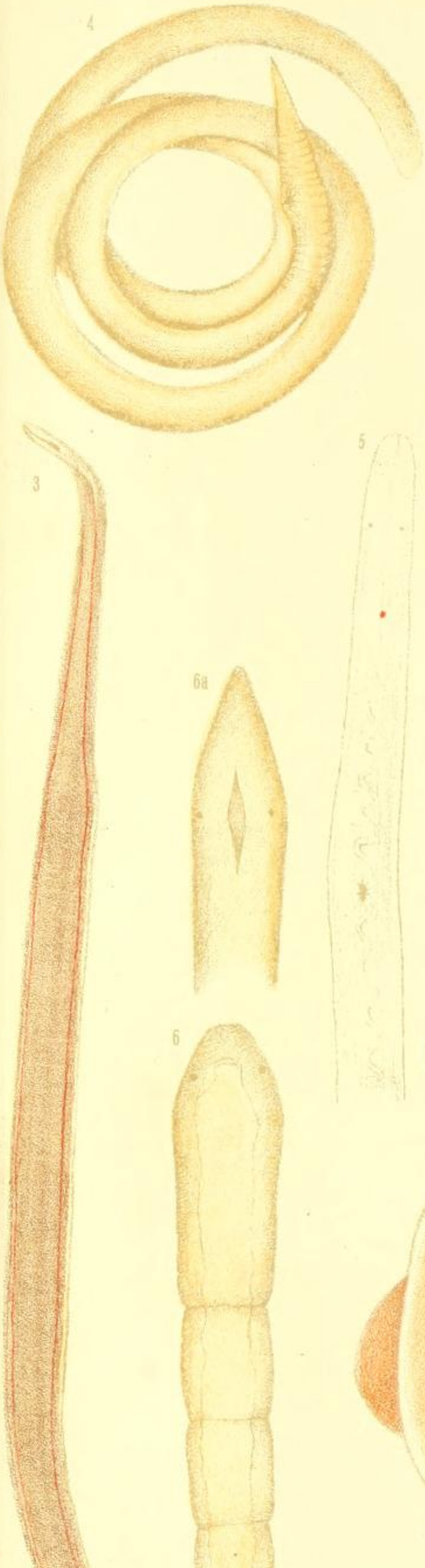


E. Crisand, lith., New Haven, Ct.

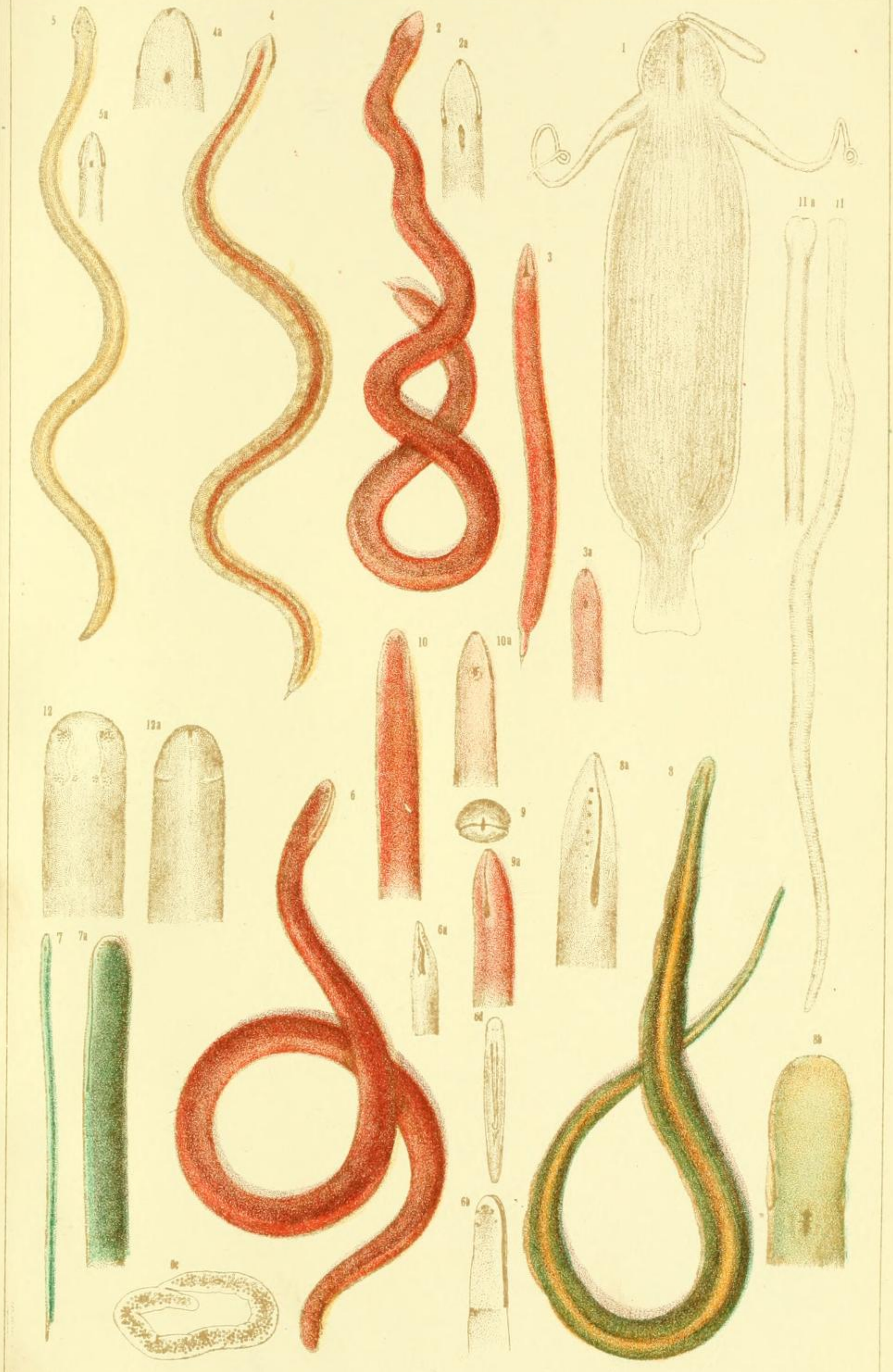
NEMERTEANS.



E. Grisand, lith., New Haven, Ct.

NEMERTEANS.

E. Crisand, lith., New Haven, Ct.



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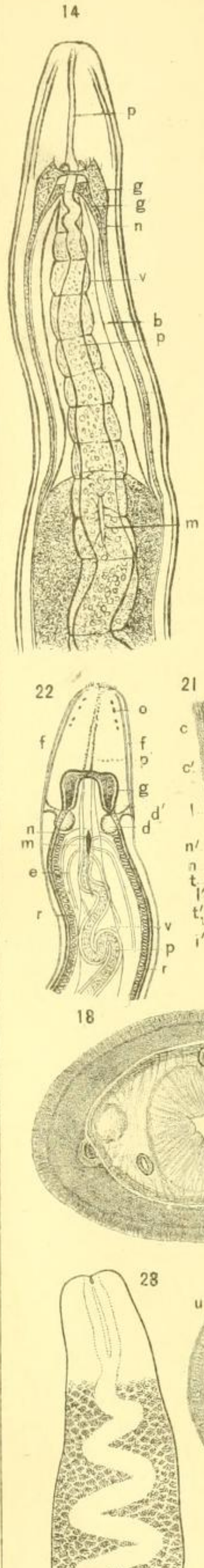
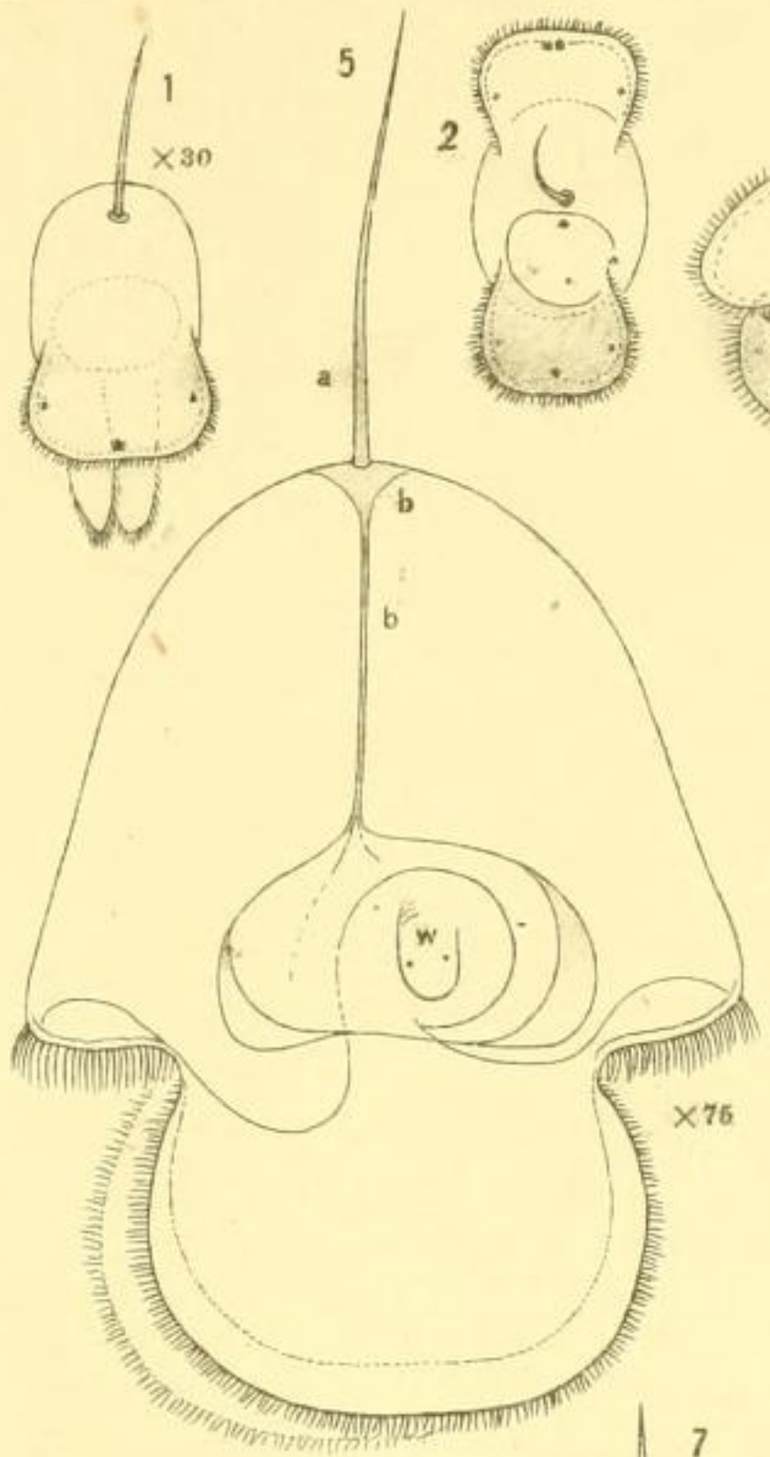
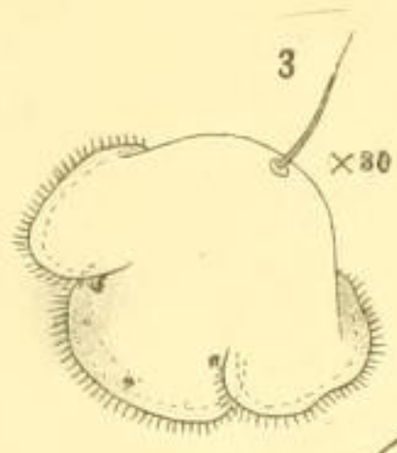
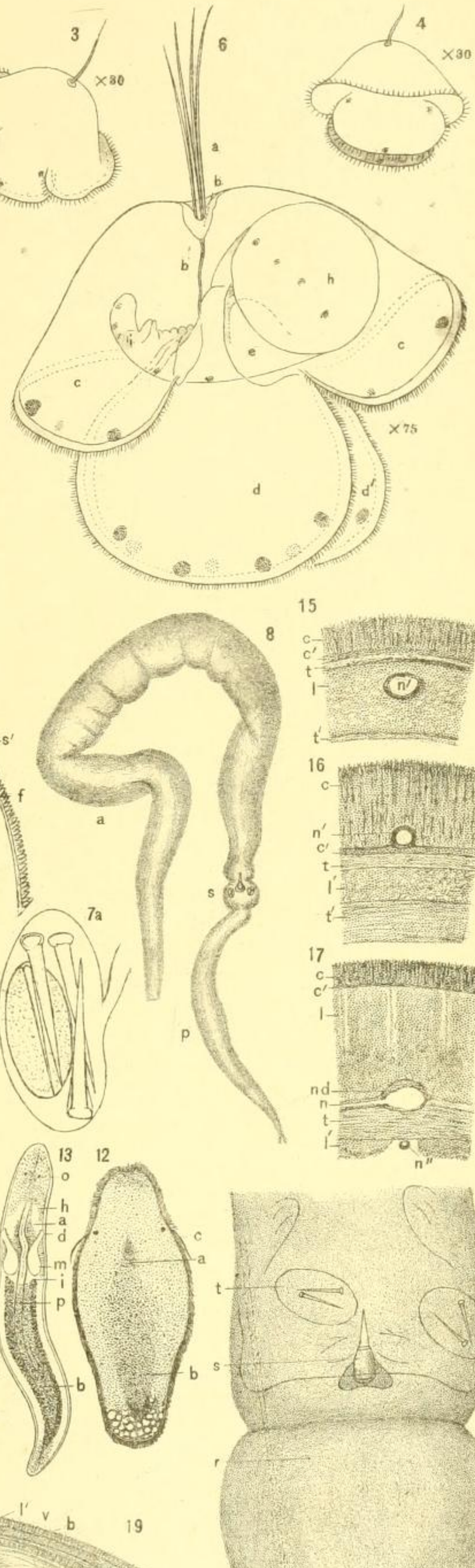
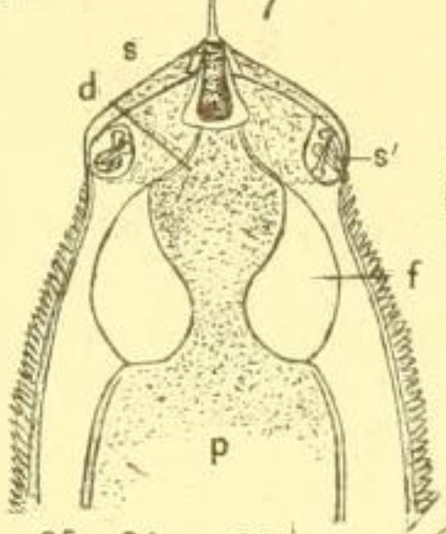
NEMERTEANS

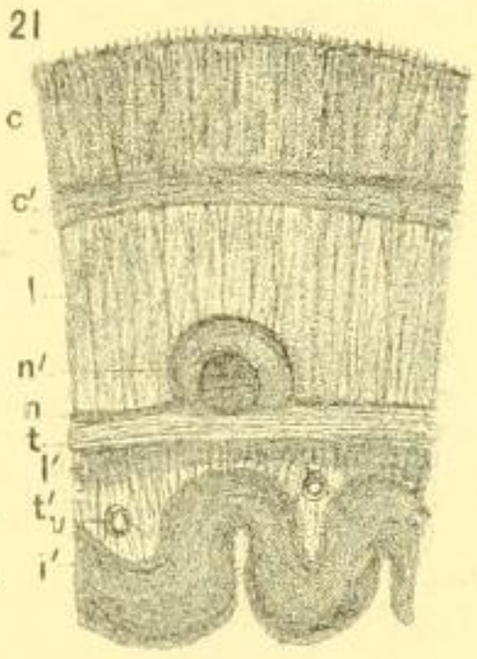


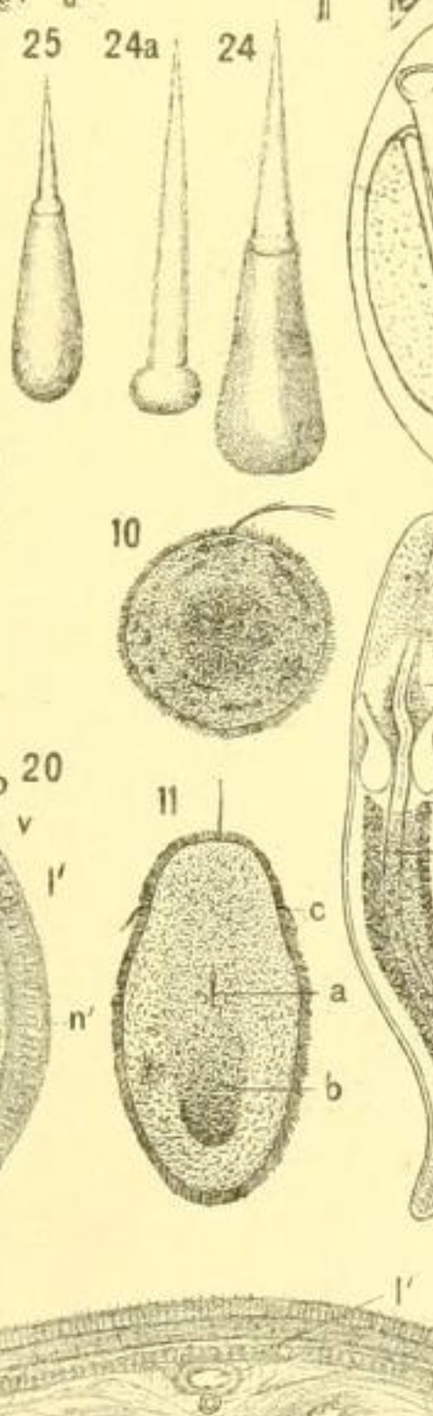


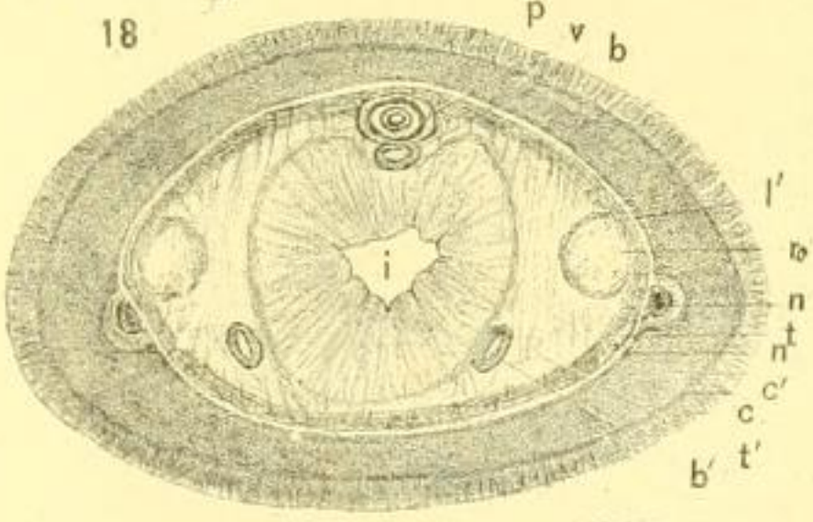


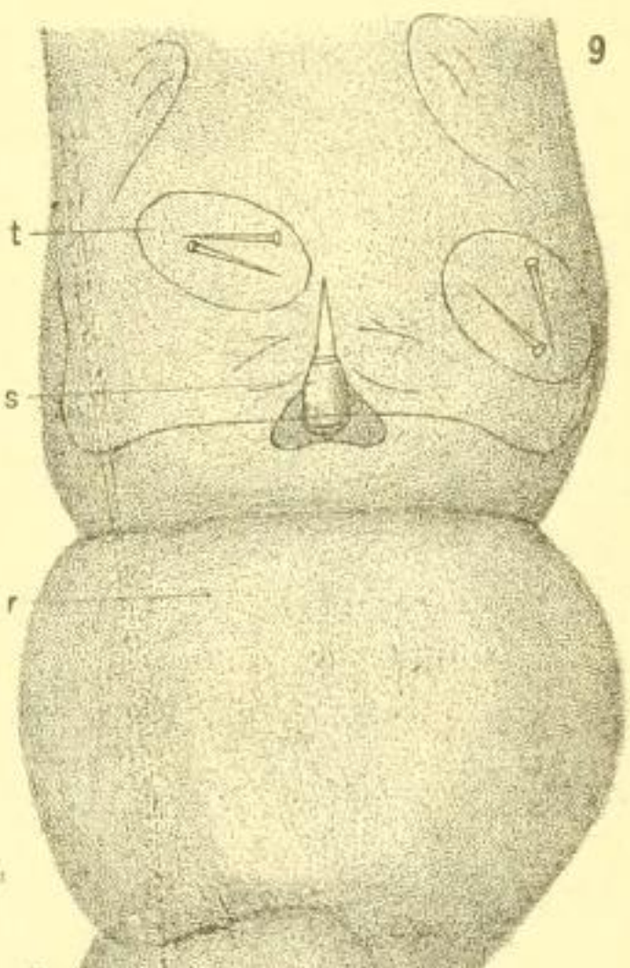


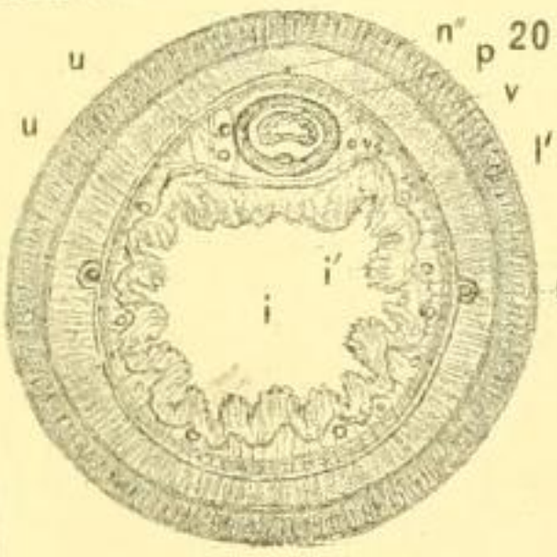


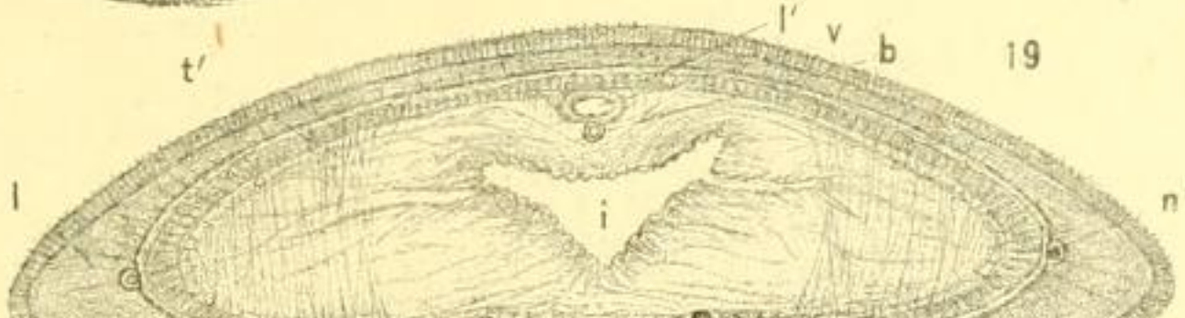












E. Crisand, lith., New Haven, Ct.

NEMERTEANS.

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[Begin Page: Page 382]

XXII. — The Marine Nemerteans of New England and Adjacent Waters. By A. E. Verrill.

The following article is intended as a descriptive catalogue of all the Nemerteans of the North-eastern Coast of North America that have been observed with enough care to permit me to give a description presumably sufficient to enable ordinary observers to identify the species Avhen seen living. Therefore all my own descriptions, herein given, have been made from living specimens, except in a few special instances, which are, in each case, particularly stated.

As a rule, undetermined alcoholic specimens of Nemerteans, unaccompanied by notes on their forms and color's while living, cannot be identified with certainty unless they belong to genera containing very few and widely differing species. To distinguish the numerous species of Atnphijyorus, Tetrastemma, Lmeus, etc., with alcoholic specimens alone, would be a hopeless task, at least in the present state of our knowledge of these groups. Possibly, when all the known species shall have been studied thoroughl}- by means of microscopic sections, it may be possible to distinguish many of the species by means of such sections of preserved specimens, but that will be a condition possible only in the distant future, and in any case would require much time and labor.

Exceptional cases are, however, not uncommon in which some

prominent feature may be preserved in the alcoholic specimens sufficiently well to enable the species to be recognized with certainty. Thus, among the Enopla^ the stylets of the proboscis are frequently characteristic in form or number. The ocelli, often visible in alcoholic specimens, may also be characteristic. In a few cases, even the characteristic colors may be preserved many years in alcohol, and still better in glycerine. I have specimens of Aviphiporus angxilatns [Stimpsotd), preserved in alcohol twenty years ago, in which the dark purple color of the bod}^ and the characteristic white patches on the sides of the head are still very distinct. These specimens have, however, been kept in dark drawers; those that were exposed to light faded many years ago.

In consequence of the difficulty or impossibility of identifying alcoholic specimens, T have, in this article, made very little use of a

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large part of the vast collection of American Nemerteans preserved in the Museum of Yale University, and including those collected by myself and others during the explorations carried on from 1871 to 1887 by the United States Fish Commission, under the direction of the late Commissioner, Professor S. F. Baird.

These collections include several thousands of specimens, filling more than a thousand bottles and jars. They represent very fully

the Nemertean and Planarian fauna of the coast, from Cape Hatteras to Labrador, and from high-water mark to 2000 fathoms. Fortunately I personally identified and labelled when captured a large number of those specimens that belonged to described species, and made copious descriptions and sketches of most of the unfamiliar forms that came, while still living, under my observation diiring all the sixteen seasons spent on the work of the U. S. Fish Commission, as well as during several summers (1864 to 1870) spent in independent researches in the waters of the Bay of Fundy and elsewhere. But there were many specimens, especially deep-water forms, that I did not see until they had been placed in alcohol. Most of those are entirely omitted from this paper. Probably they include a number of additional species.

Many of the general figures accompanying this article were made from life by Mr. J. H. Emerton and Mr. J. H. Blake, under my direction, for the U. S. Fish Commission. For the privilege of using these drawings for the present purpose, I am indebted to the late commissioner, Professor Baird, this article having been in preparation before his death. Other figures have been drawn by myself for this paper. Numerous figures, taken from my own field-notes and rough sketches, have been copied and put into shape by my son, A. H. Verrill, under my personal supervision. The latter are, therefore, quite as reliable as the former ones. A few anatomical figures (on PI. xxxix) have been copied from the works of Mcintosh* and Hubrecht,f in order to illustrate more fully some of the differences between the orders and sub-orders of Nemerteans.

It was originally a part of my intention to have included numerous anatomical details of our native species, based on new preparations and studies, but various circumstances have compelled me to defer that portion of the subject to a future time. Such details are, however, less essential in the case of our Nemerteans than they

* A Monograph of the British Annelids. Part I. The Nemerteans. Ray Society, 1873.

f Voyage of the Challenger, vol. xix.

otherwise would have been, because many of our native species are closely allied to, and several others are identical with, some of those that have been well studied anatomically by Mcintosh and other European writers.

Nemerteans are almost universally present on our shores, between tides at all levels, from near high-water [Lineus socialis) downward. They are also to be found, by dredging, at all depths down to 1000 fathoms or more, but are much more abundant in shallow water (1 to 60 fathoms) than at greater depths. They occur on all kinds of bottoms, but are usually more abundant in soft and partially organic mud than elsewhere. But in rather shallow water, on some hard bottoms overgrown with ascidians, hydroids, and

sponges they are often very abundant, especially in the Bay of Fundy. The littoral Nemerteans occur in greater numbers and of more numerous species on the rocky shores of the Bay of Fundy, and especially in Eastport harbor, than in any other localities where I have collected them.

On sandy shores, also, there are nearly always several species living buried in the sand, to be found easily by the use of a spade. These sand-dwelling forms include the largest species of Cerebratu-hcs, which are, perhaps, the largest of all Nemerteans.

NEMERTINA.

The Nemertinea may be characterized as follows:

Smooth, ciliated, often bright colored, and mostly marine worms, destitute of external paired apjjendages, usually wuth a long and somewhat flattened body, often almost linear; without definite body-cavity. Muscular walls of body thick and complex, not segmented.

Head not very distinct from the body; mouth ventral, beneath the head, or subterminal, without teeth or jaws.

Intestine large, usually straight and furnished with many short, lateral, saccular, often lobed appendages; anus posterior.

A long, tubular, dorsal proboscis is contained in a special muscu-lar sheath, which is filled with a corpusculated fluid and situated above the intestine but entirely separated from it. The pi'oboscis

can be protruded by eversion from a special aperture at the front of the head.

Two pairs of cephalic ganglions are present ; they are united transversely by an upper and a lower commissure, between which pass the proboscis and its sheath. Most species have ciliated pits or sacs connected with the posterior ganglions by ducts leading from

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fossae or grooves on the sides of the head. They are probably olfactory organs. Two large lateral nerves run back from the lower cephalic ganglions; often there is also a smaller median dorsal nerve trunk, and in many there is a continuous nervous plexus between the muscular layers of the body-wall.

Vascular system closed ; a main longitudinal vessel runs along-each side and usually a median dorsal one is situated above the intestine; the blood is usually colorless, rarely red.

A paired nephridial system, consisting of ducts and tubules vari-ously arranged, is usually present in the oesophageal region.

The sexes are almost always separate and nearly all the species are oviparous. Reproductive organs are very simple and similar in both sexes, consisting of simple saccular ovaries or spermaries,

situated along the sides of the body, usually between the lateral saccules of the intestine. External genital openings are mere pores in the body-wall.

Development is usually direct, but sometimes with a metamorphosis through a Pilidium, or free swimming larval form, very peculiar in structure. (Plate xxxix, figures 1 to 6).

Order I, ENOPLA.

Enopla M. Schultz; Mcintosh, Brit. Annelids, Part I, Nemerteans, pp. 36, 43, 134.
Ilojilonemerimillubriicht] Cams, Fauna MediterraneEe, p. 163, 1884.
Hoplonemertea Hubrecht; Voy. Challenger, vol. xix, p. 15.

Proboscis divided into three distinct regions (Plate xxxix, figures 7, 8, 9) ; the first is evertible and tubular ; the middle region (wood-cut 1), is furnished with a hollow miiscular bulb and a complex armature, consisting of a central calcai-eous st^det (o), or a toothed plate, usually accompanied by two or more lateral chambers containing small, pin-like, free spines or stylets (figures 7, "la, and wood-cut 1, r>, I)'), The central cavity of the bulb and the lateral stylifer-ous chambers communicate with the anterior evertible chamber of the proboscis by means of ducts. Proboscis-pore is either terminal, at the end of the snout, or subventral.

Fig. 1. Armature of proboscis of Amphiporus ladifloreus; A, muscular bulb; B, its cavity; c, central stylet; d, d', lateral stylet-sacs: e, duct of d; h, muscular b^nd, (after Mcintosh).

The mouth is small and inconspicuous when contracted, situated beneath the end of the snout and in front of the cephalic ganglions, often in close connection with the proboscis-pore.

Lateral longitudinal cephalic slits are wanting and are generally replaced by shallow, transverse or oblique, ciliated grooves or fossje, connected by narrow ducts with small sacs (probably olfactory in function) that connect them with the posterior ganglions.

Cephalic ganglions rounded, the upper or anterior ones closely united to and largely covering the lower ones. Lateral nerves arise from the posterior ends of the inferior ganglions and run back within the inner muscular layer of the body-wall.

Ocelli various, often numerous; sometimes wanting.

Three large, longitudinal vascular trunks are well developed; a vascular loop in the head.

Intestine large and straight, sacculated. Muscular walls of the body consist mainly of two layers, an outer circular, and an inner longitudinal one.

The young, so far as known, undergo no marked metamorphosis.

The species are chiefly marine; a few fresh- water and terrestrial species are known.

Family, Amphiporid^ Mcintosh (restr.)

Body moderately elongated. Proboscis with a thick, tubular, evertible anterior portion, its walls consisting of about seven layers, the inner surface (or outer when protruded) thickly covered with papillae; middle region furnished with a simple central stylet and generally two or four lateral chambers containing pin-shaped stylets, but the lateral sacs are sometimes wanting; posterior region tubular, with two muscular layers, an outer circular and an inner longitudinal layer. (Esophagus with a dilated and plicated anterior portion in the head.

The family Tetrastemmidm Hubr. is here included. I can find no characters that seem to me sufiicient to warrant even a sub-family distinction between Tetrastemrna and Amphiporus.

On the other hand, I would separate Drepanophorus Hubr. as a separate family, Dbepanophorid^, characterized by having the central armature of the proboscis in the form of a lamina or plate, bearing several stylets or denticles ; by the numerous styliferous sacs ; and by the presence of lateral caecal sacs connected with the sheath of the proboscis.

[Begin Page: Page 387]

Amphiporus Ehrenberg, 1831, Mcintosh, non Dies., nee CErsted.

Oinmatoi)lea khr., Symbohe Physicse, 1831.

Omato'pka Diesing, Syst. Helm., vol. i, p. 248, 1850.

Polystemma Khr., 1831 ; (Ersted, Naturhist. Tidssk., iv, p. 579, 1844.

Polia Quatr. (pars), Ann. des Sci. Nat., vi, p. 201, 1846, non Delle Chiaje, 1841.

Cosmocephala Stiinpson, Prodromus, in Proc. Acad. Nat. Sci., Philad., vol. ix, p.

165 [21, aep. copy]. 1857.

Folina Stimpson, op. cit., p. 165.

OpMonemertes Yerrill, Amer. .Journ. Sci , vol. vii, p. 45. 1873 ; Proc. Araer. Assoc,

1873, p. 389, 1873.

Body only moderately elongated, in some species slender, in others stout ; usually strongly convex dorsally and with rounded sides.

Head often distinct from the narrowed neck, but in other cases of the same breadth as the body and without any definite limita-

tion.

Transverse or oblique ciliated fossje or shallow grooves, two of them connected with the ciliated sensory ducts, are, apparently, always present, though often very indistinct; usually there is a pair at the back of the head and nearly in line with, or just behind, the posterior ocelli and the ganglions; the other pair, situated in front of the ganglions, is usually less distinct and may be easily overlooked, and is perhaps absent in some species. One or both pairs of foss?e may meet on the dorsal line in certain species.

Ocelli usually numerous, variously arranged ; perhaps the most common or typical arrangement is that of two anterior groups and two posterior or cerebral clusters, but either pair may be lacking, or the two groups may blend, and sometimes no ocelli are visible.

Proboscis-pore terminal, or sometimes sub-terminal, just under the tip of the snout. Proboscis large and long. Central armature a simple, sharp stylet with thick base ; lateral stylet-sacs usually two, each with two to four, or more, pin-shaped stylets.

Mouth far forward, usually united with the proboscis-pore, and therefore not visible in contraction.

The numerous species belonging to this genus* were distributed

* Many authors, of whom a few are indicated in the synonymy, have used Ommatoplea Ehr. as the name of this genus, and on many accounts it seems to'me that it wo\ild have been better to have continued that usage. Mcintosh, in his rnonograpli,

has, however, seen fit to change the name to Amphiporus (of tiie same date) for reasons that are. to say the least, of questionable validity, — mainly because somebody may hereafter discover that the " type " of Ommatop)lea is of a different genus, though he gives no reason for supposing that to be the case. In this instance long usage

Trans. Conn. Aoad.. Voi.. VIII. 51 .Thne, 1892.

[Begin Page: Page 388]

among a large number of genera by the earlier writers, especially by those who did not observe the armature of the proboscis, or did not consider it of importance.

In general, it is impossible to distinguish the species of this genus from other genera without an examination of the proboscis and its armature. Hence, no doubt, there are many still unrecognized species of the genus that were formerly described under other genera, from various foreign countries, I believe, however, that all the species hitherto described or mentioned as found on our coast are included in the following list, together Avith several that appear to be undescribed.

CErsted adopted Polystemnia for this genus, and placed under it two typical species; P. roseum and P..pnlchmun. At the same time he restricted Amphiporus to the genus named Nemertes (new sense) by Mcintosh, giving its essential character (a small proboscis) and

naming A. Neesii as the type.

Subgenera of Amphiporus.

The genus may be conveniently divided into several groups or subgenera based primarily on the arrangement of the ocelli and nerves, as follows :

I. Ocelli form four or more distinct groups ; the two cerebral groups are distinct from the anterior ones. — Omnia toplea, subgenus.

lo. Anterior ocelli do not form curved rows parallel witli the lateral margins of the head.

Amphiporus angulahis (Fabr.).

A. multisorus V., sp. no v.

A. heterosorus V., sp. nov.

A. tetrasorus V., sp. nov.

lb. Anterior groups of ocelli form curved rows parallel, at least in part, with the sides of the head. — Polysieinma (Ers. ; Polina Stimp.

^4. roseus (Miiller).

A. lactifloreus (Johnst.).

A. ochraceus V.

A. glutinosus V.

A. griseus (Stimp.).

would have justified him in not making the change before there was any proof of the necessity for doing so.

The cliange having been made in so important a woric, lias been generally adopted by later European authors, and I have, therefore, followed their example in this article, for uniformity of nomenclature in this group is at present of paramount importance.

[Begin Page: Page 389]

II. Only two distinct groups of ocelli, anterior or sub-lateral ; cerebral groups obscure or wanting. — Cosmocephala Stimp.

2a. Only anterior groups of ocelli are evident.

A. frontalis V., sp. nov.

2b. Only median lateral groups of ocelli are present : or else the median and cerebral groups are blended.

A. mesosorusY., s]!. nov.

III. Ocelli form only elongated lateral rows more or less parallel with the

sides of the head ; cerebral groups are not distinct from tlie others.

Body slender. — Ophionemertes Verrill.

A. cruentatus V.

A. virescens V.

A. agilis V.

IV. Only a single pair of anterior ocelli are present.--Z)ic7i//MS Stimj:).

A. bioculatKs Mclnt.

V. Ocelli indistinct or absent. — Naredopsis Verrill, sub-gen. nov.

A. caucus v., sji. nov.

VI. Ocelli doubtful, forming at least a pair of antero-lateral groups (per-

liaps others that are not observed).

A. thallius V,, sp. nov.

VII. Cerebral groups of ocelli (?) alone observed (perhaps anterior ocelli

overlooked). — Nareda Girard.

A. superbus (Gir.)

AilPIIIPORUS.

Analytical Table of s-pecies based ox the arraugeniod of the ocelli.

A. Ocelli present.

B. Ocelli numerous, arranged in groups.

C. Ocelli arranged in four groups ; two cerebral, near the ganglions, and two anterior or antero-lateral.

D. Anterior clusters of ocelli transverse, at the front margin of the head ; posterior groups roundisli.

a. Anterior groups transversely oblong or partly double. A. angidafus.

aa. Anterior groups each divided into three subordinate clusters. A. maltisorus.

DD. Anterior clusters are not transverse at the front margin.

b. Anterior clusters subdorsal, not parallel with the margins of head.

c. Anterior clusters are triangular with the acute angle backward. ^4. heterosorus.

cc. Anterior clusters are oblique I'ows parallel with the posterior ones. A. tetrasorus.

bb. Anterior clusters lateral or sublateral, curved or crescent-shaped, anteriorly partly parallel with the margins of head.

e. Posterior groups forpi round or angular close clusters.

/. Anterior groups are large, composed of several rows posteriorly, and

nearly blend with posterior groups. A. roseus.

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ff. Anterior groups are more simple, distinctly separated from the posterior

clusters, composed of one or two rows, and regularly curved. A. lacti-

floreus.

ee. Posterior groups of few ocelli, which do not form close clusters.

g. Posterior groups consist of one, two, or rarely three, oblique pairs of

ocelli on each side.

/(. Posterior pairs usually two on each side, convergent backward. A.

ochraceus.

hh. Posterior pairs of ocelli divergent backward. A. glutinosus.

gg. Posterior groups linear, each of about four ocelli. A. griseus.

CC. Ocelli arranged in only two distinct clusters.

a. Clusters transverse, -short, in front of ganglions.

b. Clusters transverse, near fi'ont margin of head. A. frontalis.

bb. A large angular cluster on each side of the middle of the head. A.

mesosortis.

cm. Clusters of ocelli elongated, lateral, parallel with the margins of the

head.

c. Ocelli forming a simple row on each side of head. A. cruentatus.

CC. Ocelli in double or triple rows.

d. Ocelli in two or three nearly parallel rows extending back of ganglions.

A. virescens.

(id. Rows of ocelli broad, terminating at the ganglions. ^4. agilis.

BB. Ocelli two only, near the front of head. A. bioctdatus.

AA. Ocelli wanting or indistinct. A. emeus.

Species not included in the above table :

Amphiporus thallius. Ocelli doubtful ; only front groups observed.

Amphiporiis (?) superbus. Ocelli doubtful ; apparently two cerebral groups

only.

Amphiporus angulatUS (Fabr.) Verrill.

Fasciola anguhiia 0. Fabr., in 0. F. Miiller, Verm. Terrest. et Fluv., i. pp. 58, 1774.

Planaria angulata 0. Fabr., in Mulier, Zool. Danic, Prod, p. 221, 177G. (Commuui-

cated by 0. Fabricius, t. Miiller).

Planaria angulata 0. Fabr., Fauna Groenlandica, p. 323, 1780.

Oinatoplea Stimj)sonii Girard. in Siimpson. Invert, of Grand MoBan, p. 28, pi. 2, fig. 18, 1853.

Amj)hiporus Stimpsoni Verrill, Notice of Hecent Addit. to Mar. Invert., Part I, in Proc. National Mus , vol. ii, p. 184, 1879; Check List Marine Invert. Atlantic Coast, p. 12, 1879; Bulletin U. S. Nat. Museum, No. 15, p. 143, 1879 (from Cumberland Gulf).

Amphiporus Fahricii Levinsen, Bidrag til Kundskab om Grceulands Turbellariefauua p. 38, 1879, from Vidensk. Meddel. fra den naturli. Foren. i Kbliva., 1879-80, p. 200.

Plate xxxui, figures 1, la, 2.

Body large and stout, only moderately elongated in extension ; back convex, sides well rounded, lower surface flattened. The bodj- is very changeable in form and can contract into a short, thick,

[Begin Page: Page 391]

oblong mass ; the posterior end is often the broadest part, but frequently in extension the breadth is nearly uniform throughout most of the length ; posterior end obtuse. Head usually more or less distinctly delined, often broader than the neck, oblong or ovate in form, rounded or obtuse in front, nearly always with a conspicu-

ous, pale, angular spot on each side. Ocelli numerous, arranged in two frontal clusters on the white marginal area, and in two dorsal groups ; each of the anterior or frontal ones consists of numerous small ocelli arranged in two or more close rows forming an oblong or crescent shaped cluster close to the antero-lateral margin of the head ; in some cases each of these clusters is double, consisting of a larger, outer or lower group and an upper, smaller one ; but these subordinate clusters are usually more or less blended ; the dorsal groups are smaller and of fewer ocelli, rounded, and situated at the postero-dorsal part of the head, close to the ganglions, and usually on, or just in front of, a narrow whitish line across the neck which marks the position of the transverse fossje. Proboscis large, covered with small papillae. Color of body, above, and middle of head usually deep pui'ple, madder-brown, or purplish brown, sometimes plum-color, chocolate-brown, reddish brown, and orange-brown ; sides and lower surface much paler brown, often flesh-color or pinkish. The head is whitish in front and is almost always con-spicuously marked with two large angular spots or patches of whitisli or flesh-color on the sides above ; most frequently these spots are broad, triangular or trapezoidal, with the apices directed toward the median line above, but separated by a wide dorsal stripe of dark color like that of the body ; in other cases the apices of these spots are more truncated, giving a broad, somewhat squarish form, the shape varying with the extension of the head; a little back of the sjjots a narrow angulated white line, corresponding to the transverse foss;e, crosses the neck, but it is sometimes absent ; in front of the angular spots there is usually another, more conspicuous, white line or narrow band across the dark pigment of the head, but this is

sometimes interrupted dorsally and is then represented by a narrow triangular spot of white on each side of the head ; proboscis, when protruded, reddish.

Length up to 100 to loO"""" ; diameter G to 8"" or more.

Massachusetts Bay to Gulf of St. Lawrence, Labrador, Cumberland Gulf, and Greenland, Very common and of large size at low-water mark, under stones, at Eastport, Me., and Grand Meuan, N. B. I have also dredged it in numerous localities ofi^ Nova Scotia ; in the Bay of Fundy ; off the coast of Maine ; Casco Bay ; off Cape

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Ann ; off Cape Cod, etc., in 4 to 150 fathoms ; and in the Gulf of St. Lawrence, 15 fathoms.

This large and conspicuous species is generally easily recognized by its clear, dark purplish or chocolate-brown color above, with pale margins and a trapezoidal or triangular white spot on each side of the head, and usually with a narrow white line across the neck ; and by the pinkish or flesh-colored lower surface. Ocelli in two or more rows in an elongated group on each antero-lateral margin of the head, and a pair of small sub-dorsal clusters on the transverse white nuchal band.

The Planaria angulata of Otho Fabricius was, without doubt, based on this species ; but his description being ver}^ brief, writers have hesitated in regard to this identification. His description of the characteristic white angular spots on the head, the color, and the habits could, however, apply to no other known species. The rediscovery of this species on the coast of Greenland by Levinsen, and its abundance in Cumberland Gulf, renders it quite certain that Fabricius had this species before him. Hence I have considered it necessary to restore his name.

This species and some of the others herein described, e. g. A. frontalis, evidently belong to the group for which Dr. Stimpson instituted the genus Cosmocephala. Among the characters given, the clusters of ocelli are said to be arranged on the antero-lateral margins of the head. The cerebral clusters may, perhaps, have been ovei'looked in at least one species. Dr. Stimpson has described two North Pacific species that are evidently closely allied to A. angulatus, viz :

Amphiporus Beringianus {Cosniocejjhala Beringiana St.) This was dredged in Bering Straits, in 5 fathoms. It closely resembles a light-colored variety of A. angnlatiis and may be identical with it.

Amphiporus Japoiiicus (^Cosmocephala Japonica St.) was from Simoda, Japan, low water, among rocks. It differs more from our species than does the preceding. It is brown above, with a pale median line, with irregular pale spots on the head, and triangular cervical spots of white ; clusters of ocelli are antero-lateral.*

* Prodromus, in Proc. Phil. Acad. Nat. Sci., ix, p. 165, 1857. The extensive collections of invertebrates made by Dr. Stimpson on the North Pacific Kxploring Expedition were nearly all destroyed in the great Chicago fire by which the Museum of the Chicago Academy of Science was burned. His original notes and drawings were burned at the same time. His colored figures of the Turbellaria and Xemerteans, which I had the pleasure of examining not long before the fire, were numerous and excellent. Had he been able to publish his figures subsequent writers would have found it easy to identify his new genera and species, briefly described in the Prodromus.

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Amphiporus multisorus A^en-iii, sp. nov.

Plate xxxiii, figure 3.

Body moderately long, versatile. Plead rather wider than the body, rather short, rounded in front, separated from the body by a slightly curved transverse fossa on each side. Front ocelli form six small rounded, submarginal clusters ; three clusters each containing 3 or 4 ocelli, are on each side of the front of the head, arranged parallel with the margin ; the posterior ocelli form two roundish, subdorsal clusters, each containing 6 to 8 ocelli, situated near the posterior part of the head, just in front of the pink ganglions.

Color of body, salmon or flesh-color, paler beneath.

Length, in extension, 25 to 35"'™ ; diameter, 3 to 5"'"'. Described

from life.

Eastport, Me., at low water mark, and in 12 fathoms, 1870.

This species, in the form of the body and arrangement of the ocelli, is closely allied to A. angulatus^ of which I formerly supposed it a pale variet3^ The very pale colors, total absence of the white patches on the head, and peculiar grouping of the anterior ocelli are characters that seem to warrant its separation as a distinct species, at least until intermediate specimens be discovered,

Amphiporus heterosorus Ven-iu, sp. uov.

Amphiporus roseus {pars) Verrill, Notice of l^eceat Addit. to Mar. Invert., Part T, in Proc. National Mus., vol. ii, p. 183, 1879. {}wn Milller.)

Plate xxxiv, figures 7, 17.

Body rather stout, rounded, obtuse at each end, versatile. Head obtuse, usually rather wider than the body. Ocelli numerous, arranged in a pair of roundish clusters on the posterior part of the head, and in a pair of triangular clusters at the front; these triangular clusters, having their bases at the anterior margin of the head, extend upward and backward to near the middle of the head and end in an acute apex formed by a few ocelli, larger and more distinct ' than the rest. The posterior groups are smaller, wide apart, and distinctly separated from the anterior ones. A pair of shallow transverse fossse, on the posterior part of the head, runs upward in line with the posterior groups of ocelli. Anterior fossce were not noticed.

Proboscis clavate in extension, large and long, equal to more than half the length, and about one-half the diameter of the body, finely papillose toward the end, and light brownish red in color.

Color of body, above, cherry-red, clear reddish brown, or light chocolate-brown ; the sides and ventral surface flesh-color ; a dark, medial, longitudinal line on the head.

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Length, in extension, 30"""" to 50""^ ; diameter 3"""" to 5"""" ; length of proboscis, in extension, 25"""" ; diameter i-o"^"^ (Xo. 5).

The specimens described above, from life, were taken off Cape Ann, Stat. 136 (U. S. F. C), in 26 fath., sand, 1878. Eastport, Me. ; Bay of Fundy ; Gulf of Maine ; Casco Bay ; Massachusetts Bay ; off Cape Cod ; common in 10 to 200 fathoms, on muddy and sandy bottoms.

Amphiporus tetrasorus Ven-iii, sp. nov.

Plate xxxiv, figure 6.

Body very changeable, in extension roundish, I'ather thick, tapering but little, obtuse at both ends. Head as wide as body, usually obtuse or subtruncated in front, separated from the body by conspicu-

ous transverse fossae which curve upward and forward on each side; on the under side of the head these fossfe run forward, on each side, to the mouth. Ocelli nvimerous, forming two oblique, oblong, nearly parallel clusters on each side, the posterior ones just in front of, and parallel with, the transverse fossae.

Color of body, above, chocolate-brown, darker medially ; head, in front of eyes, white ; body, beneath, whitish.

Length, 26 to 30"""" ; diameter, 2"^"". The specimen described above, from life, was dredged at Station 132 (U. S. Fish Com.), off Cape Ann, Mass., in 45 fathoms, mud, July, 187^8.

Amphiporus lactifloreuS (Johnston) Mcintosh.

Plavaria Inctiflorea Johnston, Zool. Journal, vol. iii, p. 489, 1828.

Nemertes lacUfiorea Johnston, Mag. Zool. and Bot., vol. i, p. 5.35, pi. xvii, f. 2 and ?,,

1837.

Borlasia alba W. Thompson, Ann. Nat. Hist., vol. xv, p. 320 (with woodcut), 18-45.

Polm mandilla Quati;efages, Ann. des sc. nat , 3"" ser., Zool , torn, vi, p. 203, tab. 8,

figs. 1 and la, and tab. 9, fig. 2, 1846.

Nemertes mandilla Diesing, Syst. Helm., vol. i, p. 274, 1850.

Omafoplea mutabilis Diesing, op. cit., p. 262, 1850.

Omatoplea rosea Johnston, Catalogue P>rit. Mus., p. 23, plate na, f. 2, 2*, 2**, 3,

and 3* 18G5.

Omatoplea alba .Johnston, op. cit., p. 23, 1865.

Amj)hiporus laclifloreus Mcintosh, British Annelids, Part I, Nemerteans, p. 156,

plate 1, figs. 1 and 2, 1873; Jensen. Turbellaria ad Lit. Norvegije, p. 80, 1878.

Amvhiporus laclifloreus Verrill, Notice of Recent Addit. to Mar. Invert., Part 1, in

Proc. National Mus., ii. p. 184. 1879.

Plate xxxix, figures 7, 7a.

Body rather elongated, roundish above and on the margins, flattened l)eneath, of nearly uniform breadth fi'om the head to near

the posterior end. Head often somewhat expanded, a little flattened, obtuse or subacute in front according to state of extension. Ocelli form, on each side of head, a nearly simple submarginal row- on the antero-latei'al part, and beliind the ends of each of these rows there is a small cluster of about three or four ocelli on each side, near the ganglions.

Color dull white, grayish, or pale flesh-color, often with a darker stripe along the back due to the proboscis-sheath; along the margins, especially beneath, the lateral sacs of the alimentary canal are often visible. Length 50 to 75"'™; diameter 4 to 6"'", in extension.

Eastport, Me., and Grand Menan, N. B., at low-water mark, under stones.

This species, which is here referred, with some doubt, to the European form, is not uncommon on the shores of the Bay of Fundy.

Amphiporus roseus (MiiUei).

Fasciola rosea 0. F. Miiller, Verm, terrest. et fluv. hist., i, 2, p. 58, 1774.

Planaria rosea Miiller, Zool. Danic. Prodr., p. 221, NTo. 2679, 1776; Zool. Danic, vol. ii, p. 31, tab. 64, fig. 1 and 2, 1788.

Nemertes pulchra Johnston, Mag. Zool. and Bot , vol. i, p. 5.T6, pi. xvn, fig. 6, 18.'?7.

Polystemma roseum CErsted, Kroyer's Nat. Tidss., vol. iv, p. 579, 181^7.

Polysteinma pulchruTTL (Ersted, op. cit., p. 580, 1837.

Omafoplea rosea {pars) Diesing, Syst. Helm., vol. i, p. 251, 1850.

Omatoplea pukhra Diesing, op. cit., p. 252, 1850.

Ommatoplea pulrhra Johnston, Catalogue Brit. Mus., p. 24, pi. iia, fig. 6 and 6*, 1865.

Amphipor-us pulcher Mdnt., British Annelids, Part I, N'emerteans, p. 158, pi. i, fig. 3; PL. XIT, fig. 11, 1873.

Plate xxxiv, figures 5, 5a, 5fe.

Body rather stout, not much elongated, tapering somewhat to both ends. Head usually broader than the body, ovate in extension, obtuse in front, separated from the body by a slightly marked, curved, transverse groove or fossa on each side. Ocelli numerous, arranged somewhat in four groups, the anterior pair lateral or submarginal, the posterior subdorsal; the anterior clusters form long, crescent-shaped groups or nearly simple rows on each side, running somewhat parallel with the antero-lateral margins of the head, but curving inward posteriorly, so that their posterior ends nearly meet on the median dorsal surface; the two posterior groups, which are opposite the hinder portion of the crescents and nearer the postero-lateral margins of the head, have an irregular I'oundish or ovate

Trans. Conn. Acad., Vol. VIII. 52 June, 1892.

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form and are often almost united to the front groups by a few ocelli scattered between them.

Color of body, above, clear orange-red, paler beneath.
Length of the specimen described above, from life, 18 to 20"""; breadth 5"'™. Massachusetts Bay to Bay of Fundy, in various localities, low- water to 112 fathoms. The specimens above described were taken at station 38, 1877, in 112 fathoms, off Grand Menan,

Amphiporus OChracens Verrill, Check List Invert., 1879.

Cosmocephala ochracea Verrill, Invert, of Vineyard Sound, etc., pp. .^1, 336, pi. XIX, figs. 95, 95ff, 1873.

Plate xxxiii, figures 5, 6; Plate xxxtx, figure 8.

Body elongated, moderately slender, somewhat flattened, but thick, with the margins rounded, obtuse at both ends, or subacute posteriorly ; broadest and often swollen anteriorly; gradually and

Fig. 2. Amphiporus ochraceus. Head and part of body, to show ocelli, enlarged.

sliglitly tapering posteriorly; the integument is translucent and the internal organs show quite distinctly ; lateral (saccular) organs voluminous, extending nearly the whole length of the body along each side, and showing through as dull yellowish white mottlings. Head usually ovate, slightly wider than the body, obtuse; a slight fossa or groove, usually appearing as a whitish line on each side, runs obliquely across the ventral and lateral surface of the head, diverging from the mouth and curving somewhat forward and upward at the sides; another, less distinct, is situated farther forward on each side of the head. Proboscis-pore small and inconspicuous in contraction; mouth, small. Ocelli numerous, but varying somewhat in number; the anterior ones form a submarginal curved row along each side of the head, anteriorly, but curve inward farther back ; just back of these, on each side, there are usually four distinct posterior ocelli, standing two by two, obliquely. Color dull yellowish, or yellowish white, often tinged with deeper yellow or orange ante-

riorly, with the median line lighter ; the position of the cephalic ganglions is shown by faint reddish spots between the posterior groups of ocelli.

Length, 50"'™ to VO""; breadth, 2-5"" to 3"".

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The proboscis is large and thick (PL xxxix, fig. 8). The central stylet (PI. xxxiii, fig. 5a) has a rather narrow, oblong shaft, rounded at the base, and with broad basal alfe; the two lateral sacs usually contain only two stylets each.

Common between tides and in tide pools, under stones and creeping among algie, hydroids, bryozoa, etc., on the piles of wharves and other similar places. Also dredged frequently in 2 to 20 fathoms, on stony or shelly bottoms, ofi: New Haven, Conn. ; Thimble Islands; Noank, Conn.; Newport, R. I.; Woods Holl, Mass.; also dredged at numerous other localities in Long Island Sound and Vineyard Sound. North of Cape Cod it is less abundant, but I have dredged it at manj" stations, at moderate depths, in Massachusetts Ba3^ It also occurred between tides on the north shore of Cape Cod, at Provincetown and Barnstable, Mass.

Amphiporus glutinosus Verriii.

Polina ghdinosa Verrill, Invert. Animals of Vineyard Sound, etc., p. .337, plate xix, fig. 97, 1873.

Plate xxxv, figure 5.

Body rather slender and elongated in extension, usually broadest in the middle and tapering to both ends, but quite versatile in form; head not distinct, usually obtuse ; posterior end narrower, usually obtuse or slightly emarginate; integument soft, secreting a large quantity of mucus; the lateral organs extend close to the head. Ocelli numerous, variable in number, usually eight or ten on each

Fig. 3. AmpJiiporus glutinosus. Outline, enlarged.

side, arranged in three pairs of short, oblique, divergent rows, two to four in each; proboscis-pore moderately large terminal; no lateral fossa? were observed. Color dull yellow or pale orange-yellow, sometimes brighter orange, especially anteriorly; posteriorly usually lighter, with a faintly marked dusky or greenish median line.

Length, 25""" to 30""" in extension; breadth, 1-3""" to 2""". 'Great Egg Harbor, N. J., to New Haven, Conn., and Wood's Holl, Mass.; low- water mark to 6 fathoms, usually among hydroids and bryozoa.

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Amphiporns griseus (Stimp.) Verriii.

Polina grisea Stimp., Proclromus, iu Proc. Philad. Acad. Nat. Sci., vol. ix, p. 164, 1857.

Body rather long, a little depressed, sub-cylindrical in extension, pale gray in color. Head distinct, ovate, or subcordate, narrower than the body, acute in front. Anterior clusters of ocelli larger, elongated, partly submarginal on the antero-lateral margin of the head; ocelli ten in each cluster. Posterior clusters cervical, small, linear, with four ocelli in each.

Length 0'8 inch; breadth 0-04 inch.

In the harbor of Norfolk, Va., sublittoral, among algie in muddy places.

The above is a translation of Dr. Stimpson's Latin diagnosis. The species appears to be closely allied to A. glutinosus.

Amphiporus frontalis Yen-ill, sp. nov.

Plate xxxiv, figures 1, la, \h, 8.

Body large, versatile in form, rather elongated, convex above, but somewhat depressed in extension, of nearly uniform breadth to near the ends, which are obtuse. Head in extension usually broader than the neck and separated by a slight constriction, usually longer than broad, but it may shorten into short ovate or broad rounded forms;

front margin often emarginate, A well-marked, but shallow, oblique, transverse, ciliated fossa at the posterior border of the head, on each side, curves inward and usually somewhat forward, but does not reach the middle line; in some states of contraction these fossae curve backward ; underneath, the fossae run very oblicpiely backward and inward, when the head is extended. Near the front of the head, on each side, a short curved fossa runs inward and curves forward, nearly parallel with the posterior ones, beneath the head they curve inward and backward but they recede in a V-shaped curve on each side of the head. Ocelli rather large and conspicuous, blackish, arranged in a single irregular cluster, or double row, of six to eight or more, on each side of the front and near the margin of the head. Mouth close to the proboscis-pore.

Color translucent white, or pale gray, or yellowish, with a darker dorsal band ; sides of body mottled with pale pink or yellowish, due to the internal organs.

A vai'iety taken at Eastport, Me., at low water, 1868, was translucent pale salmon, or flesh-color, mottled laterally with purplish and yellowish, due to the internal organs, while the median dorsal

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region was greenish, apparently due to the contents of the intestine. Ocelli about 10 in each cluster.

Length, in extension, 100"""; diameter 3""".

Length 25 to 125"""^; breadth about 3 to 5"""\ An individual 5 inches long can contract to less than 2 inches.

Eastport, Maine, low water, 1868 and 1870.

Amphiporus meSOSOrUS Verrill, sp. nov.

Plate xxxiv, figure 9.

Body not much elongated, rather thick, well-rounded. Head of the same breadth as the neck, obtuse in front. Posterior transverse fossje rather shallow and indistinct. Ocelli numerous, forming a large, irregular, somewhat triangular cluster on each side of the middle of the head, the apex of the groups pointing backward toward the ganglions. In some cases these clusters seem to consist of two rather roundish cerebral groups, which blend with two short, triangular lateral groups.

Color above, bright red; beneath, liesh-color. Length 50"""; breadth 3""".

Massachusetts Bay, off Salem, Aug. 13, 1877, station 30 (three specimens)

Amphiporus cruentatUS Verrill, Proc. U. S. Nat. Mus., vol. ii, p. 184,

1879.

Plate xxxiii, figures 7, 8, 8a; Plate xxxv, figure 3; Plate xxxix, figure 9.

A species peculiarly characterized by having red blood, so that the longitudinal vessels appear distinctly red through the translucent integument. Body soft, flaccid, versatile, in full extension slender, tapering to both ends, but capable of becoming thicker and obtuse or even swollen posteriori}'-, and of contracting into a short stout form. Head not very distinct, scarcely broader than the neck, snout strongly ciliated. Ocelli about 8 to 12 on each side of the head, in a simple, interrupted, longitudinal, sublateral row, the most anterior ocellus distinctly the largest. Two slight transverse grooves on each side of the head, apparently not extending across the dorsal side, the anterior ones curving forward in front of, and the posterior ones behind the ganglia. Proboscis long, densely covered with elongated, conical papilla?, ; &. simple central stylet, with two small, pin-shaped lateral ones on each side (PI. xxxix, fig. 9).

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Color light flesh-color or yellowish white with conspicuous bright red median and lateral blood-vessels.

Length 25™'° to 40™"'.

Vineyard Sound, 4 to 10 fathoms; off Newport, R. I., 3 to 8 fathoms. Not very common.

AmphiporUS Virescens Vernll, Proc. Nat. Mus., p. 183, 1875.

Nemertes, sp. undet. (c) Yerrill, Invert. Vineyard Sd., p. 335, 1873.

Plate .xxxiii, figures 4, 4fl, 45, 4c, 4f7, 4e.

Body, in extension, broadest anteriorly, rather depressed, long, slender, tapering gradually to the rather attenuated posterior end. Active in its movements. Head changeable in form, rather large, in expansion usually ovate, broader than the body, depressed, and obtusely rounded in front. A pair of faintl}'^ marked, nearly transverse f ossfe runs up on each side .of the posterior part of the head, crossing the rows of ocelli; farther forward and parallel with these there is another pair of similar furrows that cross the eye- patches, and beneath the head curve forward to the mouth. Ocelli numerous, forming a long lateral cluster on each side of the head; anteriorly each cluster consists of three or more rows, but backward the interior rows cease, finally leaving only the outer row, which extends back beyond the head and neck. Proboscis in partial extension clavate and covered with prominent papillae ; central stylet with an oblong shank, which in one mounted specimen is light greenish blue, together with the transverse, pigmented band near it. Color clear light green, varying in tint.

Length of largest specimen seen, about 40"""". New Haven and Noank, Conn.; Newport, R. I.; Wood's Holl, Mass., etc. Common

in shallow water among hydroids and ascidians, and on the piles of wharves between tides.

Amphiporus agilis VerriU.

Ophionemertes agilis Verrill. Am. Jour. Science, vii, p. 45, pi. 1, fig. 1, 1873; Vpr-rill, Expl. of Casco Bay, in Proc. Amer. Assoc, for 1873, p. 389, pi. 2, fig. 4.

Amphiporus agilis Verrill, Notice of Recent Addit. to Mar. Invert , Part I, in Proc. National Mus., ii, p. 183, 1879.

Plate \.\.\v, figure 4.

Body versatile, slender and elongated in extension, slightly de-pressed, with the sides well rounded, thickest in the middle, taper-ing gradually to the slender, obtuse posterior end. Head some-what separate from, and wider than, the anterior part of the body, changeable in form, often oval, sometimes sub-triangular, generally

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longer than broad, narrowed anteriorly, obtuse or slightly emar-ginate, with a terminal proboscis-pore. Ocelli numerous, forming

Fig. 4. Amphiporus agilis. Outline, enlarged.

a long, crowded, lateral row or group along each side of the head;

the rows are simple and convergent anteriorly, posteriorly they become broader and double. Back of the ocelli there is a curved transverse groove or fossa, crossing the back of the head. No anterior fossoe were observed. Color pale ocher-yellow ; median dorsal line slightly reddish ; the internal lateral organs lighter yellow, giving a reticulated appearance to the sides.

Length 25™"' to 40""; diameter 1-5"'™ to 2™"\ Described from life (No. 546).

Casco Bay, 20 to 65 fathoms; Bay of Fundy, 10 to 90 fathoms; Massachusetts Bay and off Cape Cod, 12 to 60 fathoms.

This species is very active and restless. It creeps with a rapid gliding motion, frequently moving its head from side to side, and in confinement is apt to creep above the edge of the water and perish by drying up. It secretes mucus abundantly and forms tubes of that material. It also creeps on the surface of the water, back downward, like most of the species of Tetrasternma, which it closely resembles in habits.

AmphiporuS bioCUlatUS ? Mcintosh.

Plate xxxiv, figures 3, 4, 15.

Body rarely more than 1*5 inches long, soft, changeable in form, in extension usually rather short and thick, roundish, tapering only slightly toward the ends, which are usually obtuse ; the posterior region is sometimes broader; head not wider than the l)ody, not

distinctly defined, in extension tapering to the front end, which is usually subacute ; ocelli two, forming a pair, close together and near the front margin of the head. A pair of small, rather faint, anterior transverse fosste passes upward and forward on the sides of the head, just back of the eyes, usually showing only as pale lines, apparently not meeting dorsally.

Color dark orange-red, varying to pale orange and salmon, with paler margins and ventral surfaces and usually with darker brownish mottlings along the sides posteriorly, due to the internal organs;

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the large proboscis-sheath and proboscis can often be seen indistinctly along the median dorsal region.

Length, in extension, about 35 to 40"""" ; diameter 2*5 to 3-5"'™.

Length of a specimen from station 811, in 19 fathoms, 18 to 20"^"^; diameter 1-25 to 2"^™.

Proboscis large ; its armature consists of a slender central stylet having an elongated, narrow, oblong or cylindrical shaft, surrounded by a small dark-colored basal expansion. Below the stylet there is a dark pigmented transverse band. Described from living specimens.

Long Island Sound, near New Haven, etc. ; Fisher's Island Sound ; and Vineyard Sound, in I to 10 fathoms, not uncommon. Noank, Conn., in harbor mud, IBH. Off Block I., 19 fath., sand, (Sta. 811).

Amphiporus CaeCUS Verrill, sp. nov.

Nemertesf, sp. undet. (a), Invert, of Vineyard Sound, etc., p. 335, 1873.

Plate xxxiv, figures 2, 2a, 26, 2c.

Body soft, oblong, flattened, obtuse at both ends, the edges rounded. Head not distinctly separated from the body and of the same breadth ; a faint whitish groove crosses the neck, receding in the middle above, and extends around on each side to the ventral surface, on which it advances in the middle, or runs directly across, according to the state of contraction. No ocelli. The cephalic ganglions can usually be seen through the integument of the head, especially on the lower side, as reddish spots.

Color bright orange-red; lighter orange-yellow along the sides; usually with a median dorsal stripe of darker red.

Length, in extension, 35 to 40™"; diameter 2*5 to 3™"\ Described from living specimens.

North of Block Island, 18 to 20 fathoms, Aug. C, 1874.

Amphiporus CSeCUS Young.

Body verj' slender. Head acute. Ocelli none. Proboscis with a central stylet having a narrow oblong shaft and expanded base, much as in that of A. ochraceus; lateral stylets not obsei'ved, perhaps wanting.

Color pale yellowish white, with the head red.

Length about 6 to 7"^™.

Station 812, in 28 fathom.s, sand. Off Block Island, 1880,

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Amphiporus thallius Verriu.

AmpMporus sp., Verrill, Bulletin U. S. Nat. Mus., No. 15, p. 143, 1879 (with description).

Body, as preserved in alcohol, thick, not very long, somewhat depressed, tapered a little to both ends, which are obtuse. Head not very distinct, of the same width as the body; transverse foss?e at back part of head not very distinct, running back obliquely on each side, so as to form a V-shaped line on the middle above. Ocelli minute, arranged in a small roundish cluster on each side, on the pale antero-lateral margins.

Color, in alcohol, dark bluish green above ; under surface and

margins of head yellowish white. In life " bright pea-green "
(Kumlin). Length, in alcohol, 25 to 30"""; diameter 4 to 5""".

Cumberland Gulf, N. lat. 66°, October 4, 1887; Arctic Island, at
low water, Sept. 13, 1877 (Kumlin coll.).

The very peculiar and strongly marked color, which persists for
years in alcoholic specimens, appears to be characteristic of this
species.

Amphiporus (?) superbus Verrill.

Nareda superha Girard, in Stimpson, Invert. Grand Menan, p. 28, pi. 2, fig. 17, 1853.
Plate xxxiy, figure 16.

This species was dredged oif Grand Menan in 40 fathoms by Dr.
Wm. Stimpson. The description by Girard was evidently based on
the drawing furnished him by Dr. Stimpson, and could not have
furnished anything more than the external appearance. I have
reproduced the original figure, somewhat reduced by photography.
The original description is as follows:

"Nareda Grd."

"Body elongated, subcylindrical. Head obtusely triangular in
front, neck slightly contracted; one pair of rounded ocelli."

" iV! SMjt>er5a Grd. — Length from one to two inches; body pos-
teriorly 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 fathoms, in the Hake Bay."

The only character mentioned which could have been considered as of generic value is the presence of two eyes (?) on the white

Tbans. Conx. Acad., Vol. VIII. 53 June, 1892.

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nuchal band. But it is much more probable that those spots represented either the cephalic ganglions, which usually show themselves in that position in this group, or else clusters of small ocelli.

In the latter case there may also have been small anterior ocelli that were overlooked. Either supposition is consistent with its supposed relation to the known species of Ariq^Jdporus with many of which it agrees in form.

Although I have spent })art of several summers dredging in the region of Grand Menan, and have dredged even in the same locality where this species was obtained, I have never met with a Nemertean that could be referred to the same species with certainty, even

after making allowances for errors in the original drawing. The nearest approach to it that I have seen, is a red variety of A. angii-latus in which the angular pale spots on the sides of the head are nearly obsolete, and the front ocelli inconspicuous. I have, there-fore, reproduced the original description and figure.

Tetrastemma Ehrenberg, 1831.

Folia {parb) Quatr , Ann. des sci. nat., vol. vi, 1846.

(Erstedia Quatr., op. cit, p. 22! ; Dies., Syst. Helm , vol. i, p. 2-J7 {aon lluhreclit).

Tetrastemma Diesing, Syst. Helm., vol. i, p. 2.'JG, 1850; ytiuipsoii, Prodroiiius, in

Acad. Nat. Sci. Philad , p. 163 [19], 1853.
Nemertes {pars) Dies., Syst. Helm., vol. i, p. 269, 1850.

Body rather small, moderately elongated, often nearl}' terete. Head in some species wider than neck, but in many species of the same breadth. Transverse fossae usually two on each side of the head, more or less oblique. Ocelli four, arranged in a quadrangle. Proboscis Avith a central stylet and two lateral chambers, each usually containing two to four stylets.

A terrestrial species of Tetrastemma (7\ agricola) has been described from the Bermudas by Moseley. Fresh water species of the same, or a closely allied genus, are also known.

Tetrastemma candidtim. (Fabr.) (Ersted.

? Fasciula Candida 0. Fabr. in 0. F. Miiller, Yerm. terreyt. et fiuv. hist., I, ii, p. 71,

1774.

?Planana Candida 0. Fahr. in 0. F. Miiller, Zool. Dan. Prodr., p. 223, No. 2704,

1776; 0. Fabricius, Fauna Groenlandica, p. 327, 1780.

Planaria quadriocutata (pars) Johnston, Zool. Jour., vol. iv, p. 56, 1829.

Nemertes quadriocidata Johnston, Mag. Zool. and Bot., vol. i, p. 535, pi. xvu, fig. 4,

1837.

Tetrastemma varicolor (pars) (Ersted, Kroyer's Naturhist. Tidss., iv, p. 575, 1837;

Diesing, Syst. Helm., vol. i, p. 257, 1850.

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Tetrastem7na grcenlandicum Diesiug-, op. cit., p. 259.

Tetraslemma Candida Mcintosh, British Annelids, Part I, Nemerteans, p. 167, pi. ii,

figs. 2, 3, 1873 (non Diesingr, Syst.); Levinsen, Groenlands Turbell, p. 39 [200],

1879; Verrill, Amer. Jour. Sci , vol x, p. 40, 1875; Check List, 1879.

PL.4.TE XX.XIII, FIGURES 9, 10, lOft; PL.\TE XXXV, FIGURES 9, 10.

Body very contractile, in extension slender, elongated, somewhat depi-essed, tapering backward and often attenuated toward the posterior end. Head in usual extension rather wider than the body. Ocelli rather large, conspicuous, reddish brown, nearly in a square, but when the head is fully extended, the two pairs are farther apart than the distance between those of a pair.

Color variable, usually pale green, greenish white, or yellowish white, translucent, and generally with indistinct lateral grayish mottling, due to the internal organs; sometimes the intestinal area is decidedly greenish, while the sides are pale yellow ; at other times the median region is whitish and the sides pale green. Several specimens, taken at Eastport, Me., in South Bay, 8 to 10 fathoms, mud, 1868, were clear cream color above, whitish below.

Length in extension 25 to 32™"^; diameter 1 to 2"""".

Common at many localities between tides, among alg?e, hydroids, and bryozoa from New Haven, Conn., to the Bay of Fundy. Also dredged at moderate depths, 1 to 14 fathoms, in many localities.

This species is very active ; it creeps rapidly with a gliding motion. The relatively larger size of the head, more conspicuous eyes, and lighter colors, as contrasted with the following species, are its most distinctive characters.

It seems to me very doubtful whether the Planarki Candida of Fabricius was this species. The large size and the habits given by him, and lack of mention of the eyes are against that view. His

species may have been Amphi-iw^-us lactifloreus, a Greenland species.

Tetrastemma Candida. Variations.

Several specimens of the variety figured on |)late xxxtii, figs. 10, 10a, were taken on the piles of the wharves at Gloucester, Mass., July 24, 1878. These were probably not full grown. The body was 8 to 12""" long, in extension, slender, very changeable, usually of nearly uniform breadth to near the ends. Head obtuse and usually a little wider than the body, but very changeable in shape; when extended the ocelli were farther apart longitudinally than transversely, but when the head contracted, as in progression, the two paii's of ocelli were broiight near together', as' shown in the

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figures. The form and direction of the two pairs of rather indistinct, transverse cephalic fossae also varied greatly with the changes in the shape of the head. The two lateral stylet-sacs of the proboscis contained three stylets each.

Color of body, above, pale yellowish green, or pale brown; head with an opaque, flake-white spot in front of the eyes; along the margins of the body the internal organs produce series of brownish, irregular, transverse spots or blotches, varying in depth of color; alternating with these spots, and so interrupting the marginal dark

bands, there are small, rounded whitish spots, probably due to the ovaries.

Tetrastemma elegans Vemii.

Tetrastemma elegans Verrill, Amer. .Journ. Sci., vol. x, p. 40, 1875.

? Hedate elegans Girard, Proc. Boston Soc. Nat. Hist., vol, iv, p. 186, 1852.

Plate x.xxiv, figure 10.

Body, in extension, longer and more slender than most species of the genus, depressed, broadest in the middle, tapering both ways.

Head ovate, broader than the neck, obtuse or emarginate in front; lateral fossa? not very distinct. Ocelli conspicuous, nearly in a

Fig. 5. Tetrastemma ekyans. Dorsal view.

square, the front pair rather nearer together than the others. Color above, striped with two broad brown lateral, and a wide median, yellow stripe; the median stripe is clearly defined, clear light yellow and occupies about a fourth of the breadth of the back; it extends to the front of the head, becoming narrow on the neck and then expanding on the middle of the head; a narrow ring of light yellow surrounds the neck, just behind the head; the two stripes of dark

brown are well defined, but have irregular margins and are varied in color by paler specks ; lower surface and margins of body and head pale yellow.

Length 20™™; breadth 1 to l-5"""\ Described from life.

Noank, Conn., among eel-grass ; Fisher's Island Sound, 2 to S fathoms; Wood's Holl, Mass., on piles of wharf.

A paler vai'iety occurs in which the lateral bands are lighter brown, interrupted by yellowish spots, and the dorsal stripe is less clearly defined."

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Tetrastemma vermiculus (Quatr.) stimpson.

Polia vermiculus Quatrefap:es, Ann. des sc. nat., ser. Ill, Zool., vol. vi, p. 214, 184G;

Voyage en Sicilie, vol. ii, p. 12G, pi. xiv, figs. 12, 13, 1849.
Nernertes vermiculus Diesing, Syst. Helm., vol. i, p. 270, 1850.
Tetrastemma vermiculus Stimpson, Proc. Acad. Nat. Sci. Philad, vol. ix, p. 1G3 (19),

1857 ; Diesing, Revis der Turbell., p. 290, 1862.
Tetrastemma vermictila Mcintosh, British Annelids. Part I, Nemerteans, p. 169,

Plate HI, fig. 3, 1873.

Tetrastemma vermicuhts Verrill, Notice of Regent Addit. to Mar. Invert., Part I, in

Proc. National Mus., ii, p. 184, 1879; Check List, 1879.

Plate xxxiii, figures 11 to lie; plate xxxiv, figures 11, 12; plate xxxt,

FIGURES 8, 11.

Body versatile, rather slender in extension, obtuse at both ends; sometimes tapered to the posterior end, but more often of nearly uniform diameter. Ocelli conspicuous, the two pairs i-ather far apart when the head is extended, those on the same side farther separated than those of a single pair, and connected by a dark line of pigment, which is rarely absent.

Color rather variable; above, often pale yellowish, or pale salmon, or translucent yellowish gray, more or less specked or spotted, especially along the sides, with brown, often leaving a paler, wide, rather indefinite dorsal stripe ; ventral surface and front of head pale.

Length, in extension, about 20™™; breadth 1""°. Described from life.

Many specimens taken at Wood's Holl in the mud of Little Hai'-bor, .Tuly 25th, 1881, and August 4th, 1882, varied from dull orange-yellow to bright greenish 3^ellow, more or less covered with specks of brown, especially on the sides, yet not forming a definite dorsal stripe, but with a darker brownish, often indistinct stripe on each

side of the head between the eyes.

Length up to 18 to 20""".

Yoimg — several young specimens of this species were taken together in a tide-pool, in 18*78 (No. 12).

Body slender, of nearly the same width throughout. Ocelli conspicuous, the two pairs more widely separated than usual when tlie head is extended ; the front ones a little larger than tlie others. Color translucent pale yellow, bright salmon, and flesh-color, usuallv with a white median spot in front of the anterior ocelli, and sometimes, also, with other white specks along the back; frequently an irregular brownish band runs along each side of the back; median line paler. Li many of the specimens a faint longitudinal line of

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dark brown pigment specks runs between the ocelli on each side. In one example the median region, posteriorly, Avas green probably from the contents of the intestine showing through the integument.

Gloucester, Mass., at Ten Pound Island, in a tide-pool at low-water, among algse.

This European species is common among hydroids, bryozoa, ascid-

ians, etc., between tides, on rocks, piles of wharves, and in tide-pools, from Long Island Sound to the Bay of Fundy. I have, also, often dredged it in 2 to 12 fathoms, at various localities on hard bottoms. It is especially abundant among ascidians in Vineyard Sound, in 6 to 10 fathoms. Very common at Noank, Conn., in the harbor, on muddy bottoms among eel-grass. Common in similar places and on piles of wharves, at Wood's PIoll, Mass., and Newport, R. I.

Tetrastemma vermiculus, variety catenulatum uov.

Plate xxxiv, figure 12; plate x.vxv, figure 11.

Form and size essentially as above described. Ground-color, at>ove, light salmon, pale yellow, or yellowish gray, thickly covered along the sides with irregular specks, spots, or blotches of brown, which at moi-e or less irregular intervals extend upward toward or across the middle line, interrupting the median dorsal light stripe, which is often thus divided into a series of irregular oblong or elliptical spots; sometimes there is also a row of small brown spots along the median line; middle of head pale, often with flake- white specks; stripe of dark color, more or less distinct, between the two eyes of each side ; lower surface pale yellow or yellowish white. Length up to 18"""; diameter 1""". Described from life. Specimens of this marked variety are common in the harbor at Wood's Holl, Mass.

Other specimens, from the same locality, were noted as follows: Body very changeable, often, in extension, narrow or sub-acute at both ends and more or less swollen in the middle, at one or more

places, at other times nearly cylindrical or terete. Color pale vellowish or grayish green, with a darker central line on the pale dorsal stripe and with irregular, transverse, lateral markings. Or specks of darker brown are scattered over the back, and are often arranged in imperfect lateral stripes, leaving a paler, wide, more or less irregular and interrupted median stripe; lower surface pale. Ocelli reddish brown, forming nearly a square. Usually a line of dark pigment connects the two ocelli of the same side (No. 857).

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Tetrastemma dorsale (Abiidgaard) Mclut.

Planaria dorsalis Abiidgaard, Zool. Danic, vol. iv, p. 25, tab. 142, figs. 1-3, 1806.
Tetrastemma fuscum (Ersted, Kroyer's Natiirhist. Tidss., iv, p. 575, 1844.
(Erstedia maculata Quatr., Ana. Sci. Nat., ser. Ill, vol. vi, p. 222, pi. viii, fig. 2.
Tetrastemma marmoratum Claparede, Beobach. iiber Anat. u. Entwickluiig., etc., p. 24, pi. v, fig. 14, 1863 (variety).
Tetrastemma variegatuvi Johnston, Catalogue Brit. Mus , pp. 20 and 289, 1865.
Tetrastemma dorsalis Mcintosh, British Annelids, Part 1, Nernerteans, p. 172. pi. i, fig. 4; pi. Ill, fig. 4, 1873; Verrill, Check List, 1879.
Tetrastemma dorsale Jensen, Turb. ad Litoria NorvegitTj, p. 81, pi vui, figs. 9 to 12, 1878.

Plate xxxiv, figures 13, 14.

Body only moderately elongated, sub-terete, usually nearly cylindrical in extension, with both ends obtuse. Head not wider than the body, with two rather indistinct transverse fossa3 on each side. Ocelli forming nearly a square; in full extension more distant longitudinally than transversely. Proboscis-pore a little below the end of the snout. Proboscis large, when protruded more than three-foui'ths the length of the body, thickly covered with acute papilloe.

Color variable ; generally brown or dull reddish, with a well defined light dorsal stripe; or else variegated or mottled with two or more shades of brown, with or without the dorsal stripe.

Length up to 20"'™; diameter 1-5 to 2"""".

Variations. — Among the variations noted in life, are the following:—

Several examples were taken together at stations 310 to 313, off Cape Cod, in 15 to 21 fathoms, 1879.

In these the general color above was brownish, with a conspicuous pale, flesh-colored dorsal stripe, bordered with dark brown on each side ; the brown lateral stripes were freckled with white specks; a pale line crosses the neck behind the eyes; front of the head, margins of the body and tip of the tail pale flesh-color.
PI. XXXIV, fig. 13.

Length 12 to 18"""; diameter 1-5 to 2""".

Other specimens had the following characters :

Body slender, 10"""^ long; 1""" broad. Color cinnamon-brown, specked with darker brown, and with a pale median line. Ocelli conspicuous, black. When the head is extended the two pairs are more distant than the space between those of the same pair. Proboscis large, more than three-fourths as long as the body, thickly covered with acute, conical papilla?, and protruded from a large pore, which is sub-ventral. Two slight transverse fossae are seen on each side of the head.

Broad Sound, Casco Bay, July 22, 1873 (No. 72J).

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Tetrastemma dorsale, variety marmoratum (Clap).
Plate xxxiv, figure 14.

Body terete, somewhat elongated in extension, obtuse at both ends. Proboscis large, protruded from the sub-terminal pore, thickly covered with papilla. Color pale olive-brown, or chestnut-brown, irregularl}^ mottled and blotched with darker brown.

Length IS"""; diameter 1-5""". Described from life (No. 735).

Portland, Me., in 2 to 3 fathoms, harbor mud, July 28, 1873.

A paler colored race, probably closely related to this variety, was taken in the harbor of Eastport, Me., in 12 fathoms, in 1872 (No. 507). The body was chan^able in form, usually nearly cylindrical, and obtuse at both ends. Ground-color pale yellow or salmon, thickly blotched and mottled with dark brown, or greenish brown ; some specimens bad an inconspicuous ring of yellowish white around the neck. Length 15 to 18"'"; diameter 1-25 to 2"'^'".

Tetrastemma dorsale, variety unicolor A^erriii, nov.

A specimen taken in Eastport Harbor, off Friar's Head, in 18 fathoms, August 20, 1870, agreed, with this species in form but differed so much in color that it probably ought to be considered as representing a distinct variety, at least: —

Body moderately slender, slightly depressed, with the sides rounded. Head obtuse, four distinct black ocelli. Color, above, uniform dark fuscous brown; lower surface paler.

Another specimen taken in 1879, according to the notes made from life, probably belongs to the same variety: —

Body moderate in extension, broadest at or behind the middle, tapering to both ends, not very slender. Ocelli well developed, the two pairs, when the head is extended, wider apart than the distance

between those of the same pair. A very distinct transverse fossa, on each side of the head, runs upward and backward just in front of the posterior ocelli, but the two do not meet on the middle line.

Color of the body, above, clear brown, the margins, head, and under surface paler.

Length 8"""; breadth 1""".

Station 331, off Cape Cod, in 28 fathoms, 1879.

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Tetrastemma vittatum Verriii.

American Journal of Science, vol. vii, p. 45, pi. yii, figs. 3, rt, h, 1874; Proc. Amer. Assoc, for Adv. of Science for 187.-?, p. :^89, pi. ir, figs. 7, 8, 1874; Verrill, Notice of Recent Addit. to Mar. Invert., Part I, in Proc. National Mus., ii, p. 185, 1879 (not (Ersledia vittata Hubr)

PtATE XXXV, FIGURES 6, 7.

Body rather short and stout, up to 2 or 3 inches in length, soft, changeahle, in extension nearly cylindrical but often a little flattened beneath, tapering slightly anteriorly, or sometimes both ways, usually obtuse at the posterior end.

Fig. G. Tetrastemma vittatum ; n, head, dorsal view ; 6, front view, much enlarged.

Head usually slightly narrower than the body, with a transverse groove or constriction in front of the posterior eyes ; front end obtuse, conical, or rounded. Ocelli four, small, rather indistinct in dark colored specimens ; the anterior ones are nearer together than the posterior, which are far back behind the transverse groove, which extends across, beneath, and crosses the median line above. Proboscis-pore terminal.

Color of body, above, dark or light olive-green, dull yellowish green, or greenish brown, or even greenish black, often with two yellowish or light green dorsal stripes and sometimes with one median light stripe ; beneath paler, mottled laterally. Color of head, in advance of the transverse groove, various shades of olive-green and dark green, white at the tip, and with six longitudinal whitish or pale greenish stripes, which converge to the end ; two of these stripes are dorsal, two are ventral, and one is lateral on each side; the green line between the two dorsal stripes extends back on the body. Internal organs show through the integument as irregular, short, transverse blotches or bars of lighter color along the sides beneath.

Length in extension usually about 25 to 30™"; diameter 3 to 4™™; unusually large examples have been taken as much as 75"" long, gmm 1,,-oad. Described from life.

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Long Island Sound, Vineyard Sound, Massachusetts Bay, Casco Bay, Bay of Fundy, etc., low-water mark to 25 fathoms, common on muddy bottoms. Noank, Conn., in harbor mud, among eel-grass; Wood's Holl, Mass., harbor mud.

This species is sluggish in its habits and creeps very slowly.

Tetrastemma vittatum. Variations.

Several specimens of this species were taken together at station 310, off Cape Cod, in 21 fathoms, 1879.

These show great variation in the color of the body, which, in some was flesh-color, in others light olive-green, dark olive, light greenish brown, dark olive-brown, and dark smoky brown. All these varieties agree, however, in having the head greenish with the six light vitta? distinctly marked. In all the specimens the four ocelli were detected, but they are so indistinct in the dark specimens that they mnst be sought with care.

The largest specimens were 50 to 75""^ long; diameter np to 6"""\

Tetrastemma roseum Verriii, sp. nov.

Body round and soft, in extension about 1*25 inches long. Head obtusely conical ; a transverse shallow groove close to the end of the snout ; the jpart beyond the groove is capable of withdrawing under the portion behind it. Ocelli obscure; two behind the groove and (apparently) two very minute ones in front of it. Color clear bright rosy red.

Length abput 30'''''; diameter 3'''''.

Station 826, off Block Island, in 22 fathoms, 1880.

This species was met with only once, and then circumstances prevented a careful study of its structure. In the foi'm of the body and characters of the head and cephalic grooves it resembles T. mttatuyn V., and if the front ocelli were correctly noted, would appear to be closely allied to it and might even be thought to be a plain red variety, were not that species A'^ery constant in its color markings, the longitudinal vittre being very characteristic.

Emplectonema stimpson.

Prodronius, in Proc. Philad. Acad. Nat. Sci., vol. ix, p. 164 [20] 1851.
Am2)Mporus ffirsted, Kroyer's Tidds., iv, p. 581, 1844, (? nou Ehr., non Mcintosh).
Nemertes Mcintosh, Nemerteans, p. 176, 1873 (non Cuvier, 1817, non (Ersted, 1844,

no7i Diesing, 1850, nee White, 1850).
Macronemertes Verrill, Atner. Jour. Sci., vol. vi, p. 439, 1873.

Body much elongated in extension, sometimes almost filiform, very contractile, rounded or a little flattened. Head not very distinctly defined ; in some cases with a pair of longitudinal or oblique, shallow, submarginal fossa? on the upper side ; in other cases {E. gracilis) without evident fossae.

Ocelli variously arranged, often numerous and in several clusters, both anterior and cerebral.

Proboscis relatively small, especially the anterior portion, which is much shorter than in Aniphiporus. Mouth usually (always V) separate from the proboscis-pore.

For this geinus the earliest available name seems to be tliat given by Stimpson, who named as type E. camillea (Quatr. sp. = E. Neesii Oersted sp.), which is also the type of the genus Netnertes of McIntosh. The latter name could not be retained in this sense, even if the genus had not received a prior name, for Nemertes had already been used for a genus of insects by White in 1850, in addition to its prior use for several distinct genera of Nemerteans. Had not Stimpson's generic name been available, 3Iacronemertes would have been next in order,

Emplectonema giganteum Verrili.

MacroiiKiiierttifi giguntea Verrili, Amer. Journ. Sci., vol, vi, p. 439, pi. 7, tigs. 2, a, b, 1873; Expl. of Casco Bay, lu Proc. Amer. Assoc, for 1873, p. 390, pi. 2, figs. 5, 6, 1873.

PLATE XXXV, FIOURE 2. PLATE XXXVIII, FHiURES 12, 12rt.

Size large. Body much elongated, very contractile ; in extension, subterete, a little depressed, thickest anteriorly, gradually tapering posteriorly, becoming very slender and considerably flattened toward the end. Integument very soft, secreting a large quantity of mucus. Head not distinct from the body and of the same diameter, obtusely rounded in front, with a terminal proboscis-pore ; upper surface with two shallow, indistinct, sublateral, longitudinal fosscC, often becoming more distinct in alcohol ; below with two rather indistinct, obliquely transverse grooves or fossct".

Ocelli numerous, but not veiy distinct, because deeply buried in the integument ; they are numerous, arranged in four or more clusters ; a pair of large oval or subtriangular clusters on the antero-lateral border of the head, each of which may be divided into an upper and a lower grouj), the u})per part running backward ; a pair of smaller lateral clusters farther back ; and a pair of small rather indistinct clusters on the dorsal surface, between the longitudinal fossfB.

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Color, when alive, deep salmon or l)right orange-red, flesh-color below.

Length of the largest examples, 2 to 3'5 meters, or about 7 to 12 feet, in extension ; diameter, anteriorly, 6 to 8"""", or -30 of an inch.

When preserved in alcohol this species soon loses all its color, contracts greatly in length, and l)ecomes quite hard ; sometimes the body is considerably flattened, but in most cases it retains its sub-terete form except toward the posterior end. The head often shows the shallow, dorso-lateral, longitudinal foss;e (not slits) and the two large anterior groups of ocelli can usually be seen indistinctly as dark rounded patches beneath the thick outer integument. The small proboscis is often protruded a short distance, its pore being then rather small and slightly below the tip of the snout. The mouth is not visible in the preserved specimens, but my original sketches, made from life, show what I then supposed to be the con-tracted mouth beneath the head, distinct from the proboscis-pore.

In some horizontal sections of the head the anterior ocelli form an upper pair of transverse groups nearer the front than the sides of the head, while two smaller clusters; lower down in front, seem to be nearly separate from the up})er ones. In some specimens these large anterior groups are formed of four or five transverse horizontal rows, of which the upper row runs back to a small lateral cluster of ocelli. The a^sophagus has a large i)licated anterior portion in the

head. The mouth appears to open decidedly behind the proboscis-pore.

In sections of the body the intestine, blood-system, and muscular layers are nearly as in Amphiporus, but the muscular layers are unusually thick.

One specimen, taken August 12, 1873, contained large eggs, arranged in about six rows of sacs, above and at the side of the intestine, on each side. The armature of the proboscis has not been observed, but in other respects the proboscis agrees with that of the allied species ; the length of the anterior region is about twice the diameter of the body ; the posterior portion is long and slender.

Off Cape Elizabeth, 68 fathoms, soft mud, August 12, 1873 ; Gulf of Maine, 88 fathoms, mud, station 45, 1874 ; off Martha's Vineyard, 192 fathoms, fine sand and mud, station 869, 1880 ; off Martha's Vineyard, 229 fathoms, sandy mud, station 925, 1881 ; off George's Bank, 852 fathoms, gray mud, station 2531 ; off Block Island, 156 fathoms, fine mud and sand, station 2537; off Block Island, 131 fathoms, fine sand, station 2544, 1885, (U. 8. Fish Commission).

[Begin Page: Page 415]

Family, Dkepanophorid.e Verrill, nov.

AmpliiporidcR (pars) authors.

Probosfis-slieath provided with c;i?cal appendages. Central armature of proboscis a lamelliform []late bearing a number of small stylets on its edge. Lateral stylet-sacs more than two ; often numerous, containing small nail-shaped stylets.

Drepanophorus Hubrecht.

Body^ and head nearly as in Aniphiporas; mouth-o[]ening separate from the proboscis-pore. Proboscis large. Musculature of thp body^-Avall as in Amphiporat!.

Drepanophorus Lankesteri Hubrecht.

Voyage of the Challenger, vol. xix, pp. 18, 50, pi. i, fig. 22; pi. ix, tigs. 1, 2, 10; pi. X, figs. 2, 4; pi. xii, fig. 5; pi. xiv, flgs. 9, 10; pi. xv, fig. 13, 1887.

This species was described from alcoholic specimens, destitute of the proboscis. Its external features are, therefore, entirely unknown. Its anatomy^ was, however, carefully worked out by means of sections.

It is peculiar in having numerous well marked ti'ansverse nervous commissures connecting the lateral nerve-trunks anteriorly.

The Ciccal appendages of the proboscis-sheath are also unusually well developed, with thicker walls than in most species, and they^ sometimes anastomose distally^

Ocelli are present, but their arrangement was not stated. Genital sacs are numerous, apparently in four rows, subventral.

For other details reference should be made to the original description and figures.

Oft' Nova Scotia, near Le Have Bank, 45 fathoms.

I have observed a single, small, and probably immature, specimen of DRiii'ANOPHORiD^: OH the New England coast, but do not deem it Avise to name it. This was translucent yellowish white in color.

Order II, ANOPLA.

Ano2)Ui Max Scliultze, 1852; Mclutosh.

Proboscis unarmed, long, slender, tubular, and not divided into three distinct regions ; its walls may contain three to five layers ; inner surface, when retracted, papillose.

Head with or without lateral slits or ciliated pouches.

Ocelli variously arranged ; often wanting.

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Mouth ventral, situated behind the ganglions.

The muscular walls of the body often consist of three layers : outer longitudinal, middle circular, and inner longitiulinal (PI. xxxix, tigs. 17 to 21). In some cases the outer longitudinal layer is lacking (figs, 15 and 16).

Two or three main vascular trunks ; the vessels generally not so well defined as in the Eno])la, and often having in part the character of wide lacunie, especially anteriorly,

(Esophagus entirely behind the brain, usually large, long, plicated, and surrounded by a vascular network, or by lacuna?. (PI. xxxix, fig. 22, "v, r).

Lateral nerve-trunks arise from the outer sides of the lower ganglions, and are situated between the muscular layers of the body-walls, but they vary in position in the different families. Usually there is a nervous plexus outside of the circular muscular layer. (PI. xxxix, figs. 17, 20, n).

The s|)ecies are almost all nuirine ; a few inhabit brackish water.

Suborder I, RHAG-ADOCEPHALA Diesing, 1850 (emeDded).

Schizonemtrti7ii \iv\\n-Qcht , Carus, Fauuie Med., p. 160.

Schizonemertea. Hubrecht, Voy. Challenger, xix, p. :i7.

Head with a deej), longitudinal, ciliated slit, or fossa (pro1>a])ly olfactory in function), on each side, terminating posteriorly in a deep pit or (^luct running inward to the posterior ganglions. (PI. xxxix, fig. 22,/; d, d').

Mouth large, behind or opposite the posterior ends of the lateral slits and cej)halic ganglions. (Wood-cut 8).

Lateral nerve-trunks situated between the outer longitudinal and the circular muscular layers of the body-wall. (PI. xxxix, figs. 19 to 21). A median dorsal nerve is also usually distinctly developed.

Three large, longitudinal, vascular trunks, which are usually connected by numerous transverse vessels around the intestine, especially posteriorly,

CEsophagus large, prolonged backward, plicated, and j)rovided with a vascular system, probably having a respiratory function. (PI, XXXIX, figs. 20, 22).

Many of the species of this group develop directly from the eggs, without a marked metamorphosis, but certain species of Mlcrura (perhaps all) have a peculiar, free-swimming larval form known as P'didium (PI. xxxix, figs. 1 to 6, and wood-cut 7). The embryology of the closely related genus, Cerebratidas, is apparently unknown.

Tlie species are almost exclusively marine and are found in deep water as well as between tides. Many are fossorial in their habits,

Fig. 7. Pilidium of Micrura, much enlarged: c, apical cilium; h, cephalic lobe; m, mouth; i, intestine; u, bands of cilia; o, young nemerteau developing in the interior, showiug its head with two ocelli.

living in sand or mud, or beneath stones. Some of the large Hat species of Cerebratulus leave their burrows and swim with an undulatory, eel-like movement at the surface of the sea at night.

Family, Lineid^e Mcintosh.

Body simple, generally much elongated in extension, very contractile, usually thickest in the region of the oesophagus, and becoming

fiffill!^

Fig. 8. Lineidoi. A, Cerebra lulus luridus, ventral side; m, mouth; s, one of the olfactory slits or cephalopori; p, proboscis-pore. B, head of the same, side view. C, tail ; X, anus. D, head of Lineus viridis, young, enlarged ; s, one of the cephalopori ; p, proboscis-pore.

more or less flattened farther back, where the saccular appendages

of the intestine and the reproductive glands occupy the sides. Head simple, with elongated lateral olfactory slits or cephalopori.

LiineilS Sowerby, 1806.

Lineus Sowerby, British Miscel., p. 15, pi. 8, 1806.

BorJasia Oken, Lehrbuch, p. 36.5, 1815; Blainville, Diet. Sci. Nat., .57, p. 575, 1828 ;

Johnston, Catal., p. 21, 1865.

iVemerfe.s Cuvier, Regne Anim., vol. iv, p. 37, 1815; Dies, {^pars), op. cit., p. 264.

Lineus CErsted, Naturh. Tidsskr., iv, p. 576, 1844.

Meckelia (jjars) Diesing, Syst. Helm., vol. i, p. 265, 1850.

Notosjiermus Diesing, op. cit., vol. i, p. 260.

Li'neMS Stimpson, Prodromus, p. 160, 1851.

Cerebratulus (pars) Stirapson, Prodromus, p. 160, 1857.

Poseidon Girard, Proc. Boston Soc. Nat. Hist., iv, p. 185, 1852.

Nemerfes Verrill, lavert. Vineyard Sound, etc., 1873.

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Body very contractile, in extension elongated, slender, tapering, and often attenuated toward the posterior end, rounded or slightly depressed anteriorly, generally somewhat l)roader and more depressed in the middle region, but without the conspicuous flattening back of the oesophageal region seen in Cerehratidus. No anal papilla. Head

elongated, not very distinctly defined ; often a little wider than the neck, but not constantlj^ so. Lateral slits elongated and deep, running close to the terminal proboscis-jiore, but usually not joining it. Mouth, in ordinary states, rounded or elliptical and not very large, but capable of great extension when feeding. Ocelli small, usually arranged in a simple row along the lateral margins of the head, sometimes absent.

The several European species of this genus have been referred by authors to a great number of different genera, of which I have indicated only a part. The first three names cited in the synonymy were all given to the same species [L. mariuvs =z L. lom/issimns) of Europe and are, thei'efore, exact equivalents. The two later names should, thei'efore, have been dro'pped entirely from the nomenclature of the group. Unfortunately several different writers have tried to restrict both Borlasia and Nemertes to groups entirely different from that to wdiich they were originally given, and have thus introduced great confusion. Each attempt of this kind has, hitherto, been a failure for in most instances the new groups thus named have been found to have had other and earlier names. One of the latest reapplications of Nemertes to a newly constituted group was by Mcintosh (Nemerteans, p. IVC). He applied it to a genus of Enophi^ in a wholly new sense, Nemertes of Mcintosh, 1879, is, however, antedated by Nemertes of White, 1860, applied to a Crustacean, and therefore it could not be retained, even if the nemertean genus, so named, had not already received other names.

The use of Borlasia by Mcintosh, in a wholly new sense, seems also to be untenable.

LineUS Viridis (Fabr.) .Tolmston.

Planaria viridis 0. Fabrichis in O. F. Miiller, Zoo]. Dan. Prod., 2r.S4, 1776; 0.

Fabricius, Fauna Groonlandiea, p. .'.24, 1780; Miiller, Zoologia Dauioa, ii, p. 35,

pi. 68, figs. 1 to 4, (from Greenland specimens sent by Fabricius to Miilter).

Planaria, Gesserensis Miiller, Zoiil. Danica, ii, p. 32, pi. 64, fios. 5 to 8, 1788.

Nrin'-rtcs oUvarea ^ohwsion, Mag. of Zool. and Botany, vol. i, p. .')36, pi. 18, fig. 1,

1837; Diesing, Syst. Helm., i, p. 273, IS.'iO.

Nemertes dbscura Desor, Boston Journal of Natural History, vol. vi, pp. 1 to 12.

plates 1 and 2, 1848 (embryology).

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PoUa ohscura Girard iu Stimpsou's Marine Invertebrates of Graud Manaii, p. 82,

1853 (no description).

Nemertes viridis Diesiug, yiczuugsberiClito der kais. Aliad. der Wissenschafteu,

vol. xlv, p. 305, 18G2.

Bmiasia olivacea Johnston, Catalogue British Nou-parasitical Worms, jj. 21, pi. 2'',

fig. 1, 1865; Mcintosh, Trans. Roy. Soc. Edinb , vol. xxv, pt. ii, p. 371, 1869.

Lineus wmfe Johnston, Catal., pp. 27, 296, 1865.

Nemertes viridis Verrill, Marine Invert of Vineyard Sound, etc., p. :J34 [628], 1873.

Lineiis Gesseretisis Mcintosh, Hist. British Annelida, Part I, Nemerteans, (Ray

Society) p. 185, pi. iv, fig. 2; pi. v, fig. 1, (red var.); pi. xviii to xxii, (anatomy);

pi. xxiii, (green var., embryology), 1873.

Linens viridis Verrill, Check List Marine Invert., p. 12, 1879; Notice of Recent

Addit. to Mar. Invert., Part I, in Proc. National Mus., ii, p. 185, 1879.

PLATE XXXV^I, FIGURES 5 to 5^ ; PLATE XXXVIII, FIGURES 6 tO 6C? ;

PLATE XXXIX, FIGURES 18, 22.

Budy soft, very contractile and changeable ; in full extension elongated and moderately slender, in large examples six to eight inclies long and abont one-lifth of an inch iu diameter ; usually thickest in advance of the middle, tapering gradually to the rather slender caudal portion, and decreasing less toward the head; not iinfrequently the body is dilated in two or more places at the same time, the swollen parts moving continually ; in extension the body is usually Romewdiat flattened, but tlie dorsal surface is decidedly convex and the sides well-rounded ; it is often crossed by faint, light-colored, irregularly si)aced wrinkles. In contraction the body becomes short and thick, oblong, swollen and almost saccular at times.

Head, in extension, rather large, dei)ressed, usually wider than the neck, short, ovate-spatulate, or elongated, accoi-ding to the degree of extension ; the snout is blunt, often emai'ginate, and bears three small ciliated papilhe ; proboscis-pore terminal, rounded, or in the shai)e of a short vertical slit ; lateral foss:i? long and very deep, with wide, thin, pale margins, above and below, the anterior ends of the slits reaching close to the proboscis-})ore.

The ocelli are arranged in a simple row on each side of the head, close to the edge of the dorsal pigmented region ; they vary in number and size according to the age, the large specimens often hav-ing six or eight on each side, while the small ones have but three or four, and the very young ones have only a single pair ; usually the anterior ocelli are slightly larger than the others.

The mouth is situated opposite to, or a little behind, the posterior ends of the lateral fossae ; it is ordinarily small and elliptical, with a distinct, lighter colored border, but it is capable of great dilation

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when the creature is engaged in swallowing some annelid nearly or quite as large as itself.

The color, in life, is variable; the most common variety is dull green, or olive green, varying to dark smoky green or greenish black, dai'kest anteriorly, and with the under surface and caudal portion somewhat paler ; region of the cephalic ganglions and lateral pits usually reddish ; front and margins of head pale or whitish ; on many specimens faint pale transverse lines or rings can be seen, if carefully examined ; at times a row of small whitish spots, corresponding to the genital pores, can be seen on each side. Other specimens occur, often living with grewn ones, in which the general color of the body is brown, greenish brown, re(hlisij brown, or chiar red with the margins of the head and lower surfaces liesh-color or reddish.

Some of these forms differ so much in a[>pearance from the common dark green variety that it would be convenient to distinguish them by variety names, using, in this sense, some of the numerous names applied by the early writers when they were supposed to be distinct species, viz :

Var. oUvaceiis (Johnston). The typical green and olive-colored variety.

Var. fiiscns. The brown and reddish brown variety.

Var. rufiis (Rathke). The distinctly red variety.

Var. obseurus (Desor). The smoky green and blackish variety.

Specimens intermediate in color l)etween all these are, however,

of frequent occurrence.

The length, in extension, is sometimes 150"""" to 200"""" ; the diameter 2"""" to 4"""" ; in contraction the body becomes much shorter and stouter, large specimens often being only 30"""" or 40"""" long and 4"'™ to 6"""" broad.

In alcoholic specimens the body is usually thickened and rounded anteriorly, more slender and somewhat flattened farther back, often acute at the posterior end ; head obtusely rounded or sub-truncate, with a small terminal proboscis-pore and two lateral slits, which are short and extend forward very near to the proboscis-pore. Mouth small and round, situated slightly behind the posterior ends of the lateral slits ; ocelli not apparent. When placed in alcohol the body usually contracts so violently that it breaks up into segments, especially posteriorly, and the proboscis is often completely ejected.

The extruded proboscis is long, slender toward the base, clavate toward the end, the terminal portion transversely wrinkled.

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This common littoral and shallow water species is found on the Amoi-ican coast from Long Island Sound to Lal)rador, Cumberland Gulf, and Greenland. It is also common on the coasts of Great Britain as far south as the Channel Islands (Mcintosh), and on all

the northern coasts of Europe.

South of Cape Cod, I have collected it near New Haven, Conn., and at the Thimble Islands ; Noank, Conn.; Newport, R. I.; Wood's Holl, Mass.; and at various other localities. North of Cape Cod it is more abundant and larger. Among the localities where I have taken it are TrovincetoAvn and Barnstable, Mass.; Salem and Gloucester, Mass. ; Casco Bay ; Mount Desert Island ; Eastport, Me. ; Grand Menan Island ; Halifax, N. S. ; Gulf of St. Lawrence, etc.

It is particularly abundant and large at Eastport, Me., and at all localities about the Bay of Fundy, where the shore is composed of rocks.

This species is active and restless in confinement. It creeps rather rapidly and is prone to climb out of the water and perish by drying up. It is a voracious feeder and lives largely upon annelids, I have observed it in the act of swallowing a full grown scaly annelid, {Lepidonottis squamatus), which was considerably greater in diameter than the thickest })art of its own body. A specimen of this kind, with the J^epidonottcs half swallowed, is preserved in the museum of Yale University.

The eggs are deposited in great abundance on our shores under stones near low-water mark, in midsummer. They are contained in more or less cylindrical masses of a translucent, dull greenish, jelly-like substance, made up of numerous capsules, (Plate xxxvaii, fig, 6c), These cylinders are usually from 3""" to 5""" in diameter, and

40''''^' to 50''''^ in length, and are usually coiled in a spiral or ring-like form. The eggs aro in several rows. In those clusters taken at one date, in July, at Eastport, Me., I have found eggs in all stages of development, while in some of them the recently hatched young were still present. (PI. xxxviii, fig. 6d).

I have adopted the name, viridis, given to this species by Otho P''"al)ricius, who communicated the first published descriptions and figures to Midler, as stated both by him and by Mfiller, That this is the species observed on the shores of Greenland and described by Fabricius there can be no reasonable doubt. His brief description is quite as correct and characteristic as the descriptions of such animals were wont to be at that time, and his figures, published by Midler in the Zoologia Danica, represent the worm fairlj^ well when

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partially contracted ; nor could they be referred to any other Greenland species.

The lateral slits of the head of this species are spoken of on p, 325 of the Fauna Gnpnlandica, and are also distinctly shown in the figures. Fabricius speaks of his virklis as common on the shores of Greenland among the roots of alg;e. I have personallj^ examined good specimens of this species recently taken on the coast of Greenland in the same situations. There can l)e no doubt of their identity

with the true virklis. Therefore there is not the slightest reason why his characteristic name should not be used, in preference to Gessereyisis* of much later date.

Although the latter name has been adopted by many recent writers on European nemerteans, the ordinaiy rules of priority, as well as justice to the very meritorious author of the Fauna Grwnlandica, should compel a change in this rcs]>ect.

Fabricius and Midler, in the same works, described another Greenland form under the name of rubra. I am of the opinion that this was simply the red variety of L. viridis, for the two varieties occur together everywhere on the northern coast of America. Levinsen, however, has referred the rubra to L. sanguineus^ and has given the latter as a Greenland species. If both species actually inhabit Greenland his view may be correct, for there is nothing in the original description to indicate that it belongs to one ratlun- than to the other of these two species, if it really belonged to eithor.f

Indeed these; two re))uted species arc so much alike that I am myself in doubt whether they arc really distinct. There is no special diagnostic character given by Mcintosh unless it be the somewhat narrower head in X. sanguineus. The sha])e of the head in this genus is so changeable and variable that, in practice, little reliance can be placed upon this as a diagnostic character. The ocelli are supj)osed to differ slightly in size and number, but they also vary in both forms. Hence it seems to me not improbable that a more extended study of the variations will compel us to consider X. sanguineus only a lighter red variety of L. viridis. In this article I have, how-

ever, followed most European writers in keeping them separate, although I confess that with scores of living specimens of both

* Levinsen, in his recent paper on the Turbellaria of Oreenland, also records tho typical form, under the name of L. Gesserensis, as a native of that coast.

f Fabricius mentions neither ocelli nor cephalic slits in this species. Therefore it may not have been a Linens. The necessary rloubt concerning its true relations should prevent the application of the name to any species.

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forms before me, I have always found it difficult to draw any clear line of separation between tbein,

LineUS sanguineus (-Tens Ratlike).

Planaria sanguinea Jens Rathke, Skiivter af Natiirhist. Selsk., vol. v, i, p. 83, 1709.

Planaria oefoCTt/ate Johnsf.on, Zool. Jour., vol. iv, p. 56, 1829.

Nemertes (Borlasia) oc.tocnlata Johnston, Mag. Zool. and Bot., vol. i, p. 537, pi. 18, fig. 2, 1837; ffirsted, Kroyer's Naturhist. Tidss., iv, p. 579, in note, 1S:'.7.

Nemertes sanguinea (Er&tGdi, Entw. Plattw., p. 92, 1844.

Borlasia octoculahi Johnston, Catalogue Brit. Mns., pp. 21, 2S7, 290, jii. \ih, fig. 2,

2* 1855.

Linens sanguinfinn Mcintosh, Britisli Annelids, part T, Nenierteans, p. 18S, pi. v,

fig. 2, \ST.',.

PLATE XXXYIll, FIGURES 10, 10^/.

Body strongly convex or well rounded above, flatish beneath, rather long-, in extension often 8 to 10 inches long and .25 inch broad, but it is capal)le of contracting to less than one-fourth this length, and then becomes about .35 of an inch in diameter. Head elongated, usually not so wide as the body, often acute in front when extended, but it changes much in form and may become much shorter and obtuse in contraction ; lateral cephalic slits, moderately long and deep, bordered by narrow pale lips, above ajid below. Ocelli small, but very distinct, blackish, usually 4 to 8 in a row on each side, arranged at the upper margin of the white lateral borders of the head. Mouth rather large, usually round or oval. Math corrugated white lips, but capable of great extension when swallowing large prey.

Color of body, above, dai'k red, l)riglit red, or clear reddish brown, usually darker medially ; beneath, pale salmon, flesh-color, or light yellowish red ; snout and margins of head whitish ; the red color of the middle of the head slightly emarginate or notched at its anterior end.

Eastport, Me., at Dog Island, low-water, under stones, 18GR, (No. 2). Also taken at various other localities at Eastport and Grand Menan, between tides, in 1870 and 1872, common.

ITnder L. viridis, on a previous page, I have, spoken of the close relationshi)> of the red variety of that species to X. sangtihiefis, and have given reasons for doubting the status of this as a distinct species — at least as they occur on our northern coasts. It may be possible that we do not have the real European Z,. sanguineus, but we have an abundance of specimens tlj.at agree in all respects, so far

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as I can see, witli tlie descriptions and figures given by Mclnto.sh and others.

The character upon which Mcintosh puts the most stress is the greater narrowness of the head, said to be chiefly due to the narrower lips of the cephalic slits in the present species, as compared with L. viridis [Gef^serenais). But as the length and breadth of the head and of the margins of the slits are constantly clianging during the motions of the living worms, it is not easy to make sure of such differences. The lighter and brighter red color of the body, and the greater distinctness of tlie ocelli in L. sangiiineKs are also supposed to be cliaracteristic.

It is found chiefly under stones from half-tide to low-water mark, and at moderate depths (1 to 25 fathoms) on stony and muddy bottoms. Many specimens are often found living gregariously, curled up together, under one stone,

LineUS SOCialis (Leidy) VeniU.

Nemertes socialis Leid}\ Marine Invert. Fauna of Point Jiiditli, R. T., and New Jersey, p. 11 [143J, 1855; Verrill, Invert., Vineyard Sd., etc., p. 334 [G28].

Lineus commums Van Beneden (?) ; Verrill, Notice of Recent Addit. to Mar. Invert- Part T. in Proc. National Mns., ii, p. 185, 1870.

PLATE XXXVII, FIGURES 8, 8(/ ; TLATE XXXVIII, FKiURES 7, 1".

l>ody very long and slender, subterete, attenuated posteriorly, in full extension abnost linear, up to 8 to 10 inches long, with the diameter about ,04 inch. Head very long, flattened, obtuse ; lateral cephalic slits very much elongated. Mouth placed far back from the front of the head. Ocelli very small, often obscured by the dark color of the head, in large specimens four to six or more in a row on each side of the head, the front pair larger than the others and usually separated by a slightly greater interval ; very young ones have only a single pair. Color, above, usually dark olive-green, greenish brown, greenish black, or smoky bi'own, and more rarely reddish brown, the anterior parts often darkest ; indistinct, rather distant, pale transverse lines are often pi-esent, and occasionally there is a darker median dorsal stripe ; front margin of the head paler and slightly translucent ; lower surface of the body usually

similar in color to the back but of a]>aler shade, most frequently dull green or greenish ash.

Length of large specimens, in extension, 250"""", diameter l"""" to

cmm

This is a strictly littoral species. It is common from New Jersey to the Bay of Fiindy. It occurs abundantly and usuallj' gregarious-

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ly under stones, among living mussels, between the roots of grasses and algae, etc., from near low-water mark nearly up to high-water mark of medium tides. 1 have collected it at Great Egg Harbor, N. J.; New Haven, Conn.; Noank, Conn,; Newport, R. I.; Wood's Holl, Mass.; in the harbors of Provincetown, Barnstable, Salem, and Gloucester, Mass.; Portland and Eastport, Me., etc.

This S])ecies is very gregarious, a large number usually living-coiled up together in a tangled mass, from which, however, the individual worms can easily disengage themselves when disturbed. It occurs nearly up to high-water mark where other nemerteans are not found.

Superticially this species resembles, in color and general a|)})ear-

ance, the young of L. viridis (dark green variety), but it is relatively much longer and more slender, and has a much longer and narrower head, with decidedly longer lateral slits, and the mouth is placed much farther back.

Lineus arenicola Veniii.

7'e,trastetnina{'^) nren'kol((. YcrviW, liiverteljiiite Animals of Viueyaid 8oiiud, etc., p. 335, pi. xix, fig. 98, 1873.

PLATE XXXVIII, FIGURES 5, bCl.

Body subterete, long, slender, slightly depressed, of nearly uniform width ; the head is very versatile, usually sub-conical or lanceolate, flattened, occasionally becoming partially distinct from the body by a slight constriction at the neck. Ocelli four, those in the anterior pair nearer together, The lateral fosste are long, and dee}) slits on the sides of the head. Mouth small, often sub-triangular, situated Just back of the i)osterior ends of the lateral fossiu. Body deep ilesh-color or pale purplish.

Length about 100"""", in extension.

Savin Rock, near New Haven, Conn., in sand at low- water mark.

This species has not been taken except in the original locality. It ai^pears to be very rare in our waters. Possibly it is a southern s[)ecies that does not ordinarily live so far north.

Lineus pallidas Veniii.

Lineus paUidus Verrill, Notice of Recent Addit. to Mar. Invert., Part I, in Proc. National Mus., ii, p. 18G, 1879.

PLATE XXXVII, FIGURES 9, 9rt.

Body long and very slender in extension, subterete, attenuated posteriorly. Head elongated, usually obtuse and wider than the

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body, but very changeable. Ocelli absent. Lateral (cephalic) fosste long and deep. Mouth situated far back from the anterior end. Color usually whitish or pale ocher-yellow, usually becoming reddish toward the head, and with a rather indistinct pale dorsal line ; anteriorly there are usually two pale doreal sj)ots in front of which the head is yellowish.

Length, in extension, 100"""; breadth 0-5 to 0-75""".

Off Cape Ann, Mass., 45 fathoms, mud, 1878.

Lineus dubius Ven-iii.

Liaeus dubius Verrill, Notice of Keeeat Addit. to Mar. Invert., Part I, in Proc. National Mus., ii, p, 18(3, IS79.

PLATE XXXVII, FIGURES 4, 4a.

Body very slender in extension, and attenuated])osteriorly. Head elongated, narrow, usually pointed ; lateral slits of moderate length ; ocelli lohite, inconspicuous, forming a lateral row of about twelve, extending back on each side of the head beyond the posterior ends of the lateral fossae, usually the four anterior ones on each side are separated by a little space from those that follow, but all are nearly in a simjile row. Color, above, light green to dark olive-green.

Length of tlie largest specimens observed, 50 to 75"'".

Gloucester, Mass., under stones, between tides, 1878.

Linens bicolor Verrill, si), uov.

PLATE XXXVII, FIGURES 8, 8a, 8^.

Body rather small, in extension elongated, thickest and somewhat depressed in the middle, tajjering to both ends, and decidedly attenuated posteriorly ; sides rounded. Head elongated, flattened, rather wider than the neck, in usual extension. Lateral olfactory slits long and deep, Avith thin margins. Mouth usually elliptical, situated behind the ends of the olfactory slits. The ocelli are arranged in a simple row of about 4 to 7 on each side of the head, the front pair largest. Color, above, along each side of back a broad

stripe of olive-green, yellowish green, or brownish green, separated by a median dorsal, well defined, broad stripe of pale yellow or yellowish white, usually becoming clear white on the head, where it expands and blends with a white frontal area in advance of the eyes; the margins of head are also white. Lower surface })ale greenish or yellowish white.

Length in extension, 35 to 45"""; diameter, 1 to 1.5"""". Described from life.

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Long Island Sound to Vineyard Sound, in 2 to 24 fathoms ; Bartlett's Reef, 22 fathoms, 1874. Usually taken on shelly or stony bottoms among algje, ascidians, and hydroids ; common, es})ecially in Vineyard Sound. The specimen figured was taken at Wood's Holl, July 14, 1875.

DOUBTFUL SPECIES.

Lineus truncatus (flubr.) Veniii.

Cerebratulus truncatus Hubrecht, Voyage of the Challenger, vol. xix, pp. 37, 50, pi. 1, figs. 11, 12, 1887.

This species was described from imperfect alcoholic specimens, so

that its external form and color in life are entii'ely unknown.

In the contracted speidraens the head is short, flattened, truncated in front ; the cephalic slits are short and run forward close to, but do not join, the proboscis-pore ; the mouth is small, rounded, and only a short distance back from the front.

Ofl:'Nova Scotia in 75 and 85 fathoms ; also off Bermuda. (Challenger Exp.)

The S)nall mouth, rounded l)ody, and general appearances of the specimens, as figured, indicate that it belongs to Linens or Micrura, and not to Cerehratulus, as here defined. There is nothing in the description to distinguish it from Lineus viridis, which often contracts into the same form.

Micrura Elueuberg, 1830.

Micrura (pars) Mcintosh, Nemerteans, p. 196.
Gerehrattdm (pars) Hubrecht.

Body, head, and proboscis nearly as in Lineus ; body elongated, terete or somewhat flattened ; the posterior regions usually not much flattened, nor very different in form from the region of the proboscis. Cephalopori or olfactory slits well defined. Ocelli sometimes present, but often wanting. Posterior end of the body provided with a median slender cixTus, above the anus.

This genus, as here defined, differs from Lineus in little else than the presence of a well marked contractile anal cirrus, which may often be distinguished even in alcoholic specimens. From Cerebratulus, which also has the anal cirrus, it differs in the form and muscular structure of the bod}^ posteriorly, which is not very flat and thin, nor adapted for swimming, as in the latter.

Tkans. Conn. Acad., Vol. VIII. 56 June, L892.

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Some of the flat species included in this genus by Mcintosh, I should, therefore, transfer to Cerebratidxis, especially his M. fnsca (uoft Fabr. sp.)

Ilubrecht has united 3ficricra and Cerebratulus without regard to the form of the body and the muscidar structure of the body-walls, which seem to me important characters, involving wide differences in habits.

The species of Micrura are fossorial in their habits and do not swim at the surface, so far as I have observed, and, indeed, the form and structure of the' body are not ada[)ted for swimming.

Some of the species of 3Ucrura, if not all, have a Pilidium-stage in development. The embryology of many of the species has, how-

ever, not been traced. Nor have any of the several species of Pili-
dium-larvse found on our coast been reared till the adidt characters
could be determined. On Plate xxxix, I have hgured two distinct
kinds of these larvae that are common at Wood's Holl, Mass., in sum-
mer. One or both probably belong to some of our species of Micrura,
but as the larval form of Gerehratidus is unknown, one of them may
belong to that common genus. The young nemertean seen in the
interior of one S])ecies (fig. 5, w), has already two distinct ocelli,
which would indicate that it belongs to a species like M. affinis,
which lias ocelli when adult.

Micrura affinis Voniii.

Poseidon qffiuif; Girard in Stiiiip., Marine Invert, of Grand Manan, p. 28, 1853.
Neinertes aj§inifi Verrill, Auier. Journ. Sci., vol. vii, pp. 39, 412, 1874; Proc. Am.

Assoc, for ISIS, pp. 351, 363.
Micrura affinis Y ern\\ Proc. U. S. Nat. Mus , vol. ii, p. 18G, 1879; Check List,

Invert., p. 12, 1879.

PLATE XXXVI, FIOURE 1 ; I'LATK XXXVII, FIUUKES 6, 6a.

Body elongated in extension, somewhat depressed, but with round-
ed sides, of nearly uniform breadth through most of the length, but
somewhat tapered posteriorly, and terminated by a slender, pointed,
pale anal papilla or cirrus, about one-half as long as the diameter of
the body. Head scarcely wider than the neck, elongated, flattened,
usually obtusely rounded anteriorly, but changeable. Lateral olfac-

tory slits long and deep, with thin white margins in front, uniting with the proboscis-pore. Mouth of moderate size situated opposite the ends of the slits. Ocelli rather large, black, conspicuous, variable in number, forming a single row, usually of four to six on each side at the edges of the white marginal areas ; the front ocelli are

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iisually distinctly larger than the others. Color, above, usually clear bright red, varying to dark red and reddish brown, rarely to greenish brown ; often crossed l)y indistinct, transverse, pale lines, as in Linens viridis ; front and margins of head white ; under surface light flesh-color or pinkish, often showing by translucency the intestinal creca or pouches along the sides in the form of transverse gray blotches.

Length up to 125 to 150""" ; diameter, 2 to 4"""\ Described from life.

Very common from off Cape Cod and Massachusetts Bay to Nova Scotia, in 8 to 150 fathoms or more, on shelly and stony bottoms. It is particularly connuon in the Bay of Fundy, the harbor of Eastport, Me., and the other cold waters of that region, where it is also often found at low-water mark under stones. It has also been frequently dredged in 12 to 50 fathoms south of Cape Cod, and off Nantucket and Martha's Vineyard, i?i tlie cold area.

This species, in some of its red and brown varieties, closely resembles the red and brown varieties of lAneus viridis, from which it cannot be distinguished when living without a careful examination. The presence of the caudal cirrus is easily diagnostic, when the specimen is perfect, but when mutilated, as often happens, the difficulty is much increased. The ocelli in this species are usually larger and more distinct than in Lineus viridis.

Micrura dorsalis Veniii, sp. nov.

PLATE XXXViri, FIGURES 4, Ail.

Body depressed, rather large and thick, length up to 6 inches in ordinary extension ; in contraction it becomes short and thick, and may even contract itself into a ball ; the margins are well rounded and the body tapers toward both ends. The anterior region of the body for about a sixth to a tenth of the whole length, often becomes in partial contraction rounded and narrower than the rest of the body. Head obtusely pointed or bluntly rounded in front, not distinct from the body and of the same breadth. Cephalopori moderately long, somewhat oblique longitudijial slits on the sides of the head, extending nearly to the proboscis-pore. Ocelli, none. Mouth small, rounded, nearly opposite the hind end of the cephalopori.

Color pale ocher-j'ellow with an orange tinge anteriorly, with a darker medial stripe above and below, and having pale mottlings indistinctly showing through on each side due to the internal organs.

Length 160"""^; diameter 5"""". Described from life.

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The type-specimen, described above, as now preserved in alcohol, has a stout body, thickest anteriorly, tapering to the hind end, which terminates in a small, whitish caudal papilla. The sides are everywhere rounded. Head short, thick, subconical, blunt, not distinct from the body ; proboscis-pore terminal, in the form of a short vertical slit ; lateral cephalic slits moderately long, joining the pi'oboscis-pore in front, so as to divide the tip of the snout into four parts. Mouth small, rounded, opposite the posterior ends of the cephalic slits.

Length in alcohol, 64"'™; diameter 3""""; length of cephalic slits

omm

Eastport, Me., at Clark's Ledge, extreme low- water mark, under stones, 1870.

Micrura rubra Verrili, sp. nov.

PLATE XXXVIII, FIGURES 3, 3a, 9, 9a.

Body moderately large, subterete and elongated in extension, up to 3 inches long, rather more slender posteriorly. Head obtuse or rounded in front ; proboscis- pore a vertical terminal slit ; cephalic slits or cephalopori long and deep, in front joining the proboscis-pore so as to divide the tip of the snout into four small lobes ; the slits extend back as far as, or beyond, the mouth, which is ordinarily a small elliptical opening. No ocelli.

Color, above, light orange red to bright red, indistinctly mottled along the sides with brownish red, due to internal organs.

Length 62 to 75"'™ in extension ; diameter 2'5""\ Described from life. (No. 722).

In alcohol the specimens above described are much contracted, thick and short, stoutest anteriorly, tapered, but scarcely flattened posteriorly. Ovaries filled with eggs commence some distance back of the head. Cephalic slits moderately long and deep, joining the proboscis-pore in front. Prosboscis, as ejected, coiled in a spiral, moderately long and rather thick, tapering to both ends.

OflP Casco Bay, July 16, 1873.

A curious specimen (Plate xxxviii, fig. 3, 3f/), probabl}^ of this species, was taken in the Bay of Fundy. It had, apparently, been broken and was in the act of reproducing the hinder])art of the body.

Body round, cylindrical in extension, very changeable in shape ;

posterior eiul abruptly narrowed into a small, round caudal portion terminating in a small paj)illa. Head obtusely rounded or obliquely

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conical with an oblique lateral cephalic slit on each side ; mouth small, opposite the posterior ends of the slits. No ocelli.

Color nearly uniform deep flesh-color. The salmon-colored ovaries show through slightly, especially posteriorly, as transverse spots.

Length about 25""°; diameter 2-5"""".

Bay of Fundy, off Head Harboi", Campo Bello Island, 40 fathoms, mud, Aug. 2Y, 1870. (Catal. No. 117).

Micrura albida Verriii.

Micrura albida Verrill, Notice of Recent A-ddit. to Mar. Invert., Part I. in Proc. National Mns., ii, p. 186, 1879.

Body slender, thickest and nearly round anteriorly, gradually tapered and somewhat flattened posteriorly, with a small, slender caudal papilla. Head flattened, narrow, obtuse, narroM'er than tlie body. No ocelli. Lateral fossoe rather short, extending beyond the mouth, not conspicuous. Color whitish, or pale yellowish, often be-

coming light red toward the head ; posteriorly often with grayish or clay-colored internal mottlings along the sides, due to the reproductive organs. Very sluggish in its motions.

Two specimens from 140 fathoms, ofi^ Cape Ann, apparently of the same species, were milk white above, with fine specks of opaque white, the ganglions showing as red spots ; they had a narrow l>ut distinct ring of blue around the body, behind the head.

Length, 50 to 125""; diameter 2-5 to 3"".

Common in the Gulf of Maine and Massachusetts Bay, on muddy bottoms, in from 30 to 140 fathoms.

It is sluggish in its movements and constructs translucent tubes of tough inucus,

Micrura inornata Veniii.

Micrura inornafM Verrill, Notice of Recent Addit. to Mar. Invert., Part i, iu Proc. National Mns., ii, p. 18G, 1879.

PLATE XXXVII, FIGURE 7.

Body subterete, moderately elongated, thickest anteriorly or in the middhi, gradually tapered to the somewhat flattened tail ; caudal filament white, very slender and acute, sometimes as long as the diameter of the body, but usually less. Head obtuse, often as wide

as the body or wider, somewhat flattened. Lateral fossae long, deep,

curve<l, extending to opposite the mouth, the latter not being very

far back. No ocelli. Color above, l)right cherry-red, varying to

dark red, the middle of the head l)rightest ; tail pale.

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Length of largest specimens observed, about 75'''''; breadth, 1-5 to

2''''' in extension. Described from life.

Massachusetts Bay and Gulf of Maine, 45 to 110 fathoms, mud.

Resembles the young of Cerebratulus luHdus T^, whicli occurs

with it.

Cerebratulus Remer, 1804.

. Meckelia Leuckart, Breves Anim., p. 17, 1828 (t. Rathke); Diesing, Syst. Helm.

vol. i, p. 266, 1850.

Serpentaria Goodsir, Ann. Nat. Hist, vol. xvi, p. Si?, 1835.

Oerehratulus {jxirs) and Meckelia Stimpson, Prodrorans, p. 160, 1857.

Cerehratulm Mcintosh, British Annelids, Part T, Nemerteans, p. 194, 1873.

Cerebratulus (pars) Hiibreeht, Voy. Challenger, vol. xix, p. 37, 1887; Cams, Fauna

Medit., p. 160.

Body large, elongated, much flattened along the middle and posterior portions and adapted for swimming by having the margins produced and thin, mainly oAving to the unusual development of the longitudinal muscular layers, which are greatly thickened, especially the outer layer, which, as seen in transverse sections, forms a more or less triangular band, much thicker than elsewhere, (Plate XXXIX, fig, 19, I). Transverse muscular l)undles running from the upper to the lower sides of the inner surface of the body-wall (fig. 19, t') are also unusually well developed so as to aid in giving an undulatory motion to the margin while swimming.

Anterior or oesophageal region large, with rounded margins (fig. 20). Ca^cal appendages of intestine numerous and crowded, elongated, more or less forked and lobed at the outer ends, the divisions occurring partly horizontally, and showing well in sagittal sections.

Head versatile in form, usually without ocelli. Cephalic lateral slits or olfactory organs are large and deep. Mouth unusually large, oblong or oval, rather far back. Proboscis very long and slender ; in section showing decussated muscular layers medially, above and below.

Anal papilla or cirrus often long and slender, delicate, contractile, often M'an ting owing to injury. Tt contains a continuation of the muscular layers of the body-wall.

Hubrecht has united Micrura to this genus, and in his report on the Nemerteans of the Challenger Exp. he proposes also to unite

Lineus with it.

Such a wholesale massing together of these groups seems to me unnecessarj^ and undesirable, and is, apparently, only thought of because of the diificulty of distinguishing the generic position of alco-

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holie specimens — a difficulty tliat holds with quite as nuu!h force in many other groups of animals, which lose many of their characters by preservation in any known medium.

However, it seems to me that some of the large species referred to Micrura by authors really belong to Cei'ebrattdus, especially those like 31. fusca Mcintosh {non Fabr. sp.)

The differences noted by Mcintosh in the muscular layers of the proboscis appears to me of less importance than the special muscular structure of the body-wall which enables the species of Cerehratalus to swim actively at the surface, while the more slender and rounded species belonging to Micrura (restr.) and Linens, so far as I have observed, are unable to swim, and do not voluntarily leave the bottom.

The broad, flattened form of the body with thin tnargins is the external expression of the internal musculature, adapting it to the un-

dulatory swimming motion.

Cerebratulus lacteus (Leidy) Veniii.

Meckelia frag ills Girard, Nord Arner. Monatsb., 1851 {non Goodsir, sp.)

Meckelia lactea Leidy, Proceedings Academy Natural Sciences of Pliiladelphia, vol.

V, p. 243, 1851, (young); Verrill, Invertebrate Animals of Vineyard Sound, p.

336 [630], 1873, (young), nou 0. lacteus Hubrecht, Mont. s\). = Liueus lacteus

Mcintosh.

f Meckelia Lizzice, Girard, Proc. Acad. Nat. Sci. Philad., vol. vi, p. 366, 1854.

Mecktlia iwjens Leidy, Marine Invertebrate Fauna of Rhode Island and New Jersey,

p. 11 (143), 1*855; Verrill, Invertebrate Animals of Vineyard Sound, p. 336 [630],

Plate XI.V, figures 96, 96a.

PLATE XXXV, FIGURES 1, \a ; PLATE XXXVI, FIGURE 2 ; PLATE

XXXVII, FIGURES 1, Irt, \b ; PLATE XXXIX, FfGURES 19, 20, 21.

Body flat, large and very long when full grown, sometimes becom-

ing fifteen to twenty feet long and upwards of an inch in breadth,

very contractile and changeable in length, breadth, and form.

While swimming the body is turned up edgewise and thrown into

many undulations and the motion resembles that of an eel, but is

less rapid. Tlie anterior part of the body for some distance back of the head is, in usual extension, narrower and thicker than the rest, with the margins rounded ; the body then expands rather rapidly in breadth and at the same time becomes more flattened while the margins become thin and pale, and throughout the rest of its length the body continues thin and flat, gradually decreasing in breadth and thickness toward the])osterior end, which is usually obtuse, or slightly emarginate, but occasionally, or when perfect, terminates in

[Begin Page: Page 434]

a slender aiuil papilla. The posterior end is, however, seldom seen entire, owing to its extreme fragility and its tendency to disrupt itself when irritated. When disturbed the middle region of the body often contracts, while the anterior becomes thick and swollen.

The increase in breadth of the body and enlargement of the marginal regions marks the commencement of the crowded lateral lobes of the stomach and the genital organs, which can usually be seen through the translucent integuments ; the caecal lobes of the intestine usually appear as closely arranged, transverse, oblong spots, forming a regular row along each side, from their commencement nearly to the posterior end of the body, and usually having a slightly darker or more brownish tint than the central and marginal regions. The ctecal appendages, when seen from above or below, usually appear as simple, narrow, but often forked, and closely ar-

ranged lobes, but when examined in sagittal sections they are mostly lobed and forked horizontally. The genital organs are closely crowded between the enseal pouches of the stomach, digitally.

The head is exceediugly changeable in shape, according to its state of contractiou or expansion, but is usually narrower and thinner than the adjacent part of the body. In full extension it is usually broad spear-shaped or rhomboidal, and more or less pointed at the ajsex, while marked lateral constrictions separate it posteriorly from the body, but in another moment it may contract to a broad rounded form, or it may even become deeply emarginate in front, with rounded lateral lobes, or it may change to a very narrow and elongated form with a sharp point. Ocelli are wanting.

The lateral cephalic slits are large and deep, extending the entire length of the head, and running forward close to and a little above the proboscis-pore, those of opposite sides not uniting together except by a very shallow furrow ; they do not join the proboscis-pore, so that the snout is not four-lobed at tip, as in some allied species. Their margins are thin and mobile, often undtdated or curled back so as to open the slits widely and expose the deej) posterioi- pits, which, in life, are dull red within. Proboscis-poi'e large, terminal or subterminal.

Mouth very large, but variable in form as the head varies in shape, most frequently appearing as a long, narrow oval or oblong-slit, its anterior end opposite the posterior ends of the lateral slits.

Proboscis exceedingly long, slender, round, whitish, and, nearly

smooth. When the worm is placed in alcohol or other irritating fluid the proboscis is usually ejected entirely without eversion (PI.

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XXXV, fig. la); in large specimens it is fonr feet or more long, and 3 or 4'''''' in diameter at the large end.

Color of small and moderate-sized specimens is translucent milk-white, cream-color, pale tlesh-color, and occasionally pale salmon or pale pink, with the margins paler and more translucent ; larger individuals are generally deeper flesh-color, cream-color, light salmon or ocher-yellow, and occasionally dull gray ; the ca^cal appendages of the intestine and the i*eproductive organs appear as a more opaque yellowish or pale brownish liand along each side, near the pale margins ; the latei-al nerve-trunks are reddish.

Length of Ordinary adult specimens, in extension, 500 to 1200''''''; breadth in middle 15 to 22''''''; some specimens ai*e more than double these sizes.

Common, burrowing both in sand and mud at and above low-water mark, and in shallow water down to several fathoms in depth, from Florida to Massnclinsetts Bay, and locally found on the coast of Maine.

It is particularly abundant near low-water mark on the sheltered sandy shores of the New Jersey estuaries ; Long Island Sound ; Buzzard's Bay ; Vineyard Sound ; Cape Cod ; and at Annisquam, Mass., noith of Cape Ann. I have taken a number of well grown examples at Quahog Bay, on the coast of Maine, where it is associated with a colony of other southern species. I have not found it in the Bay of Fundy, where it is replaced by a closely allied arctic species (C JuscKs). Its southern range is not well determined, but I have seen specimens from Fort Macon, North Carolina, and others from St. Augustine, Fla., and Charleston, S. C, (W. R. Coe).

The largest specimen hitherto obtained I personally dug from the sand at low-water mark at Great Egg Harbor, N. J., April, 18'72. This one, when extended, was 22 feet long and nearly an inch in breadth, in the middle. It could contract, however, to less than 6 feet in length, becoming, at the same time, much broader, thicker, and firmer. This gigantic specimen is, apparently, the most bulky nemertean that has ever been described, though species of Lineus far exceed it in length.

When preserved in alcohol it contracts very firmly and shows very plainly the contrast between the form of the anterior and middle regions of the body, the latter being decidedly fiat with thinner margins. The head takes various shapes.

In alcoholic specimens the mouth is usually large and open. Sometimes numerous small whitish papillae, probably containing the

Trans. Conn. Acad., Vol. VIII. 57 June, 1892.

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genital pores, can be seen a short distance from the mai'gin, both above and below ; sometimes there are several in each transverse row ;-at other times only two or three are visible.

In transverse sections the great thickening of the interior longitn-dinal muscular layer in the marginal areas is strongly marked. (PI. XXXIX, figure 19.)

The earliest name of this species that can be retained is apparently G. lacteva (Leid)"), which was given to the white specimens tliat I now regard as the young of this species. I have adopted this name for the species, notwithstanding that Linens lacteiis (Mont.) Mcintosh is now referred to Cerehratuhis by Hubrecht. That the latter belongs to Cerehratuhtx, as here defined, I do not think |)os-sible,

A large species (C. Pocohontas) from Charelston, S. C, ver}^ briefly described by Girard under tlu; name of Mechelia Pocohontas* appeal's to be very similar to our species in size (3 feet long), form, and color, but he states that the snout, is split vertically [by the proboscis-pore], indicating that the cephalic slits join the proboscis-pore in front, so that the snout, as he states, is four-lobed at the tip, which is not the

case in our species. (J. Lizzia', from the same place, described in few words, at the same time (op. cit. p. 367), agrees with our species in respect to the color, snout, and slits, and may be identical with it.

C. striolenta [Leodes strlolenta. Girard, loc. cit.) also from Charleston, appears to be a typical Cerehratidus, but it is a very distinctly mai'ked species, having a pink body, longitudinally striped, and with dark longitudinal blotches on the head ; margins pale ; length six inches ; no ocelli.

Cerebratulus Leidyi Yeniii.

J/ecW/a, rowo, Leiily, Proc. Acad. Nat. Sci. Philad., vol. v, p. 244, 1851; Verrill,

Invert, of Vineyard Sound, etc., pp. 336, [630] 1873.
? Renieria rubra Girard, Proc. Acad. Nat. Sci. Philad., vol. vi, p. 306, 18r)4.
CerebratMlus roseit^YnTYxW, Check List Invert., p. 12, 1879, (»ow C. roseus {T>. C\i.) Hubrecht).

rr.ATE xxxviii, figures 2, 2a.

Body elongated, rather slender in extension, rounded in the oesophageal region, decidedly flattened and wider farther back, l)ut not so much so as in C. lacteux and allied s})ecies, nor do the margins become so broad and thin. Caudal papilla of moderate length, slender, white, often absent, owing to injury.

*Proc. Acad. Nat. Sciences, Philad.. vol. vi, p. 366, 1854,

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Head versatile, in extension decidedly long and narrow, often narrower than the body, regularly tapered to the acute tip.

Mouth large, elongated, with slightly crenulated white lips ; its anterior end is about opposite the posterior ends of the lateral slits.

Lateral cephalic slits long and deep, with thin, translucent margins, often curved back so as to show the large interior cavity ; in front they run very close to the proboscis-pore, which, in contraction, appears as a sub-terminal vertical slit. Proboscis very lono- and slender, pale pink in color. No ocelli. Cephalic ganglions laro-e showing through the integument as dark red spots.

Color of body dull red, or rose-color, or pale purplish, somewhat lighter beneath ; usually with a lighter colored median line, and a red spot in the head corresponding to the ganglions ; front of head and mouth area Avhitish ; the closely arranged c;ecal lobes of the intestine often show through the integument, especially beneath, as a pale brown baud along each side. These ctecal appendages are numerous, and many of them are divided into two or three lobes distally.

Very common, burrowing in sand near low-water mark, from New Jersey to Cape Ann, Mass. It is abundant near New Haven, Conn.;

Thimble Islands and Noank, Conn.; Newport, R. I.; and Wood's Holl, Mass.

This is a more strictly littoral species than the preceding. It seldom occurs much below low-water mark. The mucus that it secretes is more tenacious than that of most species, so that captive s])ecimens often cover themselves quickly with adherent sand.

This species is generally found associated with C. lacteus, from which it can easily be distinguished by its decidedly red color, and its narrower and more slender body, without the very thin margins. It is also a more sluggish species and seldom swims freely. It is prone to break itself in fragments when captured.

It is unfortunate that the name roseus, which applies so well to this species, cannot be retained on account of the much earlier named Mediterranean species. I have, therefore, given it a new name in honor of Professor Leidy, who tirst described it.

It is quite probable, however, that C. rubra {=:Iie?iierla rubra Girard, op. cit., p. 366, 1854) is identical with this species. Girard's description is too brief and indefinite to determine this question. He describes C. rubra as uniform brick-red, paler beneath, and as lacking eyes ; length 5 to 6 inches. Its form was nearly as in the present species. It was from Charleston, S. C, on sand-tiats at Fort Johnson.

CerebratuluS fuSCUS (Fabr.) Venill.

Planariafusca Fiihw, Fauua Groulandica, p. :{2'l, 1780.

Meckelia olivacea Rathke, Beitrage zur Fauna Norvvegeus, p. 324, 1843 (from Acta

Akad. Ca3S. Leop. Carol. Nat. Cur., vol. xx, 1843).

Serpentaria fragilis G-oodsir, Aim. Nat. Hist., vol. xv, p. 387, pi. 20, tigs. 1 and 2,

1845.

Jieckelia se7-2>e7ita'na Diesiug,Syste\na lielm., vol. i, p. 266, 1850.

Gordius fragilib- Dalyell, Povk^. Great., vol. ii, p. 55, pis. 0, 7, and 7 (his), 1853.

Meckelia serpentaria Leuck-Avi, Arcliiv. fur Naturges., ii, p. 187, 1859.

Serpentaria fragilis Johnston, Catalogue Brit. Mus., p 28, 1865.

CerebratuluS angulatus Mcintosh, British Annelids, part i, Neraerteans, p. 195, 1873.

Cerebratulus (?) sp. undeter. («) Verrill, Report on Invert. Anim. of Vineyard Sound,

p. 336 [630], 1874.

Cerebralulus fragilis (!) Janseu, op. cit., p. 85, 1878.

Cerebrniuhis grandis (Sars) Jensen, op. cit., p.. 97, pi. 8, figs. 17-22.

Cerchratulas fusce.sceus Levinsen, Bidrag til kuudskab om Groulands Turbellarie-

fauna, p. 40 [202], 1879.

PLATE X.XXVII, Kl<;URES 2 TO 2c.

Body large, stout, rounded for a considerable distance back of the head, and thence broad and much flattened to the posterior end, the edges thin and usually pale in color. Head very changeable in form, often broad lance-shaped, with acute snout, changing (piickly to ovate, rounded,' or even emarginate forms. Ocelli wanting. Mouth large, oblong. Cephalic slits large and deep, moderately long ; they do not meet in front, nor run into the proboscis-})Ore, but lie in a higher i)lane Anal cirrus slender, easily detached.

Color, above, dull ash-gra}^, greenish gray, slate-color, clay-color, o-rayish olive, or dirty brown, paler below, and with paler margins, within which, on each side, a red line, showing through theintegumeut? marks the position of the large lateral nerves. Sometimes the back is mottled with lighter, and darker gray or slate ; mouth surrounded by white, reddish at the anterior angle.

Length np to two feet or more. A specimen taken at Todd's Head, Eastport, Me., under stones at low-water, Aug. 19, 1870, measured 400"""" in length, when moderately extended ; breadth, in middle, 12 to 14"""", but it could contract to less than 100"""" in length.

This is a northern and arctic species. I have taken it at Halifax,]^. S.; Grand Menan, N. B,; Eastport, Me., under stones and in sand and gravel near low water mark, and beyond in shallow water to 20 fathoms or more. South of Cape Cod it occurs in 15 to 45 fathoms on bottoms of sand and mud in the cold areas swept by the

arctic current, as off Gay Head, in 19 fathoms, and off Block Island, in 29 fathoms. It is also found on the coasts of Greenland, northern Europe, and Scotland.

This species usually lives in burrows under stones, in muddy or sandy places, at and below low-water mark, but when disturbed it swims readily and rapidly with vigorous eel-like undulations of the posterior flattened portion of its body, which is carried with the greater diameter vertical while swimming. In this habit it agrees with (J. lacteus and several other large species, but it is, perhaps, more active and more vigorous than C. lacteus, and somewhat less liable to disrupt its body when captured. Like C. lacteas it is occasionally taken at night in surface nets, showing that it is nocturnal in its habits and voluntarily leaves its burrows and swims free at the surface.

After long preservation in alcohol the slate-color of the body and the white margins are often distinctly visible. In some alcoholic specimens the small and slender anal papilla is still preserved, but it is so fragile that it is generally lost during capture or in the violent contractions caused by the alcohol.

Our species is probably identical with the European species

named C. angulatus by Mcintosh, who supposed his species to be the JPlanaria angulata of Fabricius (Fauna Grunlandica). The latter is, however, our Aniph'qoorus angulatus, as stated on a former page.

Formerly* I supposed that the Greenland species named Planaria fusca by Fabricius might be the brown variety of Lineus virldis, but a more careful study of his description, in which the absence of ocelli, the presence of lateral cephalic slits, the rounded form of the anterior, and the distinctly flattened form of the posterior part of the body are mentioned, has convinced me that the species he had in hand was the common dark-colored, large, northern Cerehrattdus, which has received many later names. His statement that it lives in sand on the shores conflrms this view. Moreover, this same Cerebrat'idus has been recently recoi'ded from the Gi*eenland coast and referred to the Fabrician species by Levinsen, as quoted above. He, however, adopts the later emended form of the name, quite unnecessarily it seems to me. Hence I have restored the original name, first given by Fabricius to this species.

* Proc. U. S. Nat. Mus., vol. ii, p. 185, 1879.

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Cerebratulus luridus Veniii.

Meckelia lurida Verrill, Report ou Invert of Vineyard Sound, etc., p. 33U [630],

1873.

Cerebrattilm luridus Verrill, Check List Invert., p. 12, 1879.

PLATE XXXVI, FIGURE 3 ; PLATE XXXVII, FIGURE 3.

Body large, rather stout, very changeable in form, broad, flat, thin posteriorly, where the lateral cteca and reproductive organs are developed ; these diminish anteriorly and do not extend forward into the narrower, rounder, and thicker portion which occupies nearly one-fourth the whole length. Head very changeable, often separated from the body by a constriction ; in expansion often spade-shaped, obtuse, or pointed. Lateral cephalic slits very long and deep ; in front they are connected together by a shallow furrow, above the proboscis-pore. Mouth large, usually in the form of a long slot, commencing about opposite the posterior end of the lateral slits. Proboscis long and slender. Caudal papilla small, slender, acute.

Color reddish brown to dark olive-brown, chocolate-color, or purplish brown, darkest anteriorly, and with pale margins ; the cfecal lobes of the intestine show through the integument as dull brownish or ocher-yellow transyerse bars ; usually there is a brown or reddish median dorsal line, and a pale ventral line. Some dark specimens are marked with several narrow lighter reddish or purplish longitudinal lines. Young specimens are usually reddish brown or liver-brown with paler snouts.

Length 150 to 250""; breadth 8 to 12"", Described from life,

(No. '723).

Off Gay Head, 19 fathoms, soft mud, 1871 ; off Buzzard's Bay, 25 fathoms ; and off Block Island, 29 fathoms, sandy mud, 1871 ; Casco Bay, 10 to 68 fathoms, 1873 ; Massachusetts Bay, in many localities, 1877, 1878, 1879, in 10 to 100 fathoms; Bay of Fundy ; off Halifax, N. S., etc., common ; off Martha's Vineyard, 192 fathoms, 1883. Numerous specimens of various sizes from 1 to 8 inches long were taken in Cape Cod Bay, in 15 to 21 fathoms, soft mud, Aug. 29, 1879. The larger ones were filled Avith eggs.

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TIOUBTFUI. SPECIES.

CerebratuluS medullatUS Hubrecht, Voyage of the Challenger, vol. xix, pp. 39, 50, pi. xi, fig. 10 ; pi. xii, figs. 9, 10, 1818.

PLATE XXXIX, FIGURE 17.

Tliis species was described from a mere fragment, without head or tail. It is said, however, to differ from other species in the structure of the body-wall, which is thinner than usual.

The inner glandular layer of the integument and the inner basement membrane are wanting, as distinct layers, so that the outer

glandular layer and its basement layer are in contact with the outer-longitudinal muscular layer. The median dorsal nerve, or nervous thickening, is also unusually large and distinct, being from one-third to one-fourth as thick as the core of the lateral nerve-trunks.

Off Nova Scotia, in 85 fathoms.

This species is probably not a Cerebratulus, as here defined, but more likely belongs to Lineus or Micrura, and perhaps to some of the speties described above.

Suborder II, GYMNOCEPHALA.

Holocephala Diesing, 1850, non Miill., 1835.

Gymnocephnlidce, Kefferstein, Zeitsch. fiir wiss. Zoo!., xii, 1862.

Ano'pla. (pars) Mcintosh, Nemerteans, p. 203.

PalmonemfiTiini Hubi'echt ; Canis.

Palceonemertea Hubrecht, Voy. Challenger, xix, p. 5, 1887.

Palwomertina Lang, Text-Book of Comparative Anat., p. 178, 1891.

Head without lateral slits, but sometimes having shallow transverse or oblique fossae connected with small, ciliated (olfactory) pouches or ducts leading to the posterior ganglions ; sometimes des-

titute of both fossiB and ciliated ducts. Mouth distinct, situated back of the ganglions.

Proboscis long and slender, more simple in structure than in the Rhagadocephala. Usually only two (lateral) longitudinal blood vessels are present.

Ocelli often numerous, variously arranged, sometimes wanting.

Lateral nerve trunks sometimes situated between the basal layer of the cutis and the external circular muscular layer ; sometimes outside of the longitudinal muscular layer; and sometimes in the midst of the muscular layer of the body-wall ; usually connected with a continuous nervous plexus.

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In the classification adopted by Hubrecht and several other writers this group and the Rhagadocephala (or ScJtizonertina) are both raised to the same rank as the Eitopla. To rae they appear to be of subordinate value, as here indicated.

The species are all marine, and, so far as known, none of them undergo a marked metamorphosis.

Family, Cephalothricid^e Mcintosh, Nemerteans, p. 208.

Uody slender. Head elongated. Superior ganglions and commissure situated decidedly in front of inferior ones. Cephalic fossa^ and pits wanting. Ocelli usually few or absent ; sometimes numerous. Two longitudinal blood vessels.

Cephalothrix fErsted, Kroyer's Tidss., iv, p. 573, 1844.

Astemma CErtsted, Kroyer's Tidss., iv, p. 574, 1844 (t. Mclntosli).

Body slender, terete or nearly so. Head terete, much elongated, tapering to a point in extension. Mouth small, situated far back.

Cephalothrix linearis (Rathke) (Ersted.

Plamiria linearis Jens Rathke, Skrivter nf Natiirhist. Selsk., vol. v, p. 84, tab. 3, fig. 11, 1799.

Planariafiliforrnis Johnston, Zool. Jour., vol. iv, p. 56, 1829 (t. Mcintosh).

Nemerf.es {Borlasia) rufifrons Johnston, Mag. Zool. and Bot., vol. i, p. 538, pi. xviii, figs. 4 and 5, 1837 (t. Mcintosh).

Cephalothrix linearis G5rsted, Entw. Plattw., p. 82 (note under C. cceca), 1844 (t. Mcintosh).

Cephalothrix bioculato (Ersted, Kro3'er's Nat. Tidss., vol. iv, p. 573, 1844 (t. Mcintosh).

Astemma fill formis iohn?,\.on, Catalogue Brit. Mus., p. 19, 18G5.

Cephalothrix filiformis Mcintosh, Rept Brit. Assoc, 1867, Trans. Sect., p. 92, 1867.

Cephalothrix linearis Mcintosh, British Annelids, Part I, Nemerteans, p. 208, pi. IV, figs. 4 and 5; pi. xviii, fig. 15; pi. xxi, figs. 2, 8, 13; pi. xxni, figs. 12 to 16, 1873.

Plate xxxvi, figures 4, 5; plate xxxix, figures 10 to 13, 14, 15.

Body small, nearh' terete, changeable ; in extension very slender, elongated, often linear or hair-like, fre(piently coiled in a close spiral form, usually rather thickest in the middle and tapered both Avays, but often with the posterior end thicker and obtuse. Head very long and round, in full extension tapering to a slender sharp tip, in contraction often circularly wrinkled ; usually, in mature specimens, without distinct ocelli ; sometimes dark specks of pigment, irregularly arranged, resemble imperfect ocelli. Young examples usually

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have a pair of distinct ocelli. No cephalic slits nor fossae. Mouth small, situated far back from the snout ; and usually Avith slightly prominent lips.

Color pale yellow, flesh-color, or cream-color, varying to pale

salmon and greenish white, often with the anterior region deeper salmon or reddish, or with a median red line ; sometimes the posterior part of body is bright salmon ; the head and anterior portions of body often show a whitish or drab median line, due to the proboscis ; lower surface paler than the upper. Proboscis very long and slender ; when exerted, covered with slender acute papillae.

Length 50 to 75"""" ; diameter -5 to 1"""".

Long Island Sound to Nova Scotia, at many localities, between tides under stones and in sand. Noank, Conn. ; Newport, R. L ; Wood's Holl, Mass. ; Portland, Me. ; Eastport, Me. ; Halifax, N. S., etc. Also common on the northern coasts of Europe.

This species often occurs gregariously, many individuals being intricately coiled up together in a mass, often mingled with numerous pale young ones, of various sizes.

Family, Carinellid.e Mcintosh.

Body elongated, roundish, decreasing backward. Head broader than body, obtuse anteriorly. Mouth small, not far back. Cejshalic shallow fossae and olfactory sacs present. Ocelli often Avanting.

Carinina Hubrecht, Voy. Challenger, vol. xix, p. 5.

" Closely allied to Carhiella, from which it dift'ers in the presence of a distinct posterior brain lobe, situated with the rest of the brain

and nerve-stems in the integument, outside of the body musculature.

A ciliated canal penetrates into this posterior brain lobe."

Carinina grata Hubrecht, op. cit., pi. i, figs. l-3; plates II, III, IV; pi. vi, figs. 1-3; pi. XI, figs. 1, 2.

This species is known only from two alcoholic specimens, which were very fully studied anatomically.

Off the East Coast of the U. S. States in 1240 and 1340 fathoms.

Trans. Conn. Aoad., Vol. VIII. 58 Dec, 1892.

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Order III, B DEL L OMO RPH A.

Body short, stout, flattened, and leech-like in appearance, Avith a large rounded sucker or acetabulum at the posterior end, as in the leeches. Head indistinct. No ocelli. Anterior end emarginate, with neither lateral slits nor grooves. Mouth at the bottom of the anterior emargination.

Proboscis seldom protruded in captivity, small, slender, unarmed, but with a small special bulb and sac in the middle region ; probos-cis-poi'e close to the mouth, in the anterior notch.

Intestine not lobulated, slender, convoluted, longer than the body ; anus at the base of the sucker. Reproductive organs voluminous, filling the larger part of the body. A median dorsal and two lateral blood-vessels, with numerous branches.

Muscular walls of the body consist of an external circular, and an internal longitudinal layer. Lateral nerve-trunks ai'e not included in the muscular layers ; they are united by a posterior commissure.

This singular group is united to the Enopla by some writers, mainly on account of the rudimentary bulb and sac in the proboscis, which certainly indicate some relationship. The simple, convoluted intestine and other peculiar features appear to me of ordinal value.

Family, Malacobdellid^ Semper.

Characters not distinguishable from those of the sub-order.

Malacobdella Biaiuviiie.

Diet. Sci. Nat., vol. xlvi, p. 270 ; Blanchard, Ann. des sci. nat., ser. 3, vol. iv, p. 364, 1845 ; op. cit., viii, p. 142, 1847 ; op. cit., vol. xii, pp. 267-276, pi. 5, 1849, anatomy.

Phyllme Oken, 1815, (non Abilg-, 1790).

This is the only genus of the order known. Therefore the generic characters are not distinguishable from those of the ordei-.

Malacobdella obesa Verriii.

Report on Invert, of Vineyard Sound, etc., pp. 458 [164] and 625 [331], pi. xvm, fig. 90, 1873.

Wood-cut, No. 9.

Body stout, broad, thick, convex above, flat below, broadest near the posterior end, narrowing somewhat anteriorly ; the front end is broadly rounded, with a median vertical slit, in which the mouth is situated. Acetabulum large, rounded, about as broad as the body. Intestine convoluted posteriorly, visible through the integument.

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Between the intestine and lateral margins, especially posteriorly, the skin is covered with small stellate spots, looking like openings, around which are large numbers of small round reproductive vesicles. Color yellowish white. Length, 30 to 40"""; breadth, 12 to 15""".

Whole coast of New England ; abundant in Massachusetts Bay- Parasitic in the branchial cavity of the long clam {Mya arenaria). This species is closely related to M. grossa of Europe, and may prove to be identical with it. The latter occurs mostly in 3fya truncata and Gyprina. Islandica.

Fig. 9. Malacobiit'lld obrsa, dorsal view, nat. size.

Malacobdella mercenaria Verriii.

Malacobdella grosaa Leidy, Proc. Acad. Nat. Sciences Philad., vol. v, p. 209 (non Blainville).

Malacobdella mercenaria Verrill, Report on Invert, of Vineyard Sound, etc., pp 458 [164] and 625 [331], 1873.

Plate xxxix, figure 20.

Body, in extension, elongated, oblong, with nearly parallel sides, or tapering slightly anteriorly ; ' anterior end broad, obtusely rounded, emarginate in the center, but not deeply fissured. In contraction the body is broader posteriorly. Dorsal surface a little convex ; lower side flat. Acetabulum round, rather small, about half the diameter of the body in the contracted state, but nearly as broad when the body is fully extended. The intestine shows through the integument distinctly ; it is slender, and makes about seven turns or folds. Color pale yellow, with minute white specks beneath and on the upper surface anteriorly, giving it a hoary appearance ; middle of the dorsal surface irregularly marked with flake-white ; laterally reticulated with fine white lines.

Length in extension, 25""" ; breadth, 4""" ; in partial contraction,

18'''''' long ; 5 to 6'^'''' wide.

New Haven, parasitic in the branchial cavity of the round clam {Venus mercenaria), October, 1871. Philadelphia, in the same species of clam (Leidy).

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Addenda to the Enopla,

I take this opportunity to describe two very remarkable new forms of pelagic nemerteans, of which several specimens were taken by the U. S. Fish Commission Steamer Albatross, in the region of the Gulf Stream. Whether they occurred at the surface or near the bottom I am unable to say, but their form and structure is eminently adapted to a purely pelagic mode of life. In form they somewhat recall Sagltta, though they are much larger and stouter. The internal structure is, however, entirely nemertean, and not very different from that of the typical Enopla. In that grouj), however, they should form at least a distinct family {Nectonemertidm) . They also have some affinity with Pelagoneniertes^ but differ from that genus widely in form, as well as in having a distinct head and caudal fin, lateral cirriform organs in one species, etc. The latter, moreover, has long, much subdivided intestinal diverticula, which is not the case with our new genera. The resemblance in the structure of the muscular walls of the body and the nervous system is quite marked.

Several forms occur among the few specimens of Nectonemertidm hitherto obtained. Some of them are entirely destitute of the lateral arms or cirri of the neck, which in others ai'e large and long and give them a very striking appearance. But as small specimens of Nectonemertes occur in which the lateral cirri are of small size, it is pi'obable that they would be entirely absent in still smaller specimens of that genus. In the second genus [Hyalonemertea) they are probably never developed.

Although I have prepared many microscopic sections of two specimens of N'ectonemertes of different ages, I have not yet had suflicient opportunity to work out several important parts of their anatomy, — especially the structure of the brain and certain special organs in the head, supposed to be sensory. But since there is, at this time, no opportunity to illustrate the details of the anatomy, I propose to describe here only the more prominent features, reserving details for another occasion.

Family, Xectoxemertid.e Verrill.

Body with highly muscular striated walls, adapted for swimming actively, elongated, more or less flattened, and with a differentiated, muscular caudal fin ; the dorsal and ventral surfaces are similar.

Proboscis with a distinct bulb and sac. Mouth far forward, close to the proboscis-pore. Intestine straight, with large lateral pouches.

which are often bilobed ; anus at the posterior end of the caudal fin. Lateral nerves large, not included in the muscular walls of the body, united posteriorly. A median dorsal, and two lateral blood-vessels are well developed.

Muscular walls of the body are composed mainly of a thin, outer, circular layer and a thicker inner, longitudinal muscular layer, in which the fibers are arranged in distinct bundles, except in the thinner marginal regions. A pair of long, muscular, cirriform appendages is developed from the sides of the nuchal region in one genus.

Nectonemertes, gen. nov.

Body decidedly flattened and with thin borders along the sides ; caudal fin usually broadest at the end and sometimes bilobed. Head separated from the body by a more or less distinct neck-like portion. Lateral cirriform appendages project from the neck or posterior part of the head, in the adult. Mouth near the front of the head, just below the terminal proboscis-pore.

Proboscis long, slender, with a small bulb and sac ; its sheath extends nearly to the posterior end of body. Lateral lobes of the intestine exist nearly to the end of the intestine, even into the caudal fin.

Special sense organs,* imbedded in the integument of the lower side of the head, form a cluster on each side, their ends projecting as small papilla?. Eyes of the ordinary type are, apparently, wanting. Probably the species are transparent in life and swim actively, like Sagitta.

Nectonemertes mirabilis Veiriil, sp. nov.

I^LATE X.V.Wiri, FIGURE 1.

Description of the adult: Size large, up to 2 inches or more in length. Bodj' rather elongated, decidedly flattened and with abruptly thinner marginal regions, smooth, with the walls somewhat translucent, longitudinally and transversely striated, elastic ; in the middle region of the body the sides are nearly parallel ; posteriorly it narrows rather rapidly to the base of the tail, and at this place, in some examples, the thin marginof the body forms a sort of fin or thin rounded lobe on each side.

*The precise nature of these organs has not been ascertained, but they are probably special sense organs.

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The tail gradually thins out to the end and at the saine time in-

creases in width by the development of the thin marginal regions, thus forming a true caudal fin, in form somewhat like that of a fish. Its posterior mai'gin is emarginate in the largest specimens, with a distinct notch in the- middle, Adhere the anus is situated, but in other specimens it is truncate. The integument of the tail shows strong longitudinal muscular fibers toward its base, while the edges are thin and delicate.

The head is ovate in form, narrowest, but obtuse, in front, considerably flattened, and usually separated from the body by a distinctly narrower neck. From the back part of the head, or commencement of the neck, a long, tapering cirrus arises on each side. The cirri have a thick, roundish, muscular base from which they taper gradually to the long, slender, lash-like, often coiled tip. These organs seem to be mere extensions of the muscular walls of the body and are not hollow.

On the ventral surface of the head and occupying a large ovate patch on each side, there is a group of small acute papillae, projecting slightly above the surface ; they are arranged in three or four irregular rows, and are connected beneath the integument with pyriform organs which can be seen by transmitted light as opaque yellowish bodies.

The proboscis-sheath is well developed and extends back nearl}^ to the base of the tail, where it is abruptly naiTOwed to a short muscular band that joins the wall of the body. The proboscis is long and slender, with a small rounded muscular bulb* and a small saccular organ, much as in ordinary Enopla, though relatively smaller.

When the proboscis is partially protruded, as is the case in one example, it is somewhat clavatc distally and is covered with small papillae. In transverse sections its structure is similar to that of the typical Enopla; its internal glandular layer is thick.

The intestine is large and straight ; its lateral pouches are large, not much elongated, mostly bilobed distally, those in the tail becoming small and simple. The generative organs, in the form of rather large, round or ovate vesicles, occupy the lateral and ventral regions of the body-cavity, between and beyond the intestinal pouches.

In transverse sections the walls of the body are rather thin ; the outer layer of circular muscular fibers is thinner than the inner

*I have been unable to find any armature in the only specimen hitherto prepared for this purpose, but the stylets, if they existed, may have been destroyed by the acidity of the alcohol in which it was preserved.

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layer, wliich is made up of longitudinal fibers arranged in bundles, 80 that its inner surface, in the sections, is strongly crenulated, or deeply furrowed ; from the indentations between these bundles numerous strong vertical bands oif muscular fibei's extend from the dorsal to the ventral body-walls, between the internal organs. Toward the margins the muscular layers thin out rather abruptly, leaving

the marginal portions thin and without longitudinal bundles. The general structure of the interior of the body-cavity is loose, with many spaces in the porous parenchyma, which is feebly developed, as compared with that of other nemerteans.

The lateral nerve-trunks are very large and quite interior to the muscular layers. They are situated ventrally, some distance from the edges, and near the commencement of the thin-walled marginal portion of the body. In transverse sections they are elliptical or rounded, with an excentric translucent fibrous core along the dorsal side, thus giving the cellular portion a thick-lunate or reniform shape. The lateral nerves are large and conspicuous even back to the caudal fin, where those of opposite sides unite.

The median dorsal blood-vessel and the two lateral blood-vessels are well developed and situated nearly as in typical Enopla. The lateral blood-vessels are subventral and only a short distance interior to the nerve-trunks.

There are no memoranda as to the color of the living specimens. All had been placed in alcohol when first seen by me. One that had been in alcohol only a short time was distinctly salmon, or pale orange, in tint ; the others had lost all color, if they had any when living. They may have been white or colorless, and were doubtless translucent, like many other pelagic creatures. Even in alcohol some of them show considerable translucency, — nearly as much as the larger sj^ecies of Sagitta.

The largest specimens, when first examined by me, were about 2 '5 inches long and '50 wide ; subsequently they have contracted considerably by long preservation in strong alcohol.

The largest specimen now measures as follows : length 38"^"' ; breadth of body O™"' ; vertical diameter of body 2'"'" ; length of cirri 14'"'" ; length of head 4'"'" ; breadth of head 6'"'" ; breadth of caudal fin 4'°"'.

Descriptions of immature s^^ecimens : A specimen from station 2076 is smaller and more slender than those described above. It has a narrower head and shows scarcely any constriction at the neck. The caudal fin is somewhat elliptical, being widest in the middle and

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truncate at the end. Otherwise it agrees very well with the larger specimens. The cirri are, however, relatively shorter, their length being scarcely more than the breadth of the bod}^, but they taper to slender tips, as do those of the adults. They are directed backward. ,

This specimen is somewhat translucent in alcohol and the thin, marginal bands are very distinct along the sides of the body and in the tail fin. The intestinal pouches, proboscis-sheath, and other internal organs show more or less distinctly, especially posteriorly.

In the head there are about 20 sense organs (?) in each lateral cluster.

Length 35""" ; breadth of body 5""" ; length of head to base of cirri 4""" ; its breadth 4""" ; length of cirri 5""".

Perhaps this may be a male and the larger and flatter specimens females.

A specimen from station 2229 agrees in most respects with the fuUgrown ones described above, except that it is smaller and has short nuchal cirri. In this the body is relatively narrower and less flattened than in the larger examples, but the head, caudal fln, and proboscis are nearly as described and figured. The nuchal cirri are, however, short, tapered, blunt, not much longer than half the breadth of the head, and stand out rather rigidly from the sides of the neck, and nearly at right angles with it.

This specimen is about 30""" long ; 7""" broad ; caudal fin 3-5""" broad ; length of cirri 2""". It has been treated with hardening reagents for sections, and is therefore strongly contracted.

A single specimen was taken at each of the following stations by the steamer Albatross :

Station 2036, N. lat. 38"^ 52' 40", W. long. 69° 24' 40", 1735 fathoms. Adult.

Station 2076, N. lat. 41° 13' OO", W. long. 66° 00' 50", 906 fathoms.

Young with small cirri.

Station 2229, N. lat. 37° 38' 40", W. long. 73° 16' 30", 1423 fathoms.

Young with small cirri.

Station 2236, N. lat. 39° 1 1' 00", W. long. 72° 08' 30", 636 fathoms.

Adult.

The specimen from Station 2236 is marked as having been taken in the trawl-wings. Many of the specimens of other groups, thus taken, undoubtedly came from near the bottom, but on the other hand, it is eas}^ for any surface species to be taken in the same nets while the trawl is being loAvered or when it is being taken in. Con-

[Begin Page: Page 451]

cerning the other specimens there are no memoranda, but from their good condition it is more probable that they were all taken in the trawl-wings than in the trawl itself.

Hyalonemertes, gen. nov.

Body elongated, fusiform, somewhat flattened, having no evident constriction at the neck, nor marked marginal folds, except in the caudal fin. Cirri wanting. Head not differentiated from the neck. Caudal fin well developed.

Proboscis long and slender, with a distinct bulb and sac, and, apparently, having a small central stylet. Lateral pouches of the intestine numerous, short, not much divided. Walls of the body thicker and more gelatinous than in Nectonemertes, not showing transverse striations, but covered with fine granulations ; inner muscular layer longitudinally striated.

Pyriform bodies not present in the head. Eyes apparently wanting. Neither ciliated grooves nor pits were noticed on the head.

Hyalonemertes Atlantica, sp. nov.

Body of the larger specimen moderately flattened, fusiform, about four times longer than broad, gradually tapered both ways ; head blunt, flattened ; caudal fin short, stout at base, a little broader toward the end, which is thin and slightly emarginate. Along the sides of the body the marginal fold is very narrow and indistinct, the edges being rounded ; the folds become more evident posteriorly and form the boi'ders of the caudal fin.

The integument appears somewhat soft and gelatinous, and is more translucent than in Nectonemertes, and not so firm. The whole surface is covered with minute soft granules hardly visible to the naked eye, but appearing, when magnified, something like fine shagreen ; beneath the surface the longitudinal muscular striations can be seen. The granulation of the surface is finer and less distinct on the head. The proboscis is not protuded in this speci-

men. The small mouth is just below the end of the snoiit; near the upper margin there is a small round papilla.

Length of the larger specimen, from Station 2724, 38""""; breadth of body 11™""; breadth of caudal fin 6"™.

Length of the smaller specimen, from Station 2428, 20™"; breadth 3-5"""".

The smaller specimen, just mentioned, is rather more slender than the larger one ; its caudal fin is distinctly bilobed, with the lobes

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[Begin Page: Page 452]

well rounded at the end. The long slender proboscis is partially protruded, so as to show the bulb and sac in the exserted part, but not at the end ; there appears to be a small stylet, but the mounted sj)ecimen is not sufficiently transparent to show its foi'm ; the exterior of the exsert proboscis is finely papillose. The large proboscis-sac extends back to about the posterior fourth ; it is abruptly narrowed near the posterior end, and a band of muscular fibers near the end, on each side, binds it to the bodjj- wall. A single specimen was taken by the Albatross at each of the following stations :

Station 2428, N. lat. 42° 48', W. long. 50° 55' 30", in 82G fathoms.

Young.

Station 2724, N. lat. 36° 47', W. long. '73° 25' 00", in 1641 fathoms.

Adult.

EXPLANATION OF PLATES.

Plate XXXIII.

Figure 1. — Amphiporus angukdus. Dorsal view with the proboscis partially protruded, natural size; !«, the same, ventral view of the head and anterior part of the body. Eastport, Me., low- water, Aug. 7, 1872.

Figure 2. — The same. Dorsal view of a specimen of the reddish brown variety, more enlarged. Massachusetts Bay.

Figure 3. — Amphiporus multisorus, sp. nov. Dorsal view of the head and anterior portion of the body ; x 2. Kastport, Me.

Figure 4. — Amphiporus vircscens Y. Dorsal view; x .'5. Noank, Conn., July 24, 1874; 4a, the same specimen, posterior end, more enlarged ; Ab, the same, ventral view of the head, more enlarged ; 4r, the same, dorsal view, more enlarged ; id, the same, head with the slightly protruded proboscis ; x 8 ; 4e, the same, nearly profile view of the head ; x 8. Wood's HoU, Mass., July 13, 1875.

Figure 5. — Amphip>orus ochraceus Y. Dorsal view ; x 4 ; 5a, the same, central stylet of the proboscis, much enlarged. Wood's Holl.

Figure 6. — The same. Head and anterior portion of another specimen more contracted ; X 6. Eel Pond, Wood's Holl, July 19, 1875.

Figure 7. — Amphiporus cruentaf us Y . Dorsal view; x 3. Noank, Conn.. July 14, 1874 (No. 740)..

Figures. — The same. Doreal view of a larger specimen : x 6; 8«, head of the same specimen, more enlarged. Wood's Holl.

Figure 9. — Tetrastemma candidum. Dorsal view of a greenish specimen ; x 6.

Figure 10— The same. Dorsal view of a specimen of the yellow variety; somewhat compressed under the microscope; x 3, low-water; 10a, the same specimen, showing variation in the form of the head owing to the different degree of extension. Casco Bay, low-water, 1873.

Figure 11. — Tetrastemma vermiculus, var. Dorsal view ; x 7; 11 a, 1 1 ft, other views of the head of the same specimen in different states of contraction ; lie, proboscis-armature of the same, much enlarged. Wood's Holl, on piles of wharf, July 24, 1875.

Figures 1, 2, and 10 are by J. H. Emerton ; figures 3, 4a to 4e, and 11 to lie, are by the author; the rest are by J. H. Blake. All are from living specimens.

[Begin Page: Page 453]

Plate XXXIV.

Figure 1. — AmpM'por us frontalis, sp. no v. Dorsal view ; x 2; la, the same specimen, ventral view of the head. (No. 10) Eastport, Me., 86 fath., 1870; 1&, the same, dorsal view of the head of another specimen. This was pale salmon with pale purplish spots on the sides due to the ovaries ; proboscis-sheath greenish, (No. 86) Eastport, Me., low-water.

Figure 2. — AmphiiMrus ccbcus, sp. nov. Dorsal view ; x 5 ; 2a, 2b, dorsal and ventral views of the head of another specimen (No. 721); 2c, extruded proboscis of the same specimen, enlarged.

Figure 3. — Amph/porusbioculatus. Dorsal view; x 5. Off Fisher's I., Conn., July 22, 187'!:. The ocelli are too much obscured by the color in printing.

Figure 4. — The same. Dorsal view of a younger specimen of the light colored variety, compressed under the microscope ; x 10. Newport, R. I.

Figures. — Amjjhijwrus roseus. Dorsal view; x 2; 5«, the same, head and anterior portion of body, dorsal view; x 4 ; 5&, the same, side view; x 4.

Figure 6. — AynpMporus tetrasorus, sp. nov. Dorsal view ; x 3. Massachusetts Bay, 1878.

Figure 7. — Ampjliiporus heterosorus, sp. nov. Head and anterior portion of body, dorsal view; X 1-J-. Massachusetts Bay, 1878.

Figure 8. — Amphiporus frontalis, sp. nov. Dorsal view of a small specimen partly

contracted; x 3. Off Witch Rock, Massachusetts Bay, September, 1877.

Figure 9. — Amphiporus mesosorus, sp. nov. Head and anterior portion of body, dorsal view; x 3. Massachiisetts Bay, off Salem, August 13, 1877.

Figure 10. — letrastemma elegans Y . Type specimen from life. Dorsal view; x 6.

Figure 11. — Tetrastemma vermiculus. Young, dorsal view; x 12.

Figure 12. — Tetrastemma vermiculus, vav. catenula. Dorsal view ; x 8. Noauk, Conn.

Figure 13. — Tetrastemma dorsale. Dorsal view of head and anterior portion of body with protruded proboscis ; x 8. Casco Bay, 1873.

Figure 14. — Tetrastemma dorsale, y&v. marmoratum. Dorsal view; x 3. The lighter and darker mottlings are not sufficiently distinct. Casco Bay.

Figure 15. — Amphiporus bioculatus (?). "Very young, dorsal view ; x 1 2 ; compressed imder the microscope, while alive. Newport, R. I., September 1, 1880, station 851, \2^ fath. Color translucent white ; eyes black.

Figure 16. — Ainphiporus {Nareda) superba. Copy of the original tigure.

Figure 17. — Amphiporus heterosorus, sp. nov. Head and anterior part of body, dorsal view ; x 2.

Figures 2, 3, 10, 11 are by J. li. Blake; figures 4, 8, 13, 15 are by J. H. Emerton ; the rest, except 16, are by the author. All are from living specimens.

Pl.\te XXXV.

Figure 1. — Oerebratulus lacteus. Young, natural size; la, the same, ventral view of head and extruded proboscis, natural size. New Haven, Conn.

Figure 2. — Emplectonema giganteum V. Dorsal view of a specimen not full grown ; i natural size.

Figure 3. — Amphiporus cruentoMis Y . Dorsal view; x 4.

Figure 4. — Amphiporus agilis V. Dorsal view ; x 4.

Figure 5. — Amphiporus glutinosus Y. Dorsal view ; x 2.

Figure 6. — Tetrastemma vittatuvi V. Dorsal view; x 8; compressed under the microscope, while living.

[Begin Page: Page 454]

Figure 7. — The same. Dorsal view of the variety with a single pale dorsal stripe ; x 3.

Figure 8. — Tetrastemma vermicubis. Dorsal view: x 8. Wood's Holl, Mass., low-water.

Figure "d. — Tetrastemma candidum (?). Dorsal view of a very young specimen, much enlarged; compressed under the microscope, while living. Newport, R. I., sta.

851, 12i fath., September 1,. 1880.

Figure 10. — The same. Dorsal view of a somewhat older specimen. Savin Rock,

Conn., October 18, 1887.

Figure 11. — Tetrastemma vermiculus, waw catenida : x 2.

Figures 1, 6, 8 are by J. H. Emerton; figures 3, 11, are by J. H. Blake; the rest are

by the author. All are from living specimens.

Plate XXXVI.

Figure 1. — Micrura afflnis. Dorsal view; x 4. Off Martha's Vineyard, 1887.

Figure 2. — Cerebratulus lacteus. General view of a living specimen of the pinkish

variety, natural size. Wood's Holl, July 17, 1875.

Figures. — Cerebratidus luridus Y . Natural size. Noank, Conn., Aug. 8, 1874.

Figure 4. — Cephalotlirix linearis. General view; x 8.

Figure 5.— The same. Dorsal view of the head and anterior portion of the body of a

young specimen, much enlarged. Wood's Holl, Mass., August 19, 1881.

Figure 6. — Dinophilus simplex, sp. nov. Dorsal view, much enlarged; 6a, the same,

ventral view of head and mouth, much enlarged. Newport, R. I.

Figures 1, 2, 3 are by J. H. Blake; 4, 5, 6 are by J. H, Emerton. All are from living

specimens.

Plate XXXVII.

Figure 1. — Cerebratidus lacteus. Pale variety, ^ natural size; la, the same, side view

of head, in extension; 16, the same, ventral view of head, in partial contraction.

Figure 2. — Cerebratulus fusciis. Dorsal view of head and anterior part of body in

moderate extension ; 2a, the same specimen in a state of contraction ; 2b, 2c, ventral views of the same specimen in different degrees of extension. All natural

size.

Figure 3. — Cerebratulus luridus. Natural size, but considerably contracted in length.

Figure 4. — Lineus duhius. Ventral view; x 2; 4a, dorsal view of the head, more

enlarged. August 18, 1878.

Figure 5. — Linens viridis. Green variety, natural size ; 5a, the same, side view of

head, natural size ; 56, the same, ventral view of head, more enlarged. Eastport, Me., low- water.

Figure 6. — Micrura affinis. Enlarged 11; f rom Eastport. Me. ; 6a, the same, posterior

end of another specimen.

Figure 7. — Micrura inornataV. Dorsal view; x 2. Massachusetts Bay, sta. 135,

25 fath., 1878.

Figure 8. — Lineus socialis. General view of the light green variety ; x 2 ; 8a, the

same, side view of head and anterior part of body, more enlarged.

Figure 9. — Lineus pallidus. Dorsal view; x 2; 9a, the same, side view of head;

more enlarged. Massachusetts Bay.

Figures 3, 5, 6, 9 are by J. H. Emerton ; 1 and 8 by A. H. Verrill ; the rest are by

the author. All are from living specimens.

Plate XXXVIII.

Figure 1. — Nectonemertes mirabilis, sp. nov. Dorsal view with proboscis partially extended; x 2. Atlantic Ocean, sta. 2036, 1883.

[Begin Page: Page 455]

Figure 2. — Cerebrahdus Leldyi V. Natural size; la, the same, ventral view of head.

New Haven, Conn.

Figure 3. — Micruru rubra, sp. nov. Peculiar specimen, probably repaiiing mutilation of tail. Side view; x IJ; 3a, the same, ventral view of head.

Figure 4. — Ilicrura do7'salis, sp. nov. Dorsal view; x 1|; 4a, the same, ventral view of head, more enlarged. Type specimen. Eastport, Me.

Figures. — Lineus arenicola V. Dorsal view of the original specimen; x 1^; 5a, the same, ventral view of head.

Figure 6. — Lineus viridis. Red variety, dorsal view; x H; 6a, the same, side view of head ; 6&, the same, dorsal view of a very young specimen having but four eyes ; 6c, the same, a cluster of eggs, f natural size ; 6c?, the same, a young

specimen Just hatched, much enlarged.

Figure 7. — Lineus socialis. Young, ventral view, natural size ; 7a, the same, dorsal

view of the head and anterior part of the body, enlarged. August 12, 1880.

Figures. — Lineus bicolor. Dorsal view; x 5; 8a, 8b, the same, side and ventral

views of head, more enlarged. Wood's Hoil, Mass., July 14, 1875.

Figures 9, 9a. — Micrura rubra, sp. nov. Front and side views of the head ; x 3.

Eastport, Me.

Figures 10 and 10a. — Lineus sanguineus. Dorsal and ventral views of the head and

anterior part of the body ; x 3.

Figure 11. — Lineup, sp. (?) Young, dorsal view, much enlarged; 11a, another view

of the front part of the same specimen. Vineyard Sound, among compound

ascidians, 1881.

Figures 12, 12a. — Empledoneitia giganteum Y. Dorsal and ventral views of the head

of the original type-specimen ; x 2.

Figures 1, 6, 7, 11 are by J. H. Emerton ; 8 to 8& are by J. H. Blake; 2 by A. H.

Verrill ; the rest are by the author. All are from living specimens.

Plate XXXIX.

Figures 1, 2, 3, 4. — Pilidiuni, sp. uudetermined. Different views; x 30. Wood's

Holl, Mass., at surface, in day time, August 18, 1881. J. H. Emerton, from nature.

Figure 5. — The same; x 75; a, apical cirrus ; &, apical plate; //, nerve ; w, head of developing nemertean with two eyes. J. H. Emerton, from nature.

Figure 6. — Piliditim, undetermined, sp. with golden yellow spots around the margins ; taken with the preceding ; a, cluster of apical cirri ; b, apical plate ; b', nerve ; c, c', anterior and posterior lobes; d, d', lateral lobes ; t, oesophagus; /^ /, developing nemertean ; x 75. J. H. Emerton, from nature.

Figure 7. — Amphiporus lactifloreus. End of protruded proboscis, much enlarged; s, central stylet ; s', lateral stylets ; 2>, posterior region of proboscis ; d, bulbous region ; /, saccular organ ; 7a, one of the lateral stylet-sacs, more enlarged. After Mcintosh.

Figure 8. — Amphiporus ochraceus V. Extruded proboscis, enlarged ; a, anterior region ; s, middle region with central and lateral stylets ;' p, posterior region. Camera-lucida drawing by the author.

Figure 9. — Amphiporus bioculatus (?). Middle portion of the proboscis, compressed under the microscope and much enlarged ; p, commencement of the posterior region; r, muscular bulb; s, central stylet; f, one of the lateral stylet-sacs. Camera-lucida drawing by the author.

[Begin Page: Page 456]

Figures 10, 11, 12. — Ce-phalotlirix linearis. Different stages in the development of the larva, much enlarged ; c, large cephalic cilia; a, region of the mouth; ft, intestinal area. After Mcintosh.

Figure 13. — The same, farther developed; o, oceUi, li, ganglions; a, mouth area; rf, opening of cephalic ducts; m, ,one of the cephalic sacs; /, oesophagus; p, proboscis ; h, intestine, imperfectly developed. After Mcintosh.

Figure 14. — Cephalothrix linearis. Head, much enlarged, and seen as a transparent object ; m, mouth ; p, proboscis ; p\ rhynchodeum ; v, proboscis-sheath ; h. lateral blood vessel; g, superior, r/', inferior gangUon ; n, origin of lateral nerve. After Mcintosh.

Figure 15. — The same. Part of a transverse section of the body-wall adjacent to one of the lateral nerves ; c, external cuticle layer ; c% basement layer ; t, outer, and t\ inner circular muscular layers; /, longitudinal muscular layer; ?i, lateral nerve. After Hubrecht.

Figure 16. — Car inina grata Ji. Section of a part of the body-wall corresiDonding to that in the preceding figure with the same lettering. After Hubrecht.

Figure 17. — Cerebrafulus niedtdlatus H.nhr. Section of the body-wall in the region of the median dorsal line; lettering the same as in the two preceding figures, with the following additional ones; nd, median dorsal nerve ; n, nervous plexus; n'', proboscis-nerve; V, inner longitudinal muscular layer. After Hubrecht.

Figure 18. — Lineus viridis. Transverse section through tlie middle of the body; X 14; j), proboscis ; v, proboscis-sheath; h, dorsal blood vessel ; ?/, one of the

lateral blood vessels; /, cavity of intestine ; c, external cuticular layer; c', basement layer of cuticle ; I, outer, and I', inner longitudinal muscular layers ; t, circular muscular layer ; t', transverse muscular bundles arising from t; n. nervous plexus ; n% lateral nerve ; ro, reproductive organs. After Mcintosh.

Figure 19. — Cerebratulus lacteus. Transverse section of the middle region of the body; x 8. Lettering the same as in figure 18. From nature by the author.

Figure 20. — The same. Transverse section in the region of the oesophagus ; x 8. Lettering the same as in figures 18 and 19, with the following additional ; ?', plicated wall of the oesophagus; n" , median dorsal nerve; ?<, «, nephridia. From nature, bj^ the author.

Figure 21. — The same. Portion of the same section shown in figure 20, from the region of the lateral nerve; x 3G. Letters the same as in figures 18 and 20. From nature, by the author.

Figure 22. — Lineus viridis. Head and anterior part of body viewed as a transparent object; o. ocelli; /./.lateral cephalic slits; g, superior ganglion; cf, interior of olfactory sac; d', its duct; n', lateral nerve; ?«, mouth; e, oesophagus; p, proboscis ; p\ rhynchodeum ; v, proboscis-sheath ; r, r, blood lacunae surrounding the oesophagus. After Mcintosh.

Figure 23. — Malacobdella mercenarice. Dorsal view; x 4. Newport, R. L, July, 1880, in Venus mercenaria. J. H. Emerton from life.

Figure 24. — Tetrastemma dorsale. Central .stylet; x 200; 24«, one of the lateral stylets; x 350. After Mcintosh.

Figure 25. — Tetrastemma cCmdidum. Central stylet ; x 150. After Mcintosh.

ERRATUM.

Page 384, line 23, for Nemertinea, read Nemertina.

Page 405, line 31, for Candida, read candidum.

[Begin Page: Page 457]

XXIII.— DixoPHiLiD^ OF Np:av England. By A. E. Verriu..

No representatives of this group have hitherto been described from this coast, so far as I am aware. Two species have been known to me for several years, but I have delaj^ed publishing descriptions of them, hoping to be able to obtain additional specimens in order to make the figures and descriptions more complete. But since this group is supposed by many writers to be related to the Neraerteans, it seems to me desirable that our species should be put on record in this connection.

Both our species may be referred, provisionally, to Dinophilus, though they differ considerably in structure. One of them {D. simplex) may not be a true Dinophilus.

Family, Dinophilid^ Graff.

Dinophilus pygmseus, sp. nov.

Wood-cut 10.

Body very small, translucent, in extension long-ovate or nearly cylindrical, capable of contracting into a short-ovate or subglobular form, composed of five segments, exclusive of the head and tail ; the posterior segments are usually the largest. Each segment is surrounded near its middle by a circle of rather long and strong-cilia. The head is usually rounded in front, often nearly semicircu-lar, and has a tuft or fringe of strong cilia around its front margin, and two transverse lateral tufts which are parts of two continuous preoral bands, one before and one behind the eyes. The eyes are rather wide apart, small, reniform, conspicuous.

The mouth is small and appears to be bilobed. The pharynx or oesophagus is short and swollen. On each side of the pharynx there is a small pharyngeal gland. The stomach is large, oblong-cylin-drical, and occupies about three body-segments in ordinary extension ; the intestine is narrow and tei'minates in an anal opening at the

Fig. 10. — Dino2Jhilus 2}yfjm(eiis, dorsal view, somewhat compre.ssed ; a, mouth pharynx and pharyngeal glands ; .s, stomach ; i, intestine.

[Begin Page: Page 458]

base of the caudal segment, which is small, short-triangular, and

terminated by a tuft of large cilia. In the posterior part of the body are two relatively large, ovate, opaque, reproductive bodies, but whether they wei'e ovaries or spermaries I did not ascertain, so that the sex of the specimen described and figured is uncertain, but it is probably a female. Color whitish. Length -7"'" ; breadth, as compressed, 'IG"'™.

Taken on the piles of a wharf at Wood's Holl, Mass., Aug. 1 0, 1 883.

This species is closely allied to D. gyrociliatus of Europe. The latter has, however, six post-oral segments, and differs also in the form of the head, pharynx, and stomach. How much importance should be attached to these differences is uncertain, for they may be due largely to different conditions of the specimens examined. The two may eventually prove to be identical.

Dinophilus simplex, sp. nov.

Plate xxxvi, figures 6. 6a.

Body nearly smooth, distinctly segmented, in extension elongated and more or less cylindrical, the anterior part usually broadest, composed of four evident segments, exclusive of the large head and abortive tail. Segments well defined, but without any conspicuous bands of cilia. Head-segment large and long, subtriangular in front, and often pointed, but sometimes rounded. Eyes nearly lateral, small, but conspicuous. Mouth simple, elongated, situated between, or a little in front of the eyes. Stomach long and not much enlarged ; intestine nearly as wide as the stomach, terminating in a

nearly terminal anal pore. The tail segment appears to be rudimentary or abortive. The sex was not ascertained. Color pale yellow. Newport, R. I., Aug., 1880.

The afiinities of this species are somewhat uncertain. The pharynx and stomach differ considerably from a typical Dinophilus. Reproductive organs were not observed.

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"PLATE XXXV

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vOl VIII.

PLATE XX:-v,.i.

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NEMERTEANS

Z Ciisaiicl, lith .New Haven, Ct

[Begin Page: Text, Illustration]

Trans^ Com. Ac acl.Sci, Vol . VIII .

PLATE XXXEX:

NEMERTEANS.

E Cnsand, litli-,Ne-w Haven, Ct..