

- Fig. 8. *Porella princeps*, Norman.
 Fig. 9. The same, to show the number of blind zoecia ("kenozoecia," Levinsen) and irregularly shaped zoecia around the aucestrula.
 Fig. 10. The same, operculum.
 Fig. 11. The same, in which the thick outer calcareous wall has been removed by acid, and a previously entirely concealed oecium and the oral avicularium have been exposed to view.
 Fig. 12. *Monoporella spinulifera*, Hincks. A zoecium which has, like the last, been partially decalcified, and an oecium has been brought to view.
 Fig. 13. *Schizoporella cruenta*, Norman. A zoecium which has been similarly treated, as the two previous species, with nitric acid, and an oecium of which the existence was previously unknown has been brought to light.
 Fig. 14. *Smittia lineata*, Nordgaard.
 Fig. 15. The same. Operculum and outline of margin more magnified.
 Fig. 16. *Schizoporella auriculata*, Hassall. Operculum, for comparison with the preceding.

VI.—Notes from the Gatty Marine Laboratory, St. Andrews.
 No. XXV. By Prof. M'INTOSH, M.D., LL.D., F.R.S., &c.

[Plates X.-XIII.]

1. On the *Eunicidæ* dredged by H.M.S. 'Porcupine' in 1869 and 1870.
2. On Canadian *Eunicidæ* dredged by Dr. Whiteaves, of the Canadian Geological Survey, in 1871-1873.
3. On Norwegian *Eunicidæ* collected by Canon Norman, D.C.L., F.R.S.

1. *On the Eunicidæ dredged by H.M.S. 'Porcupine' in 1869 and 1870.*

A species of *Diopatra* was procured in the Expedition of 1870, at Station 50, off the Algerine coast, near Cape Tenez, in 7-51 fathoms, which most closely approaches *Diopatra neapolitana*, Delle Chiaje.

It consisted only of a fragment of a small example, about half an inch long, and comprising the head and about thirty of the anterior segments. The head is characterized by the great size of the tentacles, their enlarged ringed ceratophores, and the presence of two short, spindle-shaped, frontal tentacles. The palpi have a tuberculated anterior border. The eyes have disappeared, whereas in the Neapolitan examples they are present. The body is rounded in front, the first segment—which is no wider than the succeeding—being devoid of feet. From its anterior border project the

two slender subulate tentacular cirri, which are nearer each other than the corresponding organs in *Eunice*. In contrast with the Neapolitan examples, the specimen procured by the 'Porcupine' is much smaller, its tentacles rather longer, the branchial spirals have shorter pinnæ, and its coloration less deep.

The dental apparatus in examples of *Diopatra neapolitana* from Naples and that from the 'Porcupine' is very closely allied. In both the colour is pale chocolate, with a dark brown bar separating the maxillæ from the posterior appendages, a dark brown spot at the posterior end of each great dental plate, and a narrow, slightly fusiform, brown belt bounding the curved anterior plates and appearing on the ventral surface. The curvature of the maxillæ is the same in both, and the tips, which leave the horizontal plane, are more deeply tinted than the rest. The posterior appendages form together a spatula-shaped structure with a notch between them posteriorly, and a constriction where they join the maxillary suture. In proportion to its size the spathulate enlargements of these processes are shorter and broader in the Neapolitan form, and a distinct flange a short distance from the inner edge just in front of the articulation with the posterior appendages is present on each maxilla. The small size of the example from the 'Porcupine' may, however, account for the indistinctness of such a structure. The left great dental plate in the Neapolitan has eight teeth; in the 'Porcupine' form there are ten. The azygos plate in the former has six teeth—a portion posteriorly having a smooth edge; in the latter seven or eight. The right great dental plate in the former has seven teeth, and, like the plate of the opposite side, an additional slight elevation; in the latter this plate has seven teeth, an adjoining elevation, and a longer bare margin posteriorly. The left anterior curved plate has five teeth in the Neapolitan; in the other apparently the same number. The former has a horny plate externally, with a single tooth and a small plate behind; the latter also shows a horny point on a small plate, but the specimen is incomplete. In the former the right anterior curved plate has eight teeth, and the outer plate a single tooth; in the latter the right anterior curved plate has at least seven teeth, and an outer plate with a horny tooth.

The dentary edge of the mandibles in the Neapolitan form shows a larger foliate outer tooth, a middle stout conical tooth, and an inner rounded ridge. A dark brown touch

marks the end of the shafts externally, and a small black speck is near the inner margin. The shafts are brown and of moderate length. Unfortunately the mandibles in the 'Porcupine' form were broken, but sufficient remained to show that the dentary edge, though slightly sinuous internally, was more or less entire. The small size of the example probably accounts for this variation.

Other examples from Naples show variations in the number of teeth on the several plates, so that the divergencies indicated are not of essential importance.

The first four or five feet are larger than the succeeding, from the elongation of the proximal region, and this is especially the case with the first three, which are directed forward and outward, and to a less extent with the fourth. All these appear to be developed for special functions, and they are very vascular, a network of anastomosing vessels occurring from base to tip. The first is the longest and largest, bearing dorsally a cirrus of considerable proportional size, and which arises towards the tip from a basal enlargement. A group of slender spines, as in *Eunice*, passes through the basal segment to the cirrus itself. Beneath is a bluntly conical setigerous region with a long subulate papilla at its extremity. The ventral cirrus is somewhat fusiform in outline—constricted at the base, then enlarged, and finally tapering to the tip. The setigerous region is supported by two pale spines, and has superiorly rather stout dorsal bristles, none of which project beyond the tissues, but they appear to be simple with a short tapering region at the tip and winged. The ventral bristles (passing below the spines) have a feebly marked articulation and a long tapering terminal piece, which has a bifid claw guarded by wings.

The 2nd, 3rd, and 4th feet are similar to the 1st, but the bristles, especially the ventral, are stronger (Pl. X. fig. 1). The 5th foot has a branchial process of full-size, arising from the site of the dorsal cirrus, but so large is it that the cirrus appears to be a mere process of its outer wall. Every succeeding segment in the preparation has a stem, the slender spines of the region traversing their origin and going beyond into the cirrus for three-fourths of its length, in the posterior feet of the fragment.

The feet of the Neapolitan and 'Porcupine' forms agree in general contour, and in being double—that is, having a dorsal and a ventral division, as indicated by a group of spines which penetrate the base of the dorsal cirrus, and in having bifid bristles. In the Neapolitan form the 1st foot

has about six strong spines with tapered tips supporting the setigerous lobe, which bears a series of translucent yellowish bristles which have a slight curvature at the tip and diminish a little towards the pseudo-articulation. The tip varies in length, and ends in a bifid hook with a pair of pointed wings, which spring from the sides where the tip begins to be differentiated. These bristles are also found on the 2nd and 3rd feet; but on the 4th, where the first branchial process is, they are replaced by simple bristles with winged tips. The secondary spur below the terminal hook is often very slender and appears to be readily abraded, since many show no trace of it.

In the example from the 'Porcupine' the bristles of the first four feet (that is, one more than in the Neapolitan) have a similar outline, but the bifid tip has its secondary process more distinct. In this, as in the Neapolitan form, the developing bristles show the respective differentiations as clearly as those fully formed, the tip being the first part to appear. The spines supporting the setigerous region are fewer, viz. about four. The simple winged bristles which supplant the foregoing special bristles appear in the 5th foot, which bears the first branchial stem.

At the 10th foot of the Neapolitan form the bristles are stout, have tapering tips with narrow wings finely serrated at the edges, the central region being striated. The brush-shaped forms have slender shafts and about seven rather broad teeth distally. The spines pass to the front of the foot; the bristles are superior and in two groups, which diverge slightly from each other—with the cirriform lamella beneath—in the centre. In the example from the 'Porcupine' the spines are fewer, the bristles proportionally more slender, but also with narrow serrated wings, and the tips of the brush-shaped forms are longer and narrower, and the six or seven teeth appear to be more slender. In this form, moreover, the great inferior hooks begin about the 12th foot, whereas in the Neapolitan they do not appear till the 14th or 15th. In contrasting the hooks of the 20th foot, both have an upper more elongated and an inferior broader and stouter kind; but those of the 'Porcupine' form are considerably broader and shorter than in the Neapolitan. In the latter, both bristles and hooks extend to the posterior end of the body, three of the latter often occurring in a foot.

The gill in full development (Pl. X. fig. 2) forms a slender tapering pyramid with whorls of short pinnules from base to apex, and with two large blood-vessels, which also are

spiral in the preparation. A deep notch separates the basal segment of the cirrus from the distal. The setigerous region forms a short cone with the pointed lamella projecting obliquely backward behind it. It is stiffened by three fairly stout spines and bears superiorly a group of strong tapering winged bristles, the longest being dorsal. Bristles of the same kind with shorter and broader tips occur below the others. The ventral cirrus does not now project in profile, but has merged into the opaque glandular elevation running inwards from each foot, a short papilla in two of the succeeding feet, however, being present as a rudiment.

The change from the bifid ventral bristles with their indistinct articulation is coincident with the appearance of the branchia on the 5th foot, in which the branchial stem is remarkably large.

At the posterior part of the fragment from the 'Porcupine' the branchial stems are smaller, the dorsal cirri longer and more tapered, a straight powerful hook has appeared below the inferior bristles, and just above the slight projection marking the ventral cirrus is a still more powerful curved hook, also bifid and winged, which slopes obliquely downward and outward from the spines (Pl. X. fig. 3) and the separate hook (Pl. X. fig. 4).

It is not possible to contrast the entire series of branchiæ of the two forms, for that procured by the 'Porcupine' had only about thirty bristled segments, on the last of which the branchiæ still presented a spiral formation. In the Neapolitan specimens Grube gives fifty to fifty-six pairs as the number of the branchiæ, those examined in the present instance having respectively fifty-one, thirty-eight, and fifty, several of the last being simple filaments. Grube*, moreover, states that the branchiæ arise on the 5th foot, whereas in all examined they began on the 4th foot. Claparède †, again, observes that the occurrence of the branchiæ on the 4th foot (fifth segment) is exceptional, just as their absence on the 5th foot is. As Claparède states, the first three feet bear long ventral cirri, the appearance of the branchia on the 4th being coincident with the presence of

* Sitz. d. nat. Sect. Schles. Gesellsch., 20th June, 1877, Sep. Abd. p. 7.

† *Annél. Chét. Nap.* p. 123. By the kindness of Mr. Cyril Crossland, an opportunity of examining six examples from Naples and others which he procured at Zanzibar was afforded. Considerable variation in the number of the branchiæ, their origin anteriorly, and in the occurrence of additional ventral cirri was evident. Mr. Crossland will probably allude more particularly to these features in his account of the "Annelids of Zanzibar."

the ventral pad (the first being a small one). The ventral cirrus, however, is represented by a minute conical process in front of the pad in the two following feet. In the same way the example from the 'Porcupine' has four long ventral cirri in front instead of three.

It is clear therefore that the small example procured by the 'Porcupine' is only a variety of Delle Chiaje's fine species, so abundant at Naples and elsewhere in the Mediterranean.

*Onuphis (Diopatra) brevibrachiata**, Ehlers?

Dredged in 358 fathoms; also east of Cape de Gatte, six miles off shore, in 60 to 160 fathoms. In the 'Porcupine' Expedition of 1870 the Station is not given, but it probably was between Stations 46 and 47.

A form having the appearance of *Hyalinæcia*, but readily distinguished by the presence of tentacular cirri and the condition of the branchiæ, which, however, rather lean to the type seen in *Eunice*.

The two frontal tentacles arise close together in the median line and form two rounded and somewhat flattened lamellæ in spirit. The five tentacles have the normal position, but they are much shorter than in *D. neapolitana*, though they also have an enlarged base, which is ringed. The tentacular cirri arise from the anterior border of the segment, arc wide apart, and have a slightly fusiform outline—from a contraction at the base. The palpi form two flattened bosses on the ventral surface.

The first segment of the body is about the breadth of the succeeding. The dental apparatus is pale, a dark brown touch occurring at the tip of the posterior appendages of the maxillæ, whilst at the junction of these parts a triradiate band is present. The tips of the maxillæ and the teeth of the great dental plates are slightly brownish. The maxillæ are strongly curved, sharp-pointed, and rather abruptly swollen a little behind the middle. The posterior appendages are half-spoon-shaped, with a constriction at the base. The great dental plates have each about ten teeth. The azygos plate has ten. The right anterior curved plate has five; the left appears to have a larger number, but is broken. The mandibles have an oblique smooth edge anteriorly, and at the junction of this with the shaft, externally, is a projection.

The branchiæ commence on the 12th foot as a simple

* Zeitsch. f. w. Zool. xxv. p. 49, Taf. iii. figs. 11-21.

filament attached to the dorsal cirrus a little above its base. As far as the 16th foot it remains a simple, long filament. The 17th foot has a branched branchial process, and at the 20th it has a single filament above the cirrus, and the terminal part is dichotomously divided—a feature of the species. At the 30th foot three divisions occur above the cirrus, which they considerably exceed in length, and then the tip is dichotomously divided into two still longer processes. The specimen terminated at the thirty-fifth segment, and on this, so far as could be seen in the injured preparation, the number of gill-filaments was not less.

The first three feet are much larger than the succeeding, and directed forward and outward as well as flattened laterally. Dorsally the 1st foot has a large and rather thick dorsal cirrus, which is bent downwards; into its base pass three spines. A bluntly conical setigerous region follows, having a short tapering papilla at the tip. No bristles are present. The ventral cirrus is of considerable size, somewhat fusiform in outline, and shifted so that it adjoins the side of the mouth.

The next two feet (2nd and 3rd) are similar in general structure, the size slightly increasing, and the ventral cirrus of the 3rd foot is both larger and more flattened. In none do bristles project beyond the skin, though they occur internally below the spines.

The 4th foot, like the foregoing, is more or less ventral in position. Its dorsal cirrus is large and subulate, the setigerous region has short bristles projecting from its edge, and the ventral cirrus is a lanceolate or conical lobe immediately beneath it.

A marked change occurs in the 5th foot, for conspicuous glistening bristles project from the setigerous region. The dorsal cirrus is somewhat less though still prominent, the setigerous region has a posterior flap, and the ventral cirrus is visible inferiorly as a short process. The dorsal bristles are translucent and finely tapered, with narrow wings and serrated edges, as in the feet behind. The ventral are equally translucent, have their shafts slightly curved and dilated at the bevelled end, from which a long tapering blade extends distally. The ventral cirrus is included in the low glandular pad behind the foregoing region, and the dorsal cirri diminish in size.

The 10th foot (Pl. X. fig. 5) has a subulate dorsal cirrus with a ventral "bite," followed by a swelling, from which it tapers to the point. It is supported by a group of slender spines. The setigerous region has two strong spines, the

blunt points of which pierce the tissues. A short flap also projects posteriorly. Superiorly is a group of long, translucent, very slightly curved, finely tapered bristles with narrow wings, which are serrated at the edge (Pl. X. fig. 6). The ventral bristles are equally translucent, have slightly curved shafts which are enlarged and bevelled at the ends for articulation with the long tapering terminal piece, which at the base is fully the breadth of the enlarged end of the shaft (Pl. X. fig. 9).

At the 20th foot these jointed bristles have disappeared, and their places are taken by two powerful yellowish hooks with bifid winged tips (Pl. X. fig. 10), which in outline resemble miniature pliers. The dorsal bristles have shorter tips with a more distinct bend at the end of the shaft. The two brown spines have increased in strength.

The 30th foot (Pl. X. fig. 7) presents little change on the foregoing, except in the branchiæ and the slightly increased slenderness of the dorsal bristles. The brush-shaped bristles (Pl. X. fig. 8) offer little peculiarity.

From the posterior end of the fragment projected a series of fibres, apparently formed by the glands of the annelid, and enveloped in a translucent matrix. The secretion is probably allied to that of *Panthalis*.

The example procured off Cape de Gatte had the same tough fibres projecting from its posterior (broken) end as in that form. Moreover, *Loxosomæ* occurred on many of the branchial processes.

This species approaches the *Diopatra brevibrachiata* of Ehlers, though no spiral line appeared on the branchiæ. Ehlers states that the first segment is broader than the succeeding, but in this form little difference between them was observed. The number of teeth on the dental plates is greater. It differs from *Onuphis Panceri*, Claparède, in the form of the anterior feet and other particulars.

A species apparently identical with *Onuphis Grubei*, Marenzeller, was dredged at Station 10 off Cape Finisterre in 81 fathoms during the 'Porcupine' Expedition of 1870.

The examples retained their madder-brown coloration in spirit. Thus the first five segments have each two bold touches of purplish brown on the dorsum, those on the first segment being double, viz., a large patch towards the anterior border of the segment with a smaller behind it. The spots in the others lie on each side of the middle line of the dorsum and towards the posterior border of the segment. A considerable number of segments following these have

four spots, also situated towards the posterior border of the segment, the outer on each side, generally the most conspicuous, being thus between the feet. Posteriorly the two median show a tendency to fuse, a pattern being by-and-by formed in the centre, whilst the lateral dark spots are as before. In some, three distinct bands are thus formed, as De St. Joseph* observes.

A species which closely approaches the foregoing (*Onuphis Grubei*) comes from 92 fathoms on "Adventure Bank"—the shallow between the eastern and western basins of the Mediterranean, and extends between the African coast and Sicily—in the 'Porcupine' Expedition of 1870.

In external appearance it presents certain differences. Thus there are eight of the anterior segments with nine prominent feet instead of five or six. The tentacles and their long ringed ceratophores, however, have similar outlines and proportions to those of *O. Grubei*. The frontal tentacles appear to be somewhat larger, but the palpi agree.

The direction and proportions of the 1st foot agree with those of *O. Grubei*, and it carries a slender branchia on the dorsal cirrus. Dorsally are one or two simple tapering bristles, the wing of which is indistinct. A characteristic feature is present in the large inferior bristle, viz., the occurrence of two teeth below the bifid terminal region (Pl. XI. fig. 11). The pseudo-articulation of the tip and other features are similar to those in the more widely distributed form.

At the 10th foot the dorsal cirrus carries a branchia considerably longer than itself. The setigerous region forms a small cone, whilst the ventral cirrus is represented by a large projecting granular pad. The bristles are simple tapering forms without distinct traces of wings, though in some further back (Pl. XI. fig. 12) these are indicated.

The great hooks (Pl. XI. fig. 13), which by-and-by appear, have a powerful chief fang and a smaller superior fang, protected by wings. The middle of the hook is dilated. One of the feet from the middle of the body is shown in Pl. XI. fig. 14.

In the 'Porcupine' Expedition of 1869 an example of *Eunice fasciata*, Risso, was dredged in 80-110 fathoms on muddy sand with pebbles, probably off Valencia, though no Station is given. The same form was obtained at Station 10 in 81 fathoms off Cape Finisterre in the Expedi-

* Ann. Sc. Nat. 7^e sér. v. p. 193, pl. viii. figs. 57-58 (1888).

tion of 1870, and again off Cape Guardia. *Eunice vittata*, Delle Chiaje, was dredged in 92 fathoms on Adventure Bank, and in 45 fathoms off Cape Sagres in the Expedition of 1870.

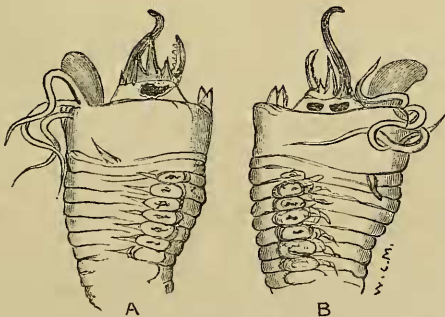
A form allied to *Eunice pennata*, O. F. M. (= *E. norvegica*, L.), was dredged in 539 fathoms on the Channel slope (Station 9) in grey mud in the 'Porcupine' Expedition of 1870. The chief points of divergence from the Norwegian examples are the more distinct eyes, the commencement of the branchiæ as a minute process on the 4th foot, and their cessation about the 34th foot. The small branchial process becomes bifid on the 6th foot, and continues more or less bifid to the 23rd foot, and ceases about the 34th foot. The shape of the foot also differs, and the separate small spines for the dorsal cirrus are more distinct. The two large brown spines of the setigerous region are longer and project more, and the ventral cirrus is longer. The dental apparatus agrees in appearance, colour, and structure with that of *E. pennata*.

Eunice Jeffreysii, sp. n.

Habitat. Dredged in 30 fathoms in Tangiers Bay on 2nd July, 1870. In the bottle beside it was a portion of the membranous tube, like that of a Terebellid, covered with minute sand-grains, fragments of shells, spines, and similar calcareous structures.

The head is distorted in the preparation by the extrusion of the proboscis, but it has a marked fissure between the

Fig. 1.



A, view of the right, and B, view of the left side of the anterior region of *Eunice Jeffreysii*. Enlarged.

palpi in front. The tentacles are normal in position, but they are remarkable for their slenderness. Two small but

distinct black eyes occur externally to the base of the longer posterior lateral tentacle.

Body probably three or four inches in length, but only about an inch and a quarter of the anterior end and a fragment half an inch long of the posterior region are present. It is flattened, like that of a *Marphysa*, and the segments are narrow. Little diminution seems to occur anteriorly. The first segment (peristomial) is broad, and is followed by a narrow one bearing the tentacular cirri, which are rather short and subulate.

Proboscis.—In extrusion (woodcut, fig. 1) the maxillæ are chocolate-brown, curved in a semicircle, and when viewed in profile they are sinuous and bend upwards at the tip. The great dental plates have four teeth, the first being longest, a large part of the edge behind being smooth. The antero-lateral plates have a blackish-brown patch externally in protrusion. The right has a long median fang with a bifid denticle ventrally, and a long tooth dorsally next it, besides a separate denticle or two dorsally. A single large blackish-brown patch occurs at the base. On the left are two small semicircular blackish-brown touches, the ventral being smaller than the dorsal. Dorsally are two long curved teeth attached to a separate base; then a curved lamina with a long curved fang and a smaller denticle beneath it, representing the azygos plate.

The mandibles have somewhat thick calcareous anterior plates with oblique cutting-edges sloping forward and outward from the middle line to the point, the outer slope being downwards and outwards.

The branchiæ commence on the 28th foot as a single short filament on each dorsal cirrus. In the anterior fragment of the body, comprising about 63 feet, they never attain more than two divisions, which are slender. In the posterior fragment three filaments exist in each.

Looked at generally, the feet are closely arranged—a feature due to the narrowness of the segments. The anterior dorsal cirri are thicker and more conspicuous than those to which branchiæ are attached, or apparently than those on the posterior region.

The 1st foot has a somewhat thick, subulate, dorsal cirrus of considerable length, a small bluntly conical setigerous process bearing a few short dorsal bristles above the spines, and below the latter are short compound bristles with moderately long tips. The conical ventral cirrus is proportionally long. Two dark brown spines support the

setigerous region, which appears to have a small papilla above it.

Whilst the dorsal cirrus, as mentioned, continues for some distance of considerable length and thickness, the ventral in the 2nd foot has diminished to a short conical process with a thickened base, and it is still further reduced posteriorly.

At the 10th foot (Pl. XI. fig. 15) the dorsal cirrus forms a long subulate organ, supported by several (three) pale slender spines which enter its base. At this region also ventrally is a slight prominence, which indicates the papilla developed in the subsequent feet. Two powerful brown spines, the tips of which project through the tissues, occur in the setigerous region, which in lateral view presents an oblique edge, sloping from above downward and inward—a feature largely due to the development of the posterior lobe or flap. Superiorly is a small clavate papilla which is directed forward and outward. It carries dorsally a series of rather stout, long, winged bristles of a pale brownish or dull yellow hue (Pl. XI. fig. 16). A slight bend occurs below the tip, which is comparatively short and abruptly tapered. They extend rather beyond the tip of the dorsal cirrus in the preparation. At their bases are a few brush-shaped forms (Pl. XI. fig. 17). The ventral bristles are paler (translucent and faintly yellowish), have a short thick shaft with a very slight bend, a faint articulation, and a long slightly tapered distal piece (Pl. XI. fig. 18). So far as observed this condition is characteristic of *Morphysa*, but is rare in *Eunice*. The ventral cirrus forms a short conical process at the tip of the large glandular ventral enlargement.

The 20th foot agrees with the foregoing, except that the papilla at the ventral base of the dorsal cirrus is larger. Two spines support the organ. The setigerous region has three black spines. The tips of both dorsal and ventral bristles are somewhat shorter. The edges of the terminal pieces of the ventral bristles are finely spinulose.

The outline of the 30th foot (Pl. XI. fig. 19) considerably differs. Branchiæ have now appeared. The dorsal cirrus is more slender, and opposite the papilla at its base ventrally a short branchial process projects dorsally, with a conspicuous afferent and efferent vessel. The setigerous region is now acutely conical, with a smaller rounded flap posteriorly. The tips of three strong dark brown spines project at the upper part. The dorsal bristles are more slender and longer, and with a slight bend below the

abbreviated tip. The brush-shaped bristles are distinguished by the great length of the teeth or processes at the tip, and one side is longer than the other. The ventral are similar to those in the 20th foot, the tips being minutely spinulose.

The 40th foot has a single branchial process, the dorsal bristles are more elongate, and the tips of the ventral bristles are knife-shaped, being short and acutely pointed. The serrations are less distinct. Two black spines support the foot.

The 50th foot has two divisions in the branchial process; the dorsal bristles are even more elongate, and the tips of the ventral shorter (Pl. XI. fig. 20). A strong bifid winged hook now projects above the ventral cirrus. A single black spine supports the foot. The glandular pad internal to the ventral cirrus is of large size. The tips of the dorsal bristles appear to be as minutely spinulose as those of the ventral, and the wings are marked by the usual striæ.

In the fragment of the posterior region of the body the male elements distend the parts. The feet have a rounded outline and three branchial filaments, the ventral papilla opposite their origin still being present. The foot has a single large spine, the tip of which pierces the surface between the dorsal and ventral bristles, a little above the short ventral cirrus. The dorsal bristles have longer and more slender tips, whilst the ventral have increased in strength, but no perfect example can be found. The foot thus possesses the strong simple spine and the strong bifid hook as levers, in addition to the bristles. The brush-like forms still have the same character as in front.

The *Lysidice multicirrata*, Claparède*, from the coast of Normandy, has compound bristles with tapering tips, but it seems rather to lean to *Morphysa*.

In the 'Porcupine' Expedition of 1869 a form was dredged in 173 fathoms between Galway and the Porcupine Bank, which approaches the *Eunice amphiheliæ* of Roule †, but as there are certain divergencies it is necessary to go into detail. The head has the palpi deeply severed in front, and with a marked fold at their middle and the demarcation of an inner portion. The tentacles are unusually long, but retain their several proportions to each other. The median extends backwards to the tenth segment in the preparation. The tentacular cirri are about twice the antero-posterior diameter of the first or peristomial segment. They appear

* Beobach. p. 60, Taf. xiv. figs. 23-26.

† "Campagne du 'Caudan,'" Ann. de l'Univ. de Lyon, 1896, p. 146, pls. xix., xx., xxiii., and xxv.

to have been smooth during life. They are thus all considerably longer than in Roule's form.

The body is probably about 10 or 12 inches in length, rounded anteriorly and somewhat flattened posteriorly where it tapers to the tail, which has two long and strong caudal cirri. The dorsal cirri are conspicuous anteriorly for their size and length.

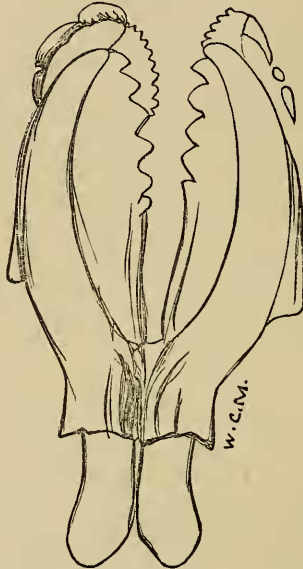
The branchiæ commence on the 7th foot as a tuft of three processes. At the 10th there are by dichotomous division five or six filaments proceeding from a common stalk, and thus differing from the semi-pinnate type. At the 20th foot nine divisions occur, the 25th eight, but three are formed by a bifurcation of the tip of one of the longer processes. The 30th has six, and they are now arranged in a semipinnate manner; the 40th has five; 50th, three; 60th, three; 70th, two; that before and that behind three; 80th, three. In the posterior region, again (of a separated fragment), an increase seems to occur, since four is the average number till within about half an inch of the tail. These branches spring from a common stem, and in the preparation spread over the dorsum, though sometimes three arise together and one separately. They continue almost to the posterior end, the 3rd foot in front of the tail having a single short branchial process.

In Roule's form the branchiæ commence on the fourth segment, and in the 40 to 50 anterior segments have about seven branches. In the segments behind these they diminish to four, three, and two to the posterior end. There are thus considerable differences in the number and arrangement of the branchiæ in the two forms, both anteriorly and posteriorly.

The maxillæ (woodcut, fig. 2) have a flat curve, only well-marked at the tips. They are deep chocolate-brown, and are boldly separated from the flattened spathulate appendages posteriorly. A double interlocking apparatus exists posteriorly, and the inner edge of each blade is sharp. Each fits into a hollow in the great maxillary plate, and thus the rigidity of the parts after seizing prey is maintained. The great plates have five strong teeth anteriorly, followed by one or two minor points, the edge behind (about half the length of the organ) being smooth. The left azygos plate has nine teeth, the curved plate in front of it five teeth, and the two continuation-plates a denticle each. The anterior curved plate on the right has ten teeth, and the continuation-plates—larger and smaller—a denticle each. The mandibles have two strong shafts which are slightly movable on each other, and are coloured blackish brown externally, paler

and marked by longitudinal veins internally. A marked shoulder occurs anteriorly, over which (ventrally) the cutting-plate extends backwards. On the inner (dorsal) surface the shoulder is boldly marked, the cutting-plate rising from each as a broadly lanceolate process with crenations on the anterior edge. The cutting-plates in certain examples seem to be easily detached, as if they were shed at intervals and renewed.

Fig. 2.

Dental apparatus of *Eunice phylacorallia*, F. Buchanan. Enlarged.

In Roule's description of the dental apparatus of *E. amphihelia*, Marion, the great dental plates agree in the number of the teeth (five). Unfortunately the nomenclature of the other parts is not conducive to perspicuity, for he adds that there are three denticles on each side, the anterior small and the posterior small, and that the anterior is devoid of teeth; the middle carries five and the posterior eight. As no mention is made of the azygos plate, considerable dubiety remains.

The anterior feet are characterized by the length of the dorsal cirri and the comparative length of the ventral in the first seven or eight. Thereafter the ventral become short processes of the great glandular mass at their base.

At the 10th foot (Pl. XII. fig. 21) the dorsal cirrus is still long, with a filamentous tip. It bears a branchial process of five divisions. The setigerous lobe forms a short cone, stiffened by two strong brown spines, the tips of which are free. The ventral cirrus is a short lobate process projecting from the thickened glandular mass internally. The dorsal bristles (Pl. XI. fig. 22) are simple winged forms rather abruptly pointed and with fine striæ and serrations on the edges. The brush-shaped bristles are characterized by their comparatively small terminal spikes (Pl. XI. fig. 23). The ventral bristles (Pl. XI. fig. 24) have shafts enlarged at the distal ends, bevelled and marked by oblique striations. The terminal piece is somewhat short with a bifid tip and wings.

At the 30th foot the setigerous region has two dark brown spines and six branchial filaments.

About the 33rd foot the great bifid ventral hook is observed piercing the surface, and at the 40th three powerful spines project from the setigerous region. The hook, which continues to the posterior end, is dark blackish brown, with a main fang and a small process or point on the crown (Pl. XI. fig. 24 a).

The great blackish-brown spines continue to the caudal region, where two only occur. In this region the large black ventral hook is present and has the same structure as in front. The dorsal bristles are very slender and elongate, and the brush-shaped forms are likewise long, though their structure does not differ. The jointed ventral bristles are similar to those in front, the tips being somewhat shorter. The ventral cirrus, like the dorsal, is comparatively long. This caudal region seemed to be in process of reproduction.

It is difficult to institute a comparison with the bristles figured by Roule, since the style of plate adopted, viz. black and white, does not lend itself to minute detail. A general agreement is all that can be said.

Accompanying the annelid were several fragments of a tough, pale, parchment-like tube minutely dotted under a lens. In structure it was minutely fibrillar, the result of fibrillation of the secretion.

Eunicea labidognatha nuda of Ehlers.

Ninoe Kinbergi, Ehlers.

Habitat. Dredged in the 'Porcupine' Expedition of 1870, at Station 10, off Cape Finisterre, in 81 fathoms. Head forming a blunt cone, comparatively broad posteriorly and occasionally slightly grooved inferiorly.

Body slightly tapered anteriorly, and more distinctly so posteriorly. Segments numerous and somewhat narrow in front, the first two devoid of feet, the second being narrower than the first. The form is readily discriminated from its allies by the remarkable condition of the feet to the 34th, and especially from the 6th to the 24th, since they project much further outward than usual and, moreover, show a digitate arrangement of the tip in the majority.

The proboscis has a pair of powerful curved maxillæ, which have a step externally and a contraction before the somewhat tapered posterior region. The great dental plates have seven sharp recurved teeth on one side and six on the other. A prominent curved fang is on the end of each of the antero-lateral plates. From the second (posterior) lateral plate a long horny band passes backward to the side of the great dental plate.

The mandibles are similar to those in the Canadian form.

The 1st foot has a short conical and vascular lobe and three brown spines. It bears a group of brownish winged tapering bristles. The second has similar spines and groups of brownish winged tapering bristles, which, like those of the 1st foot, are strong. The 3rd has three black spines and two groups of the same bristles. The lobe of the foot is lanceolate. The 4th foot presents four black spines and two groups of similar bristles, the dorsal, as usual, being somewhat longer. The lanceolate lobe of the foot (Pl. X. fig. 25) is now bifid at the tip, so that it resembles a partially split pear. In *Verrill's N. nigripes* a bifid process also occurs on this foot (3rd). The 5th has the separation between the two lobes better marked, and the upper lobe is longer, both, like the previous lobes, being vascular, a network of smaller branches connecting the larger and forming a reticulated central region in each lobe. The lower lobe, though shorter, is considerably broader than the upper.

At the 7th foot the bristles and spines remain the same. The upper lobe is larger, and the broad lower lobe has split into two at the tip, the upper being somewhat longer.

The 8th foot also has three lobes, the 9th and 10th four, but they vary in the several specimens, some at the 9th having only an elongated dorsal, and a short, broad, ventral lobe with signs of division at the tip; whilst the 10th foot had but three lobes. Four lobes are found at the 15th foot, with similar groups of tapering bristles, and four black spines. Moreover, about this foot two long winged hooks make their appearance between the dorsal and the ventral groups of bristles.

The 20th foot (Pl. XII. fig. 26) has five lobes, four black spines and two winged hooks between the groups of brownish bristles. The lobes appear to be modifications of the posterior lobe seen in other forms. The dorsal division or lobe is considerably larger and more massive than the others, and the rest form a slightly diminishing series, the two lowest springing from the same basal stem. The anterior lobe of the foot forms a truncated cone, the outline of which crosses the bases of the posterior lobes in lateral view. The elongated hooks (Pl. XII. fig. 27) have a moderately developed winged region, a short neck, a small main fang, and several minute points on the crown. In Ehlers's specimens only two black spines occur in this region. In Verrill's *N. nigripes* the lobate processes extended only to the 28th foot.

The 30th foot has six lobes, a dorsal considerably larger and longer than the others, a slightly diminishing series below, and a common trunk inferiorly which soon splits into two. Their vascular supply follows the arrangement seen in front, viz., a large marginal vessel with transverse branches and meshes. The dorsal bristles form two groups—an upper with moderately tapered tips, and a lower with very attenuate tips. One of the second series of the dorsal bristles is shown in Pl. XII. fig. 28. These are followed by the two winged hooks, and, lastly, two bristles with somewhat short tips occur inferiorly, and there are three black spines.

The 33rd foot has six lobes and two black spines; the 34th four lobes, two spines, and a hook; the 35th five lobes (the lower being small), one hook, and two spines.

The lobes diminish to three in the 36th foot, viz., an upper and two small inferior lobes. The upper dorsal group consists of about two winged bristles with moderately elongated tips, a lower series (two or three) with elongated and very finely tapered tips, one or two hooks, and a lower bristle; three spines are present. The 38th foot has only a single lobe and three black spines; two hooks are generally seen. The 39th foot has also a small lobe which becomes minute in the 40th foot, and both have only two black spines; the tips of the hooks are now shorter.

At the 50th foot only a blunt papilla indicates the upper (posterior) lobe. Dorsally the two kinds of tapered bristles are represented, and the winged hooks (three) are stouter and have shorter and broader winged regions. A minute chief fang occurs, then above it a series of still more minute points—from five to seven in number.

Coincident with the change in the posterior lobes, the feet

become less prominent and assume the condition seen in other forms.

Every specimen represented only the anterior third or less of the body, so that it would appear to be a dweller in mud or in a tube. The presence of largely developed glands at the bases of the feet would also seem to show that a special secretion is furnished either for a tube or for lining a tunnel.

The genus was established by Kinberg* from specimens procured off the coast of South America. All the species he and subsequent observers (Ehlers and Verrill) have described have been American. This is the first appearance of the genus in European waters. Further remarks will be made under the Canadian examples.

Lumbriconereis acutifrons, sp. n.

Dredged in the 'Porcupine' Expedition of 1870, though the locality is not stated.

A small and imperfect specimen, distinguished by the attenuated conical snout (Pl. XII. fig. 29), which from a base of the normal breadth tapers to a delicate extremity. In lateral (profile) view it is even thicker at the tip than when seen from above, for the dorso-ventral flattening is less marked than in ordinary types.

The body is very little diminished anteriorly, and remains of the same diameter to the fractured region, the whole measuring about three-quarters of an inch. The dental apparatus is of a translucent madder-brown hue by transmitted light. The maxillæ are somewhat broad posteriorly with a concave border, but taper in front to strongly curved and sharp points. Their posterior appendages are narrowed after the articulation, then expand into somewhat long processes, having a straight inner edge and a convex outer edge; the whole appendage is thus unusually long. The great dental plates appear to have six strong, recurved teeth, each of which is connected by a canal with a brown band externally. These correspond respectively with the central canal of the tooth and the layer of odontoblasts of the dental matrix of Pruvot and Racovitza †, as shown in their account of *Lumbriconereis coccinea*. In front the preparation showed only a single plate with a tooth. The translucent mandibles were ankylosed in front, then split into the oblique dental edge which was tipped externally

* Annul. nova, Freg. Eugen. Resa, p. 566, Taf. xviii. figs. 32 & 33

† Arch. Zool. Expér. 3^e sér. vol. iii. p. 380, woodcut, fig. 3.

with brown. Nearly parallel lines passed from these blades into the shafts, where they converged. The apparatus had been injured. In glancing along the sides the feet project evenly, for the basal part forms (when looked at from above) a cylindrical process, the setigerous lobe forming the anterior or median region of the tip, whilst posteriorly is a short subulate papilla or lobe, sometimes probe-pointed, which is longest in the anterior feet.

The bristles are translucent and brittle, so that comparatively few remain on the specimen. The spines, of which there are four or more in the anterior feet, are also pale and translucent, the tips only being russet-brown. The dorsal bristles (Pl. XII. fig. 30) are slightly curved at the end of the shaft, the tip then dilating in the usual manner with its wings and tapering distally to a fine point, which in some is considerably prolonged. A few bristles, again, are of a more slender structure, dilating little at the end of the shaft, and being continued as a very attenuate hair-like tip (Pl. XII. fig. 31).

The hooks are likewise translucent and appear to be absent from the most anterior feet, though, as mentioned, they might have been removed. The shaft is curved backwards towards the tip and gradually dilates to the beginning of the neck of the hook, which (neck) is short (Pl. XII. fig. 32). The main fang in this region of the body is small, and the crown above it has several small teeth.

The form is peculiar, and probably came from a considerable depth.

Lumbriconereis brevipes, sp. n.

Habitat. Dredged at Station 10, in 81 fathoms, off Cape Finisterre, in the 'Porcupine' Expedition of 1870. A fragment of about 40 bristled segments.

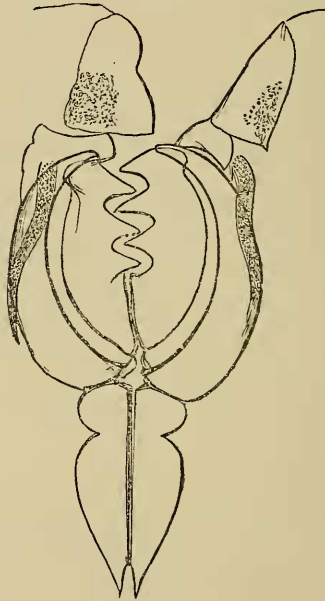
Head, as in other forms, conical, and with a median and two lateral grooves inferiorly.

Body gently tapered in front, the first two segments broader than the succeeding, and the first only very little broader than the second. The trim condition of the feet is a feature of moment, for the small posterior lobe is scarcely noticeable. The bristles stand stiffly outwards beyond the line of the feet.

Proboscis.—The maxillæ (woodcut, fig. 3) are curved in the usual manner and dark brownish. Posteriorly they are articulated to two processes which together form a broad spear-head, a constriction marking off the region near the

articulation. The great dental plates are well defined externally and posteriorly, the outer border in front having a projection so that, as the first tooth is opposite it, the apparatus is hammer-like. Each plate has three large and widely separated teeth which apparently interlock. The antero-lateral plates have each a single tooth, and the anterior plate is large, and by transmitted light is dotted with minute granules. The same dotted or file-like arrangement is seen in the band passing backwards from these to the lateral region of the maxillæ and great plates.

Fig. 3.



Dental apparatus of *Lumbriconereis brevipes*.
The anterior lateral plates are displaced. Enlarged.

The mandibles form broad, flattened cutting-plates, the anterior edge of which is symmetrically notched, so that it resembles the tail of a fish. Dark pigment occurs on each outer section; longitudinal lines internally and looped lines externally mark its surface. The posterior processes are slender.

The anterior feet have a bluntly conical anterior lobe, whilst the posterior forms a small conical process which projects superiorly beyond the rest. Two or occasionally

three black spines support the foot. In the specimen only slightly brownish, long, tapering, winged bristles were present; but as all the inferior were broken, their condition is uncertain (Pl. XII. fig. 33).

About the 40th foot the posterior lobe or papilla becomes somewhat less, though of a similar outline, and the pale tips of the two black spines pierce a conical papilla anteriorly. Above the spines are two brownish winged tapering bristles as before, whilst beneath are three long hooks, the terminal winged region being rather short (Pl. XII. fig. 34). The crown of the hook is little developed and the main fang in this region is small; it probably increases in size posteriorly.

The *Lumbriconereis parva-pedata* of A. L. Treadwell* from Culebra comes near this form; but as no description of the dental apparatus is given, the relationship is uncertain.

2. On Canadian Eunicidæ dredged by Dr. Whiteaves, of the Canadian Geological Survey, in 1871-1873.

Three species of Onuphididæ were procured: one, *Onuphis conchilega*, Sars (the *O. hyperborea* of Hansen), occurred in considerable abundance in 125 fathoms off Cape Rosier Lighthouse in the Gulf of St. Lawrence in 1871, and also on Orphan Bank in 1873. As a rule, the branchiæ commenced on the 11th foot. The tubes are composed of coarse gravel and flat fragments of Echinoids firmly fixed to the tough lining of secretion. Those from Orphan Bank are smaller and the fragments composing the tubes less coarse.

Onuphis quadricuspis, Sars †.

Dredged in 150 fathoms off Cape Rosier Lighthouse, Gulf of St. Lawrence, 1871, and between Cape Rosier and Cape Gaspé in 75 to 80 fathoms on a stony bottom, in 1872.

The head generally resembles that of other forms, but is eyeless in the preparations. The frontal tentacles are small and ovoid in outline. A patch of pigment occurs in the middle line posteriorly. The palpi form two prominent bosses inferiorly. The ceratophores of the tentacles are ringed, and the median is considerably shorter than the adjoining lateral.

* "Polychætous Ann. of Porto Rico," U.S. Fish Com. Bullet. for 1900, p. 198 (1901).

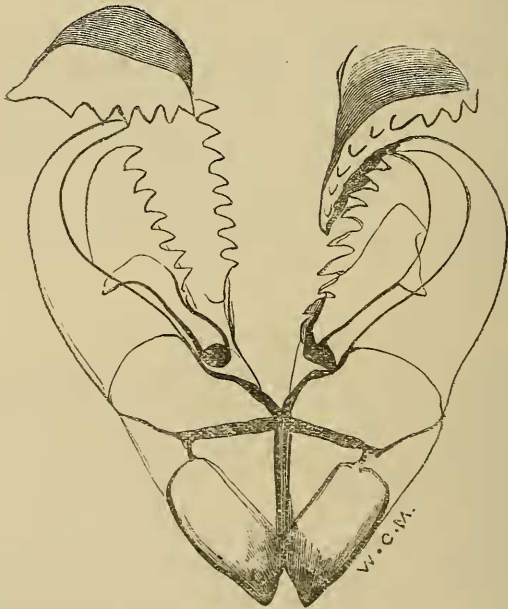
† Særsk. aftrykl af Vidensk.-Selsk. Förhandl. 1871, p. 407; and Bidrag til Kundskaben om Christianiafjordens Fauna, iii. p. 16, tab. xv. figs. 7-19 (1873).

The *body* is conspicuously banded with pigment, which was probably reddish brown during life, a bar occurring dorsally in the middle of each segment, generally with a darker spot in the centre. The first segment is somewhat narrower than the succeeding, and bears two subulate tentacular cirri at the anterior border.

Proboscis.—The whole apparatus is comparatively short, pale greyish in hue, marked with characteristic blackish-brown lines.

The maxillæ (woodcut, fig. 4) are remarkably broad posteriorly, curving almost from the latter border to the hook-like tip. A dark curved line indicates a separate edge or element at their posterior end, bounded posteriorly by another line running outward from the bold dark bar separating the maxillæ from their spathulate appendages, which have a median notch posteriorly. The great dental plates have

Fig. 4.

Dental apparatus of *Onuphis quadricuspis*, Sars. Enlarged.

each about six well-marked teeth directed backward. The right anterior curved plate has nine or ten teeth; the left has fewer, apparently about six.

The mandibles have an uneven sloped edge anteriorly and tapering shafts. A black pin-shaped bar occurs at the inner edge of each anteriorly. In one example, a new maxilla was developing after the manner of a new bristle or hook. The point is short and strongly curved. The functional maxilla of that side was perfect.

The next segment carries the first pair of feet, which are considerably shorter than in such types as *Hyalinæcia tubicola* and *O. conchylega*, and pass transversely outward instead of sloping forward to the anterior border of the head as in the forms mentioned. The dorsal cirrus is well developed and subulate; the button-shaped tip is minute, whilst a long subulate papilla extends from the posterior edge. The ventral cirrus projects as a subulate process ventrally. The setigerous region forms a short cone, supported by a group of spines with slender tips. The bristles (Pl. XII. fig. 35) are pale and appear to be hollow (or with fluid internally), have a distinct bend, and an incurvation on the concave side at the tip, which is bifid with long tapering guards or wings. Such a condition indicates a tendency to form a jointed tip. A few simple tapering bristles are also present.

The 2nd foot differs little from the 1st, though it and the 3rd have a more slender dorsal cirrus. The 4th foot has its ventral cirrus in the form of a pad. The four segments bearing the feet described form a region of the body characterized by broader and shorter segments. The succeeding segments are narrower and longer from side to side.

The branchiæ commence as a simple filament on the 6th foot*. At the 10th foot there are two branchial filaments, and the setigerous region has now become a short cone. Dorsally is a tuft of simple tapering bristles with a slight wing, and inferiorly are two strong bifid hooks.

The 20th foot (Pl. XIII. fig. 36) has four branchial divisions, a tuft of slightly brownish dorsal bristles with a narrow wing at the tapering tip, and three strong bifid hooks beneath. In shape these differ from those found in *Onuphis conchylega* and *H. tubicola*. The shafts are powerful and both processes at the tip are strong, the secondary, however, being the more conspicuous. They are also winged (Pl. XIII. fig. 37). The highest number of branchial filaments seems to be four.

The 30th foot is less prominent and has two branchial processes. The dorsal bristles are considerably longer and

* Sars does not mention the foot on which these begin.

there are two strong bifid hooks. The branchiæ cease about the 31st foot.

The posterior feet project little, forming smoothly rounded processes with simple attenuate dorsal bristles and two strong bifid hooks beneath. Only a single tail in process of reproduction was present, and it bore a single cirrus; but on this no reliance can be placed. Sars describes four anal cirri—two long superior and two shorter inferior cirri.

This species approaches so closely the *Diopatra socialis** of Ehlers from the 'Porcupine,' that, though Ehlers shows a strong bifid hook with the shorter prong broken (thus comparison is difficult), I am inclined to agree with Grube in uniting them. It shows also certain relationships to the *Onuphis eremita*, Aud. & Edwards, though in the latter the branchiæ arise on the 2nd foot.

In the bottle was a firm tube of reddish mud, lined by a tough mucous secretion, but it was empty. It probably was that inhabited by the species.

The bifid, or, as he calls them, bicuspid capillary bristles of the three anterior segments mentioned by Sars † have not been observed, but what he refers to is in all probability the tips of the tapering guards or wings of the special bristles shown in fig. 35, Pl. XIII.

This species is probably the *Nothria opalina* of Prof. Verrill ‡.

None of the American species described by Ehlers seem to approach this form, for if the bristles are similar the branchiæ are absent, and *vice versa*.

The third species, which may be the *Onuphis holobranchia* of Marenzeller, appears to approach *Onuphis Grubei*, Marenzeller, a form which comes near *Nothria tenuisetis* of the 'Challenger,' especially in the structure of the bristles, though there are certain differences, such as the origin of the branchiæ. It was dredged between Cape Rosier and Cape de Gatté, in 70 to 80 fathoms, amongst stones, in 1872, and in 100 to 212 fathoms off Anticosti, in the Gulf of St. Lawrence, in 1871 and 1873.

The *head* is characterized by the great length of the tentacles, the median, however, being shorter than the adjoining long posterior lateral. The anterior or short external lateral are, on the other hand, thick, with a marked distal filament, which is abruptly narrowed. This tentacle, moreover, is

* Zeit. f. w. Zool. Bd. xxv. p. 46, Taf. iii. figs. 5-10.

† *Op. cit.* pl. xv. figs. 16, b, c.

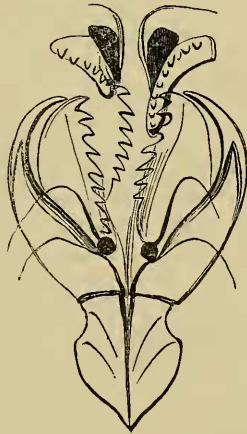
‡ Amer. Journ. Sci. & Arts, v., Feb. 1873, p. 102.

divided by the long ceratophore into two nearly equal halves. All the others have long ringed ceratophores. The frontal tentacles are somewhat ovate and the pedicle is narrow. The palpi are separated by a distinct interval from the anterior border of the snout, and form two prominent, almost cylindrical bodies which have freer motion than usual.

Body probably 3-4 inches in length, somewhat like that of *H. tubicola* in contour, though differing in detail. The first segment is slightly narrower than the second and bears a slender tentacular cirrus at the anterior margin in each lateral region, the distance between them being proportionally great. Like the succeeding five segments it is narrower and more rounded than those of the flattened region following. The five feet and their processes are also larger and more conspicuous than the succeeding.

The *proboscis* is generally pale, with dark touches on maxillæ, accessory posterior plates, and other parts. The maxillæ (woodcut, fig. 5) have sharp, curved, dark points,

Fig. 5.

Dental apparatus of *Onuphis* near *holobranchia*, Marenzeller. $\times 35$.

and their accessory posterior plates are constricted, then dilated and pointed, so as to give them a regularly spatulate appearance. A bar of pigment separates them from the maxillæ in front, another is between them, and a shade also occurs at the constricted region. The great dental plates are boldly toothed; the right has eight teeth and the left seven. The accessory or azygos left plate has six teeth.

The anterior curved plate has nine teeth on the right, five or six on the left. A small isolated process with a tooth occurs externally. The oblique anterior edges of the mandibles have in some specimens irregular denticulations and a notch on each side internally with a dark band; in others the edges seem to be smooth. The shafts are slender and pointed.

The 1st foot has dorsally an elongated tapering dorsal cirrus, springing rather beyond the middle of the short foot, and which has a group of slender spines projecting into its base. Beyond the tips of these spines a long, slender, tapering (branchial) process arises from the dorsal edge, and is shorter than the cirrus, which, like the setigerous region, is permeated by a network of fine blood-vessels. None of the latter were seen in the branchial process. The setigerous region forms a blunt cone supported by four tapering spines, and with a long lanceolate papilla projecting from its posterior edge. The bristles are similar to those of *Onuphis quadricuspis*, but not identical, having hollow shafts (Pl. XIII. fig. 38) with a bend and wrinkles at the commencement of the terminal region, which has a hook at the end, followed closely by a secondary process, and then a single spike—two tapering wings which project beyond the tip guarding the whole. A subulate ventral cirrus arises near the base of the foot ventrally.

In its progress backward the dorsal cirrus has a tendency to diminish, whilst the branchial filament has a tendency to increase. Thus at the 10th foot (Pl. XIII. fig. 39) the branchial process is now the longer, though the cirrus has the larger base, a condition due mainly to the shrinking of the dorsal cirrus, for some of the branchial processes in front are really longer than that of the 10th foot. The setigerous region is now almost adnate, with a dimple in the centre, apparently the separation between the actual setigerous region and the adnate ventral cirrus. The papilla from the posterior border of the tip is also much reduced. Simple tapering bristles with scarcely a trace of a wing only appear. A group of spines pass to the dorsal cirrus as in front and the setigerous region has two strong spines.

So far as the specimens showed, the branchial filament increased in size, being the most conspicuous process of the foot, and still retained pre-eminence to the posterior end of the longest fragment, the dorsal cirrus being much smaller. Both diminished in size posteriorly, but the proportions held.

At the 20th foot the branchia is nearly twice as long as the cirrus, and its vascular trunks are conspicuous. The foot forms a slightly rounded projection, a dimple separating

the setigerous region from the pad formed by the ventral cirrus. Three strong spines with acute tips support the setigerous region. Dorsally is a group of simple bristles with a few brush-shaped forms, while ventrally are two strong hooks which have a stout shaft, and a large main fang with a process above it similar to that in the previous species.

The chief changes in the posterior feet are the diminution of both branchia and cirrus, the elongation and slenderness of the dorsal bristles, the increased strength of one spine, the point of which projects beyond the surface, and the occurrence of only a single powerful bifid hook.

It is noteworthy that the branchiæ do not attain great bulk in any part of the body, even the longest being rather slender, but their number probably compensates for their size.

This species constructs a tube of its tough secretion and envelops it with soft, greyish, and probably sticky mud.

The *Northia iridescens*, H. P. Johnson *, dredged by Prof. Herdman at Victoria, B.C., so far as the description and figures go, is not distinguishable from this species.

The foregoing differs from the French examples of *Onuphis Grubei* by the absence of six or eight eyes behind the tentacles, by the fact that the branchiæ commence on the 1st foot, whereas in *O. Grubei* of the French coast they begin on the 4th segment. The alteration of the ventral cirrus in the Canadian form appears to be similar to that of the French, for the 7th foot has a truncated cirrus which soon becomes a rounded boss. The Canadian further differs in the number of teeth on the azygos plate and in other parts of the apparatus. De St. Joseph states that the bidentate strong hooks begin on the tenth segment. The relationship of this form with Marenzeller's *Onuphis holobranchia* is still undecided, as no opportunity of comparing the specimens has yet been available. It would appear to be closely allied, though having longer tentacles and apparently shorter branchiæ.

Eunice — ?

Dredged at Station No. 11, 1872, 30 miles N.E. of Cape Rosier, and at a depth of 200 fathoms.

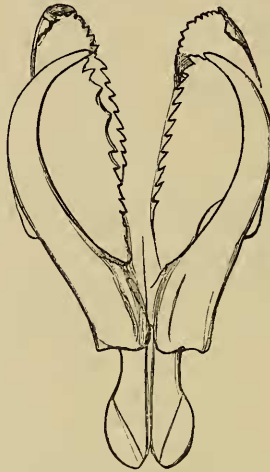
A species of considerable size, but only a fragment of the anterior region, comprising about thirty bristled segments with the head, has been received.

* Proceed. Boston Nat. Hist. Soc. vol. xxix. no. 18, p. 408, pl. viii. figs. 86, 87, pl. ix. figs. 88-92.

The head is typical, with five moderately elongated tentacles and an eye of considerable size in the normal position on each side. The palpi are soldered, with the exception of a median notch in front and a deep furrow inferiorly. The first segment is about once and a half the breadth of the average anterior segment.

Proboscis.—The maxillæ (woodcut, fig. 6) from above

Fig. 6.



Dental apparatus of *Eunice* —? Enlarged.

present a moderate curvature, whilst in lateral view only a slight sinuosity occurs, the tips, however, rising clearly above the horizontal. The right great dental plate has ten teeth, the left eleven, but three of these were on a depressed region, probably indicating fracture and renewal. The azygos plate (left) has ten teeth. The left anterior curved plate had seven teeth, the right nine or ten teeth. The single accessory plate (anteriorly and externally) had one denticle. A marked shoulder separated the maxillæ from the posterior processes, which were spatulate in outline. The mandibles have large foliate dentary processes, with two or three small denticles on the oblique anterior edge. The shafts or roots are pale dorsally, with wavy lines as in sections of wood, whilst ventrally they are marked by a broad dark brown band. The colour of the apparatus is chocolate-brown with lighter parts here and there.

The second segment is slightly less than the others and bears the two tentacular cirri, which also are of moderate length. The third and fourth segments have feet devoid of branchiæ. The third foot has a branchial process of three divisions. The next branchia has more than double the number of processes, and they steadily increase till, at the tenth, their number is about twenty-six, at the twentieth twenty-nine (Pl. XIII. fig. 40). The last segment of the fragment, viz. the thirty-first, had branchiæ with twenty-eight divisions. The upper or last divisions of the branchia are more slender, especially the terminal process, which is only about half the diameter of the average filament. The main stem of the branchia is once and a half the diameter of the base of the dorsal cirrus. The dorsal cirrus is of considerable length, extending beyond the tips of the branchial divisions, but its diameter is less than that of the branchial stem. The setigerous region (Pl. XIII. fig. 40) forms a short cone with the edge sloping inward and downward.

The dorsal bristles are translucent, tapered, and curved at the tip, which has feebly developed wings.

The ventral bristles are also translucent and the end of the shaft is slightly curved, dilated, striated, and bevelled. The terminal piece is of some length and its base is less bevelled than usual in such forms (Pl. XIII. fig. 41), so that with the gentle narrowing at the tip (front edge) the process is somewhat spindle-shaped. The tip is peculiar, for after a notch it seems to taper away to a knife-point, a condition apparently due to injury. In certain views a differentiation into a bifid condition (extremely translucent) is clearly visible, the wings terminating in a delicate tapering point. The dorsal division of the fork is the longer and more robust.

The great brittleness of these bristles is a feature of note, comparatively few being perfect, and even these seem to have been recently regenerated. The majority present a fissured imperfect tip, the hooks having been removed. In some the tip, from splitting, is brush-like, in others the fracture of the terminal piece is abrupt (below the bifid region) and from the fractured end extends a simple process of the ventral edge.

The ventral cirrus forms a conical process projecting from the enlarged base (ventrally).

The head is irregularly four-lobed by a fold in the middle of the palpus in front of each antero-lateral tentacle, so that the form may fall under the *Eriphyle* of Kinberg as possessing tentacular cirri and a four-lobed frontal region, and thus its relationship to *E. violacea* is closer. The branchiæ have two

(the first) to thirty branches. It differs, however, in that the branchiæ begin on the 3rd foot, whereas in *E. violacea* they are absent on the first five. They lean to the type seen in *Eunice aphroditois* and *E. Rousseaui*.

This species also comes near *Eunice violaceo-maculata*, Ehlers, from Tortugas, but the head does not appear to be simply bilobate, the branchial filaments are longer and more numerous, and the number of teeth on the various plates is greater. The bristles, again, are quite different.

Lumbriconereis fragilis, O. F. Müller.

Great numbers, some of large size, were dredged in 1873 off Port Hood, Cape Breton; also in Gaspé Bay, 1873; some of these were also of large size. In one, the largest, the maxillary plates only had three teeth, the posterior apparently having been abraded, and the edges of the anterior were white. The anterior feet had the posterior lobe considerably modified, so that in lateral view it had a deep vertical edge instead of the more pointed condition in the ordinary forms. The black spines are also more numerous. There is, indeed, much variation in this respect and in the length of the bristles, but it seems unnecessary to do more than to draw attention to these differences.

Lumbriconereis near *assimilis*, M'I., but with pale spines.

A small species was dredged in 200 fathoms south of Anticosti in 1871 which had rather prominent feet, with a small posterior lobe, the tip of which in the sole example projects backward rather abruptly. The spines throughout are pale, and the bristles (Pl. XIII. fig. 42) do not offer cause for remark. The winged hooks occur on the first segment and are continued to the posterior end of the example, which is fragmentary. At the 20th foot the tips of the winged hooks are long and tapering (Pl. XIII. fig. 43), the crown of the hook having minute spines which do not much differ from the lowest or chief fang. Posteriorly the winged region is shorter and the chief fang of the hook better differentiated from the smaller upper spines of the crown.

This species comes near the *L. robusta* of Ehlers*, though the spines in the latter are black.

The dental apparatus of this form had been crushed, and all that can be said is that the maxillæ had the normal outline, the curve being rather flat, and their posterior

* Florida Annel. p. 104, Taf. xxxi. figs. 1-6.

processes were short and spatulate in outline, thus differing from the allied *Lumbriconereis zonata* of H. P. Johnson* from Puget Sound. Each great dental plate had five strong recurved teeth, the first being the largest. The anterior plates had each a single tooth, the rest of the plate being minutely granular. The mandibles had broad, wedge-shaped, anterior plates with oblique edges and narrow fangs or posterior processes. The broad anterior plates were marked with curved lines.

Ninoe Kinbergi, Ehlers.

Dredged in considerable numbers off Port Hood, in 1873; probably in muddy reddish clay.

A small Lumbriconereid, probably about 4 inches in length, though none of the fragments measured more than 2 inches, with a diameter at the widest part in front (across the feet) of about 3 millim. The shape of the body is characteristic, since by the great breadth of the anterior feet a fusiform region is formed. The feet gradually increase in prominence from the 1st to the 6th or 7th, remain of considerable breadth to the 23rd or 24th, and again diminish.

The head forms a pointed cone, with a few wrinkles posteriorly, two of which are often conspicuous. The two succeeding segments and the rest of the body conform to the type in *Lumbriconereis*. The 1st foot has a setigerous process besides a short conical lobe with three brown spines and a dorsal group of simple winged bristles which slightly dilate beyond the shaft and taper to a fine point. Below the spines are two attenuated winged hooks, tapering towards the tip.

The maxillæ (woodcut, fig. 7) have a gentle curve and end in sharp points. The great dental plates have about six powerful recurved teeth. The two antero-lateral plates have each a single curved tooth, and at its base two small crenations, and a greater belt externally. These anterior plates have a different character from those in *Eunice* and *Lumbriconereis*, being folded flatly on the sides of the gape, the larger in front and the smaller behind. The posterior processes of the maxillæ have a constriction, then enlarge, and again taper off to a point externally.

The mandibles are shaped like a battle-axe, with a denticle towards the suture, the edge sloping obliquely outward and forward from this. The shafts are long and slender.

On the whole they resemble the European form and also the *Ninoe Kinbergi* of Ehlers from American waters; but the

* Proc. Bost. Soc. Nat. Hist. vol. xxix. no. 18, p. 408, pl. ix. fig. 94.

dental apparatus differs from the latter in respect to the antero-lateral plates, which are described and figured by the author as curved plates having ten minute teeth, and with a granular band externally. Whether this difference is due to

Fig. 7.

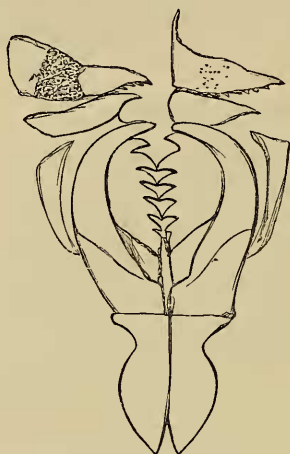


Fig. 8.



Fig. 7.—Dental apparatus of *Ninoe Kinbergi*. The points of the right anterior plates have been pushed to the right. Enlarged.
 Fig. 8.—Anterior dental plate of *Ninoe Kinbergi*. Magnified.

structure or to a misinterpretation is an open question. Certainly the forms closely resemble each other, and the discrepancy is probably due to the difficulty in getting a good view of the parts. The base of the long pointed tooth in each plate seems to be flanked by a series of small teeth (woodcut, fig. 8).

The 2nd foot has a finger-like process extending beyond the posterior lobe, but the bristles conform to the arrangement already mentioned. The 3rd foot is similar; the 4th has three digitate processes, the upper being the longer; the 5th and 6th have each three processes; the 10th foot has six processes, the dorsal being the larger, and the foot is supported by three brown spines. The dorsal bristles are somewhat stout, have broad wings, and a short finely tapered tip; those of the inferior group have shorter tips. The hooks with the long tapered tips are as before.

The 15th foot presents posteriorly a long and somewhat subulate dorsal process and four shorter processes beneath it. In front is the setigerous lobe, which bears two groups of

the winged bristles, the tips of which have now become very attenuate. The winged hooks have still somewhat tapered and slightly bent tips. There are five brown spines.

There are some minor differences in the number of spines in the feet of the Canadian examples, but it has been thought unnecessary to repeat what has been given under those from the 'Porcupine.'

The 30th foot has three spines and six lobes, the upper being the larger. The cuticle on these seems to be specially thick. The dorsal bristles (Pl. XII. fig. 28) have a comparatively short winged region at the end of the shaft and a slender attenuate tip—which is almost as long as the shaft—beyond it. The inferior winged and tapering bristles are little altered.

At the 50th foot there are three brown spines supporting the setigerous region and a single short papilla representing the dorsal lobe. The tips of the dorsal bristles are still very attenuate and the winged region short. The hooks project far, have a broad and short winged tip, the widest part being just below the neck of the hook (Pl. XII. fig. 27), which is short. The main fang is little larger than the five or six points above it.

The species secretes abundant mucus, which mixes with the brownish mud amongst which it dwells. The secretion may readily line the tunnel in the mud.

Ehlers observes that all the examples of the genus procured by Kinberg and himself came from American waters. Besides the Canadian specimens the 'Porcupine' obtained others.

It is probable that the forms described by Ehlers and that by Verrill may have closer connexion than the former supposes. Verrill observes that the first two setigerous segments have branchiæ, whereas in the present the lobe appears on the second foot. His specimens came from Vineyard Sound and Buzzard's Bay, on muddy ground.

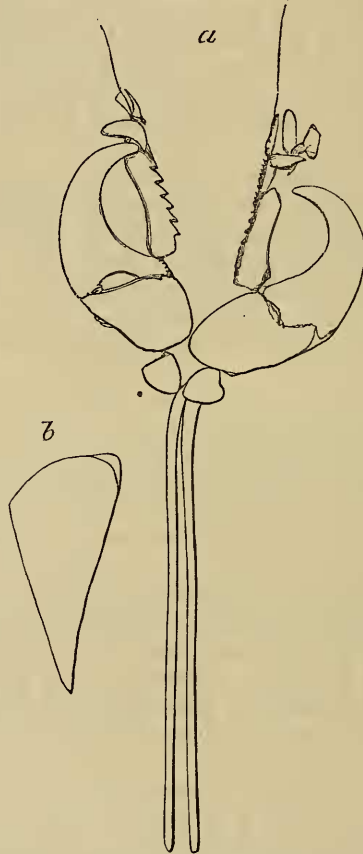
Drilonereis canadensis, sp. n.

Dredged off Port Hood, Gulf of St. Lawrence, 1873. A fragment of apparently the same form occurs in a bottle with *Nematonereis* in the British Museum, having been dredged in 40 fathoms off the coast of Cornwall by Laughrin (67. 1. 7. 29).

Head (Pl. XIII. fig. 44) when viewed from the dorsum forms a blunt cone, but laterally it is flat. Posteriorly the line of the head is convex, for it passes into a shallow crescent

cut out of the first segment. Inferiorly a median groove occurs. Body 5 or 6 inches long, very little narrowed anteriorly, remaining of nearly uniform breadth for a considerable distance, and then diminishing towards the tail, which is absent in the examples. The two segments behind the head agree with the Lumbriconereid type, the first being narrower

Fig. 9.



Dental apparatus of *Drilonereis canadensis*. *a*, maxillæ and dental plates; *b*, mandible. Enlarged.

dorsally (from the concavity in the centre anteriorly) and wider ventrally, where it has a series of longitudinal wrinkles. In spirit the body is rigid and moniliform, the feet projecting at the widest or median part of each segment.

The proboscis has superiorly a pair of short and strongly curved maxillæ (woodcut, fig. 9, *a*), which have the inner edge of the base posteriorly serrated, four or five points being present. They are continuous posteriorly with a short broad plate of the same blackish-brown colour, and marked off by a slight indentation, which again articulates behind with two triangular smaller pieces, continuous, after a constriction, posteriorly with two greatly elongated slender bars, slightly tapered posteriorly. The great dental plates are bar-like from above and are shorter than the curve of the maxillæ, though a process goes forward to the anterior plates. They have six recurved teeth, the anterior being longest.

The small antero-lateral plates are three in number, each with a prominent tooth, the larger proximal one having a shoulder below the tip.

The mandibles (woodcut, fig. 9, *b*) are triangular, blackish, broad horny plates which lie considerably in front of the anterior plates and ventralwards. The wide anterior end is rounded and they do not always touch each other.

The armature of the proboscis thus in many respects agrees with that in *Drilonereis*, which in all the examples seen possessed mandibles. The maxillæ are brittle, especially at the wide base.

The 1st foot has a small setigerous lobe in front and a conical lobe posteriorly. A pale stout spine pierces the upper part of the former. The bristles are broken.

At the 10th foot the setigerous region is better developed and bears a series of stout winged bristles with a marked curvature beyond the shaft and a tapering tip (Pl. XIII. fig. 45). A single powerful spine or hook-like spine projects inferiorly, the tip being simple. The tips of the winged bristles project inferiorly. The posterior lobe is now somewhat lanceolate in outline, its inferior border being convex.

The shape of the foot is little altered at the 30th, and the tips of the inferior bristles are as in front, viz., just projecting in profile beyond the posterior lobe. The tip of the great simple spine is conspicuous inferiorly.

At the 50th foot the posterior lobe is somewhat diminished (Pl. XIII. fig. 46), so that the tip of the great spine and the bristles are more prominent. The wings of the bristles are also narrower and the tips proportionally longer.

Posteriorly, whilst the tips of the bristles are more slender, the great spine has rather increased in size.

It is a very tough species, the cuticle resisting even considerable force, so that the bristles are apt to be injured in removing a foot.

This form comes near the *Drilonereis longa* of H. E. Webster*, from the Virginian coast, though the concavity at the anterior border of the first segment and certain details of the dental apparatus differ. How much such differences are due to imperfection in figures is an open question.

It approaches the *Drilonereis Elisabethæ* of the British seas, though differing in details of the dental apparatus, in the broader wings to the less tapered bristles, in the shape of the head, and in the presence of the crescentic hollow at the anterior border of the first segment.

3. *On Norwegian Eunicidæ collected by Canon Norman, D.C.L., F.R.S.*

The Eunicidæ in this collection are in considerable numbers and of much interest, were it only for comparison with the British representatives. *Onuphis conchylega*, Sars, is not uncommon, yet *O. quadricuspis*, Sars, does not appear in the series, though it stretches to the shores of Canada and was formerly procured in Norwegian waters. The examples of *Hyalinæcia tubicola* are of medium size and show the occasional occurrence of a tentacular cirrus as an abnormality. The most abundant Eunicid is *Eunice pennata*, O. F. M., and several varieties occur. Amongst these is a small series in which the branchiæ commence on the 3rd foot. A single branchial filament is on the 8th foot, whilst the 12th branchia has 4 divisions, the 20th has 6 or 7, and the 30th 5 divisions, whilst the last, on the 39th foot, is a simple process as in front. The highest number of divisions observed was 10. This form seems to abound on shell-gravel, and it constructs tubes. *Eunice amphiheliæ*, Roule, is likewise common in its parchment-like tubes. Lastly, *Lumbriconereis fragilis*, O. F. Müller, is very generally distributed and of average size. Besides the foregoing, six or seven fragments pertaining to the group were dredged.

EXPLANATION OF THE PLATES.

PLATE X.

- Fig. 1.* Ventral bristle of the second foot of *Diopatra neopolitana*. × Zeiss oc. 2, obj. D.
Fig. 2. Anterior (10th) foot of the same. The finely spiral branchia is not in good condition. Enlarged.

* Trans. Albany Inst. vol. ix. p. 40, pl. vii. figs. 84-88.

- Fig. 3. Foot of the same species behind the foregoing (about 20th). Enlarged.
- Fig. 4. Powerful (lower) winged hook of the same foot. \times Zeiss oc. 2, obj. D.
- Fig. 5. 10th foot of *Onuphis brevibrachiata*, Ehlers. Enlarged.
- Fig. 6. Dorsal bristle of the same. \times Zeiss oc. 2, obj. D.
- Fig. 7. 30th foot of the same. Enlarged.
- Fig. 8. Brush-shaped bristle from the anterior region of the same. \times Zeiss oc. 4, obj. D.
- Fig. 9. Ventral bristle of the same. \times Zeiss oc. 2, obj. D.
- Fig. 10. Winged hook of the same from the 20th foot. Enlarged.
- Fig. 25. 4th foot of *Ninoe Kinbergi*, Ehlers, the first of each group of bristles only being shown. \times Zeiss oc. 2, obj. D.

PLATE XI.

- Fig. 11. Bristle of the 1st foot of *Onuphis* from Adventure Bank, allied to *O. Grubei*. \times Zeiss oc. 2, obj. D.
- Fig. 12. Dorsal bristle of the same. Similarly magnified.
- Fig. 13. Great winged hook of *Onuphis* from Adventure Bank. \times as before.
- Fig. 14. Posterior foot of *Onuphis Grubei*, Marenzeller, 'Porcupine,' 1870. Enlarged.
- Fig. 15. 10th foot of *Eunice Jeffreysii*. Enlarged.
- Fig. 16. Dorsal bristle from the same foot. \times 100.
- Fig. 17. Brush-shaped bristle of the same. \times 100.
- Fig. 18. Ventral bristle of the 10th foot of the same. \times Zeiss oc. 2, obj. D.
- Fig. 19. 30th foot of the same species. \times 28 diam.
- Fig. 20. Ventral bristle from the 50th foot of the same. \times Zeiss oc. 2, obj. D.
- Fig. 22. Dorsal bristle of *Eunice amphihelicæ*, Roule. \times Zeiss oc. 2, obj. D.
- Fig. 23. Brush-shaped bristle from the same. Similarly magnified.
- Fig. 24. Compound bristle of the same from the 10th foot. Similarly magnified.
- Fig. 24 a. Jointed bristle from the 30th foot of the same. Similarly magnified.

PLATE XII.

- Fig. 21. 10th foot of *Eunice amphihelicæ*, Roule. Enlarged.
- Fig. 24 b. Great winged hook behind the 50th foot of *Eunice amphihelicæ*.
- Fig. 26. 20th foot of *Ninoe Kinbergi*, Ehlers. \times 70 diam.
- Fig. 27. Long winged hook of the same from the 20th foot. \times Zeiss oc. 2, obj. D.
- Fig. 28. Dorsal bristle of the same (30th foot). Similarly magnified.
- Fig. 29. Dorsal view of the anterior region of *Lumbriconereis acutifrons*. Enlarged.
- Fig. 30. Dorsal bristle of the same from the anterior region. \times Zeiss oc. 2, obj. D + 3 in. draw-tube.
- Fig. 31. One of the more slender series from the same region of the body. Similarly magnified.
- Fig. 32. Shorter winged hooks from the middle of the body. Similarly magnified.
- Fig. 33. Foot of *Lumbriconereis brevipes*. The dorsal edge is to the left. \times Zeiss oc. 2, obj. D.
- Fig. 34. Long winged hook of the same. Similarly magnified.

PLATE XIII.

- Fig. 35.* Bristle of the 1st foot of *Onuphis quadricuspis*, Sars. It is accidentally curved. \times Zeiss oc. 2, obj. D.
Fig. 36. 20th foot of the same. Enlarged.
Fig. 37. Powerful winged and bifid hook from the posterior region of the same. \times as before.
Fig. 38. Bristle of the 1st foot of *Onuphis* near *holobranchia*, Marenzeller. \times as before.
Fig. 39. 10th foot of the same. Magnified.
Fig. 40. Foot (about 20th) of *Eunice* from Cape Rosier. Enlarged.
Fig. 41. Ventral bristles of the same. \times as before.
Fig. 42. Upper bristle of *Lumbriconereis assimilis*. \times as before.
Fig. 43. Winged hook of the same. \times as before.
Fig. 43 a. Head and anterior end of the foregoing. Enlarged.
Fig. 44. Anterior end of *Drilonereis canadensis*. Enlarged.
Fig. 45. Upper bristle of the same. \times as before.
Fig. 46. 50th foot of the same. \times 70 diam.

VII.—*On some Points in connexion with the ordinary Development of Vaucheria Resting-spores.* By H. CHARLTON BASTIAN, M.A., M.D., F.R.S., F.L.S.

[Plate XIV.]

COMPARATIVELY few persons have probably followed the development of the resting-spores of *Vaucheria*, owing to the length of time they remain in a dormant condition. I have long been familiar with these bodies and with various changes that are from time to time apt to occur therein, but until the summer of 1901 I had never seen them germinate and give rise to young *Vaucheria* plants.

The only description of their germination that I have been able to find is that given by Pringsheim *. He says:—"The spore remains for some time longer, without being thrown off from the parent tube on which it was produced; but the colour of its contents, which was at first green, gradually becomes paler and paler; the spore is at last rendered quite colourless and presents in its interior only one or more largish dark brown bodies. When it has lost all its colour it is detached from the parent tube in consequence of the decay of the membrane of the sporangium enclosing it. After some

* "On the Impregnation and Germination of Algæ." Translation in *Quart. Journ. Microsc. Science*, 1856, p. 63, pl. iii. figs. 17-20. The figures, as reproduced in the *Journal*, and as copied in Cooke's 'British Freshwater Algæ,' are very crude, and even erroneous in several respects; this is especially the case with fig. 17.