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REPORT on the POLYCHÆTOUS ANNELIDS  
of the L.M.B.C. DISTRICT.

BY JAMES HORNELL.

With Plates XIII., XIV., XV.

[Read 13th March, 1891.]

INTRODUCTION.

THE dredged material with which the following report deals was collected in great part on the various dredging cruises instituted by the Liverpool Marine Biology Committee during the years 1886—90; while the littoral species were mostly obtained by myself during 1890 from selected local centres. Great help was in addition rendered by the keeper of the Biological Station on Puffin Island, especially during the past winter.

I offer hearty thanks to Professor Herdman for the uniform kindness he has shown in facilitating my labours. Indeed to one with my limited leisure, his words of encouragement and advice furnished an incentive I could ill have spared. Messrs. A. O. Walker, I. C. Thompson, F. Archer, and Dr. Chaster have also at various times kindly procured specimens for me, and I gladly avail myself of this opportunity to express my thanks. Finally, I have to express my obligation to Professor M'Intosh for help in the determination of a few of the more critical species.

In the arrangement and nomenclature of the larger divisions I have followed Claus,\* but with the generic

\* *Traité de Zoologie*, 1884

nomenclature I have used a free hand—especially among the Polynoinæ, the Syllidæ, and the Nereidæ where I have followed the example set by Théel, Hansen, and other recent authors in suppressing many of the genera instituted by Malmgren and adopted by Professor M'Intosh in his "Challenger" Report and elsewhere. Lists of synonyms are dispensed with, as such can be found by reference to the *Nordiska Hafs-Annulater* and the *Annulata Polychæta* of Malmgren, and to the memoir on the *Polychæta Sedentaria of the Firth of Forth* by Cunningham and Ramage. The specific nomenclature of these works I follow closely; the few exceptions being noted.

To make the present report as far as possible, a complete chronicle of the Polychætous fauna of the district, such species as I have not met with, but which appear in previous lists and are well authenticated, have been inserted. Re-examination, however, of some of the material described by Mr. R. J. Harvey Gibson in his paper upon the Vermes of the district, (*Fauna of Liverpool Bay*, vol. I., p. 144) shows that he had fallen into the following errors, viz.: (a) His "*Malmgrenia castanea*" found in the ambulacral groove of *Astropecten* turns out to be nothing more than the usual *Astropecten* commensal *Acholoe astericola*; (b) his "*Spiochætopterus typicus*" is the diagnostic portion of the body of *Chætopterus insignis*; (c) his (new British species) "*Iphione muricata*" is in reality the not uncommon *Nychia cirrosa* from the tube of *Chætopterus*; (d) his *Nereis viridis* is one form of *N. pelagica*; while (e) the identity of *Pectinaria auricoma* with *P. belgica* which he tried to prove, is, as has been shown by Cunningham and Ramage, founded upon oversights and erroneous premises. There are some other cases where I suspect Mr. Gibson's identification to be at fault, and in this uncertain category I am inclined to place

*Sthenelais zetlandica*—the original specimen of which unfortunately I cannot discover.

This list—including the last mentioned doubtful species—enumerates 88 species and two varieties. Both the latter—*Polynoë haliæti* var. *hyænæ*, and *Sabella pavonia* var. *bicoronata* are hitherto undescribed: while of the former, one—*Dasychone herdmani*—is new to science; three are new to British waters, viz. :—*Polynoë (Lagisca) extenuata*, *Autolytus alexandri*, and *Ampharete grubei*; and 39 have been found for the first time in this district. Of these the most important are *Polynoë castanea*, *P. johnstoni*, *Halosydna gelatinosa*, *Hermadion pellucidum*, *Sthenelais boa* and *S. limicola*, *Spinther oniscoides*, *Eunice harassii*, *Onuphis conchilega*, *Nereis virens*, *Syllis tubifex*, *Psamathe fusca*, *Castalia punctata*, *Phyllodoce maculata*, *Glycera goësi*, *Ammotrypane aulogaster*, *Capitella capitata*, *Nicomache lumbricalis*, *Axiothea catenata*, *Scoloplos armiger*, *Cirratulus tentaculatus*, *Nerine cirratulus*, *Amphitrite figulus*, *Nicolea venustula*, *Amphicora fabricia*, and *Serpula reversa*. Species recorded for the first time in this district are prefixed by an asterisk, thus:—\**S. boa*. At the end a table is given showing the world-distribution of local species side by side with details of the distribution of these forms in our own area. The bathymetrical range is also supplied so far as the often scanty data permit of. I fear the details of distribution outside our local area are not so complete as could be wished—several memoirs being out of my reach for consultation. However, so little has been done in the way of tabulating records of distribution that I venture to think that the present may prove useful to students of the group.

From my observations on the vertical range of local Annelids, I would divide them under three heads—(a) littoral forms, (b) deep water forms, i.e., ranging down-

wards from low water mark, and (c) species extending from the littoral to considerable depths, i.e., indefinite. The following short list embodies these observations.

LITTORAL.	DEEP WATER.	INDEFINITE.
	Hermioninæ	
* <i>Polynoë imbricata</i>	<i>Polynoë haliceti</i>	<i>Polynoë propinqua</i>
	„ <i>castanea</i>	„ <i>impar</i>
	„ <i>lunulata</i>	
	„ <i>johnstoni</i>	
	<i>Acholoë astericola</i>	<i>Nychia cirrosa</i>
	<i>Hermadion assimile</i>	<i>Lep. squamatus</i>
	„ <i>pellucidum</i>	
<i>Sthenelais boa</i>	<i>Sthenelais limicola</i>	
	<i>Spinther oniscoides</i>	
	Eunicinæ	Nereidæ generally
	Lumbrinerinæ	
	<i>Nephtys cæca</i>	<i>Nephtys hombergi</i>
<i>Psamathe fusca</i>	<i>Castalia punctata</i>	<i>Ephesia gracilis</i>
* <i>Eulalia viridis</i>		
<i>Capitella capitata</i>	<i>Ophelia limacina</i>	
<i>Arenicola marina</i>	<i>Ammotry. aulogaster</i>	<i>Scoloplos armiger</i>
<i>Axiothea catenata</i>		<i>Owenia filiformis</i>
Cirratulidæ		Chlorhæmidæ
Spionidæ		Terebellidæ
<i>Sabellaria alveolata</i>	<i>Sub. spinulosa</i>	
		<i>Sabella pavonia</i>
	<i>Filigrana implexa</i>	
	<i>Serpula vermicularis</i>	<i>Pomatoc. triqueter</i>
<i>Spirorbis borealis</i>	<i>Spirorbis lucidus</i>	

Although I put the foregoing forward provisionally, I believe it to be accurate in the main, and I would draw attention to the graphic manner in which it depicts the

\* Occasionally found in deep water.

fact that where a species has (in the same district) one nearly related form only, the one is nearly always found to be littoral, the other to belong to deep water. It was only very gradually as I gained in familiarity with annelid life that there dawned upon me the full significance of the fact that every organism occupies its own particular niche in nature. It was as though a key to nature had been placed in my hands. For instance, in this district *Sthenelais boa* lives under stones between tide-marks; its near neighbour *S. limicola*, characterised by but very minute though constant differences, invariably frequents deep water. *Sabellaria alveolata* is littoral; *S. spinulosa* is always dredged. *Polynoë castanea* is only met with among the spines of *Spatangus purpureus*, *Acholoë astericola* never elsewhere than in the ambulacral groove of *Astropecten*. *Nereis virens* burrows in boulder clay, while its congener *N. fucata* lives commensally with Hermit-crabs (*Pagurus*).

A few notes on embryology will be found under the names of several species. Those on the development of *Arenicola marina* are of the greatest interest, as they deal with points hitherto undescribed.

The following numbers and letters will be employed to indicate the stations where the species were collected, viz. :—

#### SHORE COLLECTING.

- S. Southport and Formby (sand)
- E. Egremont (sand, clay and stones)
- N.B. New Brighton and Leasowe (sand)
- H. Hilbre Island (sandstone)
- L. Lavan sands, Bangor (mud and stones)
- B. Beaumaris (mud and stones)
- P. Puffin Island (limestone)
- M. Port Erin, Isle of Man (Schist)
- Mp. Peel, Isle of Man (Schist)

## DREDGINGS.

- |  |     |   |              |
|--|-----|---|--------------|
| 1. Mouth of Mersey (sand)                | -   | - | 1—8 fathoms. |
| 2. Mouth of Dee (sand)                   | -   | - | 1—9 „        |
| 3. Colwyn Bay                            | -   | - | 3—5 „        |
| 4. Turbot Hole, Beaumaris Bay            | -   |   | 14 „         |
| 5. Menai Straits                         | -   | - | 5—10 „       |
| 6. Off Puffin Island                     | -   | - | 5—7 „        |
| 7. Off N.E. Coast of Anglesey            |     | - | 10—16 „      |
| 8. Off N.                                | „   | „ | 16—20 „      |
| 9. 20 miles N.W. of Holyhead             | -   | - | 45—57 „      |
| 10. Off S.W. coast of Holy Id., Anglesey |     |   | 16—18 „      |
| 11. W. and S.W. of Port Erin             | -   | - | 15—18 „      |
| 12. 25 miles N.W. of Bar Lightship,      |     | - | 20—22 „      |
| (“ Spindrift ” cruise, 12 July, 1890).   |     |   |              |
| 13.                                      | do. |   | do.          |
| (“ Spindrift ” cruise, 27 Sept., 1890).  |     |   |              |
| 14. 20 miles S.E. of I. of Man           | -   | - | 20—25 „      |
| (“ Weathercock ” cruise, 28 Aug., 1886). |     |   |              |

Stations 12, 13 and 14 proved the most productive in results; stations 1 and 2 the most meagre.

## Section I.—ERRANTIA.

## Family.—APHRODITIDÆ.

## Sub-Family.—HERMIONINÆ.

*Aphrodita aculeata*, Linn.

Stations:—1, 6, 7, 8, 10, 13, 14. (From low water to 40 fms.)

This worm is generally obtained from ground of a sandy or muddy character, thus differing markedly in habit from the closely allied species *Hermione hystrix* which I have found to prefer rougher surroundings—shell-debris, gravel and the like. As is the case with so many of the Hermioninæ *A. aculeata* has a very considerable deep water range. A specimen was brought up from a depth of 530

fathoms from oozy bottom in the Farøe Channel, "Knight Errant" expedition, 1880.\*

*Hermione hystrix*, (Savigny).†

Stations:—8, 10, 11, 14 (15—40 fms.). Never found in this district in purely sandy or muddy localities.

Sub-Family.—POLYNOINÆ.

The genera of this division stand greatly in need of revision. Since Malmgren's publication in 1865 of his valuable *Nordiska Hafs-Annulater*, with the erection therein made of many new genera, there has been great confusion and changing of boundaries. Indeed when a new species turned up, it was almost certain not to fit with any of Malmgren's narrow generic definitions, and consequently had to have a brand new genus formed for its special reception. In my belief, Malmgren, misled by his great capacity for perceiving minute differences, attached too much generic value to what were often altogether secondary divergences—the result being that he erected a host of needless new genera. To this class, I am of opinion, belong the genera *Lagisca*, *Harmothoë*, *Evarne*, and *Lænilla*. All are characterized by the possession of 15 pairs of elytra, stout notopodial setæ, and bidentate apex to the setæ of the neuropodium.‡ These I have placed

\* M'Intosh, "Challenger" Report, p. 34.

† Brackets round author's name signifies that the generic designation of the species is different to that originally used by said author.

‡ As Moquin-Tandon remarks (Claus "Traité de Zoologie"), great confusion reigns in the nomenclature of the appendages of Polychætes, and as a guide I now append the following list of synonyms:—

HUXLEY.	M'INTOSH & MALMGREN.	GRUBE.
Parapodium	= Foot	
Neuropodium	= Ventral branch of the foot	
Notopodium	= Dorsal Branch of the foot	
Præstomial tentacle	= Tentacle	= Unpaired tentacle
Superior præstomial cirri	= Antennæ	= Middle tentacles
Inferior „ „	= Palpi	= Lateral „
Peristomial cirri	= Tentacular cirri	= Tentacular cirri



together in the old genus *Polynoë*, together with Johnston's *Polynoë scolopendrina* which however might perhaps with advantage be removed to a separate genus.

COMMENSALISM. This favourite habit of the Polynoïnæ is well illustrated in the following pages. To summarize the local facts on this point we have *Nychia cirrosa* and *Polynoë setosissima* living in the tube of *Chaetopterus insignis*; *Polynoë castanea* upon the test of *Spatangus purpureus*; *P. lunulata* and *Acholoë astericola* in the ambulacral groove of *Astropecten irregularis*; *P. johnstoni* in the tube of *Thelepus cincinnatus*; *Hermadion assimile* close to the mouth of *Echinus esculentus*, and finally the nearly allied species *H. pellucidum* has been found upon three different kinds of star-fishes.

*Lepidonotus squamatus*, (Linn.).

Stations:—6, 7, 8, 10, 12, 13, 14; H, P, M. (From between tide marks to 22 fms).

This widely distributed form is more frequently found in deep water than *Polynoë propinqua*. The most prolific ground was in 18—20 fathoms, Porthwen Bay, Anglesey, where a large number were dredged. These were of a greater size than any elsewhere procured, and the largest were very strongly marked on the elytra. Many of the warts towards the postero-internal direction were filled with very conspicuous black pigment.

*Nychia cirrosa*, (Pallas).

Hab: B, 5, 7. Low water of spring tides to 18 fms.; sometimes commensal with *Chaetopterus insignis* and *Thelepus cincinnatus*.

Malmgren (*loc. cit.*) was the first authority to recognise this to be an undoubted British species. He found that certain British Museum specimens named *Lepidonotus cirratus* v. *parasiticus*, W. Baird, and hailing from Beaumaris, N. Wales, in the majority of cases belonged

in reality to Pallas' *Aph. cirrosa*, the remainder pertaining to *P. setosissima*, Sav. (*Lænilla glabra*, Mgrn.). Both species had been found living commensal within the tubes of *Chætopterus insignis*, Baird. Curiously enough, the first example I obtained was dredged from 5 fathoms in the Menai Straits within a few miles of the spot whence came Baird's specimens in 1864. It came up from ground covered with the valves of dead mussels, and when first noticed it was crawling from the broken end of a *Terebella* tube, probably *Thelepus cincinnatus*—thus denoting a wider range of its commensal habit. The *Iphione muricata* of Mr. Gibson's report is this species, as I can certify from an examination of the original very fine specimen now in the Zoological Museum of University College, Liverpool.

*Polynoë (Harmothoë) imbricata*, (Linn.).

Hab: G, P. M, Mp, under stones. Abundant at low water.

But few of my specimens were dredged, and these were from shallow water; the great majority were shore collected. Hj. Théel however records dredging it as deep as 80—100 metres.\* The species is predominant and exceedingly abundant under stones on the south side of Port Erin Bay, attracted and provisioned—directly or indirectly—by the large quantity of fishing refuse present at the quay. In colouration of the elytra *P. imbricata* is the most variable of our Polynoinæ—from black and blue-black it grades to grey and light rose. Usually the colouration is more or less over the whole surface of the elytron, but sometimes it is restricted to the inner third or half of each elytron leaving the outer portion colourless. Several Puffin Island specimens and others from Port Erin with this peculiar marking are especially beautiful. The inner black margins of the elytra to the eye appear to coalesce and thus give the animals the appearance of having

\* "Les Ann. polych. des Mers de la N. Zemble." 1879.

a black band extending medianly from head to tail, being edged with a pale uncoloured margin on either side.

Theel is correct in saying that only the largest individuals possess on the scales any notable rounded processes and I cannot imagine how so able a naturalist as Möbius could for a moment confound the species in question with *P. impar*. Indeed the globosely tuberculated elytra of *P. imbricata* approach much more closely to those of *P. propinqua*, but otherwise the differences between these two are striking. (Pl. XIII, fig. 2).

*Polynoë (Harmothoë) halieti*, (M'Intosh), var. *hyæne*, n.

Hab: Port Erin, Isle of Man, 15 fms.

The specimens described by Mr. Gibson (*loc. cit.*) unfortunately wanted the scales, but in one recently obtained ("Hyæna" cruise of Easter, 1889) a few scales were present. These differ considerably from Professor M'Intosh's description.\* Instead of the margin being "quite smooth throughout," it is densely fimbriated after the manner seen in *Lepidonotus squamatus* otherwise they agreed closely with the characters given. (Pl. XIII, fig. 5).

\**Polynoë (Evarne) impar*, Johnston.

Hab: 10, 12, S, H, L, P. From littoral to 22 fms.

The number of large pear shaped tubercles on the margin of the scales varies greatly, but few have so many as Malmgren gives in his figure. Many have only one very large one, others none whatever, while again a few of the largest approach Malmgren's engraving—having 3, 4, 5, and 6 tubercles. The number varies even on adjacent scales of the same individual some with none, others overlapping these with one or more. A number of the largest of these remarkable processes are made even more so by the presence on the broad summit of numer-

\* "Challenger" Report, p. 96.

ous tiny spines, (Pl. XIII, fig. 6). The inferior cirrus is shortly and sparsely ciliated, not smooth as represented in Malmgren's plate. The largest specimens were from Southport—33 mm. long—and in these the bristle bearing segments sometimes reached 37. Malmgren gives 34—35 for the oldest. Notopodial seta, Pl. XIII, fig. 3.

\* *Polynoë (Lagisca) extenuata*, Grube.

Hab: Port Erin, Puffin Id., and Colwyn Bay; under stones.

A single specimen was found at each of the above localities. This is the first record of its occurrence in British seas. Superficially it has considerable resemblance to *Polynoë (Evarne) impar*. The serration of the dorsal bristles is however distinctly finer. (Pl. XIII, fig. 4). The bristles are nearly colourless and without the brilliant golden hue so noticeable in those of the last-named species. The tips of the ventral bristles are very characteristic and reliable, especially among the strongly bifid superior bristles of the bundle. Their angle of incision is formed by nearly straight lines, wherein it differs from what is seen in *P. imbricata*, *impar* and *propinqua*, where the angle is made by curved lines. The upper median ones, however, possess curved bifid apices, while the inferior bristles show curved entire tips. These specimens agree closely with the plates in Marenzeller's "*Zur Kenntniss der Adriatische Anneliden*" except in one point in the structure of the scale. In mine, the surface of the scale is mapped out into a large number of separate areas, each containing usually several papillæ, giving the appearance of a line having been drawn around every three or four papillæ, thus forming the latter into groups (see Pl. XIII, fig. 8). All the specimens show this very peculiar marking, which is not to be found in Marenzeller's figures.

This species must be classed close to *P. impar* and *P.*

*propinqua*, between which it is intermediate in many respects.

*Polynoë (Lagisca) propinqua*, (Malmgren).

Hab: 6, 8, 9, 12, 13, S, P, M, and Mp. Abundant from mid-tide to 57 fms. Beneath stones and in rock cavities.

This species, which Malmgren constituted to receive a single individual received from Bohus, and which M'Intosh has sometimes found in the debris of fishing boats at St. Andrews, is here one of the most constant and abundant of the Polynoïnæ—present at the greatest depth yet dredged in our local area viz:—45-57 fathoms, 20 miles N.W. of Holyhead, ("Spindrift" cruise, 20 July, 1889), as well as being taken in profusion on the rocky shores of Puffin Island, Hilbre Island and the Isle of Man. At Puffin Island it is especially plentiful and is undoubtedly the characteristic Polynoë of the island.

Malmgren's figures absolutely tally with the majority of my specimens. A few deviate in that the outer edges of the elytra bear a few weak and inconspicuous cilia, and occasionally some of the smallest show none of the characteristic globose processes on the elytron edge. (Pl. XIII, fig. 7). In colour, as in most other points, my specimens agree closely with Malmgren's, while differing markedly from that described by M'Intosh from St. Andrews (Trans. Zool. Soc., vol. IX, p. 375).

The structure of the bristles is identical with that of those belonging to *Polynoë floccosa* as figured by M'Intosh. Were it not that all the specimens examined possess 15 pairs of elytra, the margins of which are unfurnished with aught save a row of sub-globular processes, in contrast with the more numerous and ciliate elytra of *P. floccosa* I should incline to unite the two species. (Pl. XIII, fig. 1 and 9).

*Polynoë (Lænilla) setosissima*, Savigny.

Hab: Beaumaris. Low water mark, commensal with *Chaetopterus insignis*, Baird.

Ray Lankester\* records it under the name of *Harmothoë malmgreni* living with the same host on the shores of Herm, one of the Channel Islands. His remark anent its commensalism—"It appears to be only met with in this habitat" I am able to confirm, as under the guidance of my good friend Mr. J. Sinel, of Jersey, I have dug up in Herm a number of *Chaetopteri* and have found this *Polynoë* invariably present. It is the *L. glabra* of Malmgren.

\* *Polynoë (Malmgrenia) castanea*, (M'Intosh).

Hab: 7, 12, 13 in 20-22 fms. Commensal with *Spatangus purpureus*.

Every living *Spatangus* I have examined—and this Echinoderm was several times dredged in considerable numbers on the "Spindrift" cruises 1890—has had one of these worms clinging to the test close to the mouth. All Prof. M'Intosh's examples were obtained from the same host. The curious fact noted in the first Report on the Vermes by Mr. Gibson† of finding this worm in the ambulacral groove of *Astropecten* turns out to be erroneous—for having occasion to refer to Mr. Gibson's specimen, I discovered it to be the ordinary *Acholoë astericola*, which Carrington recorded long ago as a common guest of the starfish named. This species is very unlike *P. castanea*.

*Polynoë floccosa*, Savigny.

Hab: The South of the Isle of Man.

I give this as a member of our local fauna on Mr. Gibson's authority. I have searched long and carefully for it without success. Prof. Ray Lankester observes that in the Channel Islands this form—his *H. sarniensis*—seems

\* "On New Brit. Polynoina." Trans. Linn. Soc. vol. xxv.

† Fauna of Liverpool Bay, p. 149.

to take the place of *P. imbricata* so common in more northern localities.

*Polynoë (Harmothoë) lunulata*, Delle Chiaje.

Hab: Southport.

Found in company with *P. astericola* D.Ch., occupying the ambulacral grooves of *Astropecten irregularis* cast ashore by storms.

\* *Polynoë johnstoni*, Marenzeller.

Hab: 8, 10 (numerous).

During the "Hyæna" expedition, Whitsuntide, 1890, nearly every haul of the dredge (12-20 fathoms) off the S.W. coast of Holy Island, Anglesey, brought up at least one specimen of this Polynoë. In one case, an individual emerged from an inhabited tube of *Thelepus cincinnatus*, suggesting another instance of the habit of commensalism so frequently noticed among the Polynoina. Quatrefages was the first to point out the presence of certain differences between Johnston's and Savigny's *P. scolopendrina*. Subsequently Marenzeller (*loc. cit.*) gave this belief definite form, by separating the two and giving separate diagnoses of each thus:—

*P. scolopendrina*, Savigny. Tentacle much shorter than the palps. The tentacular cirri longer than the palps. No wart-like tubercles projecting from the dorsum of the segments.

*P. johnstoni* (the *P. scolopendrina* of Johnston, Malmgren and M'Intosh.) The tentacle longer than the palps. The tentacular cirri shorter than the palps. Three wart-like tubercles on the dorsal aspect of each segment.

*Acholoë astericola*, (Delle Chiaje).

Hab:—Southport, and 6 m. N. of Gt. Ormes Head 14 fms.

I have to thank Dr. G. W. Chaster, of Southport, for a number of specimens of this interesting annelid which, together with *P. lunulata*, he procured in the above

named locality from the ambulacral grooves of *Astropecten irregularis* cast upon the beach. This worm ranges from the Mediterranean to Galway in Ireland. At Naples, Claparède found it in company with *Ophiodromus flexuosus* on *Astropecten aurantiacus*, while *A. aurantiacus*, *bispinosus*, *platyacanthus* and *pentacanthus* from Trieste all furnished to Marenzeller (*loc. cit.*) the same two guests.

Examples of this worm were identified as *M. castanea* by Mr. Gibson in his "Report on the Vermes" of this district. I note that in the "Challenger" Report the generic name is spelled *Achloë*.

\* *Halosydna (Alentia) gelatinosa*, (Sars).

A very large specimen was found under a stone at extreme low water at Puffin Island, October, 1887. It measured  $6\frac{1}{2}$  cm. by 16 mm. (including the bristles).

*Hermadion assimile*, M'Intosh.

Hab: 12 (21 fms.) and 11 (10 fms.).

One small specimen was found crawling among the spines of an *Echinus esculentus* dredged from 21 fathoms in the Irish Sea, 25 miles N.W. of Liverpool Bar, and Mr. Gibson recorded two from the same host dredged near Port Erin.

\* *Hermadion pellucidum*, (Ehlers).

Hab: 6, 10, 12, 13, (16-22 fms.)

This species was taken for the first time locally at Station 12, ("Spindrift," September, 1890), when three small specimens were dredged. All were commensal with Echinoderms. One was in the ambulacral groove of *Astropecten irregularis*; another upon *Solaster papposa* and the third was upon a brittle-star—*Ophiothrix rosula*. Marenzeller (*loc. cit.*) speaks of obtaining a specimen from *Ophiothrix alopecurus* from the Bay of Muggia, near Trieste.

One of these specimens was perhaps the most beautiful



*Polynoë* I have ever met with. Each of the pellucid body scales had on the hinder margin a crescent of orange-hued pigment, varied on the two head scales by the orange margin being carried completely round as a resplendent girdle.

Sub-family.—SIGALIONINÆ.

\* *Sthenelais boa*, (Johnston).

Hab : P, M, Mp, under stones from mid-tide to low-water.

Malmgren (*loc. cit.*) stated his belief that Rathke's *S. idunæ* is synonymous with Johnston's *S. boa*, a view with which I unreservedly concur. He, however, in his list of synonyms, gives Cat. Br. Mus. 1865 as date of Johnston's name, and omits reference to the British author's prior description and naming of the species in question, viz: 1833, in Loudon's Mag. of Nat. Hist. In this way Rathke's nomenclature, dating from 1843, is wrongly given priority and I gladly follow Prof. M'Intosh's lead in the retention of our countryman's title.

*S. boa* is in this district essentially a shore species. I have never taken it in the dredge but always littoral. The nearly related species *S. limicola* on the other hand is characteristic of a lower zone, being invariably obtained by dredging. The fact that in "Invert. Fauna of St. Andrew's" M'Intosh notes that storms cast up abundance of the latter species, and gives the habitat of *S. boa* as between tide mark would point to this limitation of vertical range as a constant feature.

\* *Sthenelais limicola*, Ehlers.

Hab : 12, 13.

As noted all specimens without exception were taken in the dredge, at depths varying from 18-22 fathoms. The present is the first recorded instance of the occurrence of either the present or the preceding species in this district.

*Sthenelais zetlandica*, M'Intosh.

The mutilated fragment mentioned by Mr. Gibson\* as dredged from 20 fathoms off Port Erin remains without successors.

*Pholoë minuta*, (Fabricius).

Dredged, Whitsuntide, 1890, in Menai Straits. Car-  
rington records it as rare at Southport.

Webster and Benedict† record it from Massachusetts, U.S.A. and it has an exceedingly wide range within the Arctic circle. This is an interesting form, as through the structure of its falcate compound setæ it hints at the not distant relationship of the Syllidæ with the Polynoidæ.

Family. APHINOMIDÆ.

Sub-Family.—HIPPOINÆ.

\**Spinther oniscoides*, Johnston.

Six specimens of the usual yellow hue were dredged during the "Hyæna" cruise, Whitsuntide, 1890, from about 17 fathoms, off Holy Island, Anglesey. As they were picked from off the yellow hydroid *Antennularia ramosa* and also from the yellow *Halichondria panicea*—to both of which they assimilate absolutely in colouring—they furnish another addition to the long list that is accumulating of protectively coloured animals.

Family.—EUNICIDÆ.

Sub-Family.—EUNICINÆ.

\**Eunice harassii*, Au. and M. Ed.

Hab: 12. Dredged from 21 fms.

I refer this single specimen to the above species with some hesitation as in the spirit preparation the characteristic spots on the dorsum do not show, and again the filaments to the largest branchiæ are more numerous—(20)—than is given in previous diagnoses of this species.

Report on Vermes, Fauna Liverpool Bay, Vol. i.

† Annel. Chaet. from Princetown, &c., 1884.

To facilitate future reference, a figure is given of the branchia pertaining to the 21st setigerous somite. (Pl. XIII, fig. 10).

\**Onuphis (Northia) conchilega*, Sars.

Great numbers of this widely distributed worm were taken on the "Spindrift" cruise (September 27th, 1890), 25 miles N.W. of Liverpool Bar—depth, 21 fathoms—for the first time in this district. The animals are very irritable when expelled from their homes; breaking into fragments at once. The anterior part of the body is firm; the middle and posterior soft and indefinite. The scabbard shaped tubes which *O. conchilega* constructs bears some analogy to the stick or stone encrusted tubes of the larvæ of the caddis-fly. Like the latter, they are unattached to any fixed object and can be dragged from place to place by their owners, who can turn themselves if they please in the tube. All sorts of shell fragments and bits of echinid tests are requisitioned and fitted into place. When we remember the diversity in shape and size of the material and that when completed neither are the edges of adjoining fragments allowed to overlap, nor are any unarmoured spaces left in the tough membranous tissue forming the framework of the tube we must concede a considerable amount of ingenuity and skill to *Onuphis conchilega*. Such a tube is protective both by reason of its strength and great relative size as compared with the worm itself and also on account of the admirable way in which it assimilates to the general appearance of the sea-bottom where it is found.

M'Intosh in the "Challenger" Report (where he uses the form *Nothria* for *Northia* as the name of this genus) says—"The Onuphididæ are distinguished from the Eunicidæ by their bathymetrical distribution for while the latter are often found between tide-marks, the Onuphididæ

are characteristic of deep water, many of them ranging to very great depths. Even in our own seas they frequent the deeper waters of the coralline ground." None of the "Challenger" series came from a less depth than 100 fathoms, and only one at that. Two came from 2225 fathoms.

Sub-Family.—LUMBRICONEREINÆ.

*Lumbriconereis fragilis*, O. F. Müller.

Hab: 12—13; from 20—22 fms.

True to name this beautiful iridescent annelid broke into pieces immediately on capture on the only two occasions on which I was fortunate enough to procure it. There is no doubt in my mind that this is a habit acquired and practised with the aim to save its existence when seized by enemies, as I noticed that the pieces broken off were in both cases short lengths from the posterior end. The piece left with the head was by far the longest and probably sufficient to start life afresh with had the animal escaped capture.

Family.—NEREIDÆ.

*Nereis pelagica*, L.

Hab: 13, H, P, M, Mp.

Met with at all depths and on rocky or stony ground, with as high a vertical range as *Arenicola* displays on a sandy or muddy shore.

\**Nereis (Hediste) diversicolor*, Müller.

Hab: S, 2.

A large number were found burrowing in the peat at Hightown at the mouth of the Mersey.

*Nereis (Leontis) dumerilii*, Aud. and M. Edw.

Hab: E, P, M, 6, 7, 8 (numerous).

Specimens of this worm are frequently obtained lying in cocoon-like structures composed of hardened grey mucus, often with foreign bodies attached to the outside.

In one case, an individual had seized upon a shore blown beech leaf, constructing on its surface a mucus tunnel in which it lay hid—very similar in appearance to the cocoons of many insects. A species of pycnogonid is frequently found parasitic (?) clinging to the outside of these mucus tubes.

*Nereis (Nereilepas) fucata*, (Savigny).

Hab: 4, 8, 10, 11, S, M, Mp.

The *Nereis bilineata* of Carrington. It is frequently met with in dead *Fusus* and whelk shells. Also in about 90% of such shells which have been taken possession of by Hermit-crabs (*Pagurus*). If a shell containing one of these strangely assorted couples be watched in an aquarium, the forepart of the worm's body will be seen to emerge slowly from the interior depths and sway gently from side to side, above the back of the crab, surveying keenly the environment. The fellow-lodgers together dwell in amity, though what the mutual relationship existing between the two is I have never seen explained. My own opinion—seeing how often the worms occupy otherwise uninhabited shells—is that *Nereis fucata* is the first tenant and that it tolerates the intrusion of the Hermit-crab chiefly because it can easily steal morsels of the plentiful supply of food which the latter can generally manage to procure. Besides the *Pagurus* furnishes means of locomotion unattended with danger, and his presence in the mouth of the shell prevents other intruders who might be unwelcome from getting entrance. The Hermit-crab on the other hand, I believe, derives no benefit from the partnership and takes no notice of the worm as long experience has taught him that he cannot dislodge the latter, who occupies the coign of vantage, possesses superior agility and a pair of stout mandibles. Indeed the worm can easily turn the Hermit out if so disposed,

*N. fucata* is sometimes taken free. Such specimens, as well as those forcibly taken from their refuge in shells, display a very peculiar mode of swimming. Turning on their side they assume the outline of an S much drawn out, and move through the water with a gentle undulating shivering motion with a weakness suggesting want of training, and without any of the vigorous lashing seen in *Nephtys* and in *Nereis virens*, *N. pelagica*, &c. These latter swim upon the ventral surface of the body. Used for bait sometimes by the Manx fishermen.

\* *Nereis (Alitta) virens*, Sars.

Hab: E, NB.

Abundant between tide-marks along the Mersey shore from Egremont to New Brighton, burrowing in patches of very stony boulder clay. Its extensive burrows are mucus lined. This mucus is secreted by enormous numbers of tubules found along the dorsum and in the lobes of the feet, especially in the great leaf-like upper lobe of the notopodium, the so-called "branchia" of Kinberg. This lobe seems pre-eminently modified to act as a great secretive organ, its great expanse and lamellar form giving the maximum of available surface while occupying the minimum of room. Each is richly supplied with blood vessels and its substance is crowded with masses of tubuli opening on the surface. The cirri (dorsal and ventral) contain no tubules. Immense quantity of mucus is thrown off very rapidly after capture, so filthy and dense that it is difficult to make out the presence of the worms at all.

*N. virens* (the *N. Yankiana* of Quatrefages) is the most esteemed of bait worms in this district. The fishermen have given it the name of "Creeper."

## Family.—NEPHTHYDÆ.

\* *Nephtlys cæca*, (Fabr.).

Hab: "Hyæna" and "Despatch" expeditions, 1886.

In this district much less common than *N. hombergi*. Its range is also more restricted than the latter, having been taken only by the dredge.

*Nephtlys hombergi*, Aud. and M. Edw.

Hab: S, E, NB, L, 3, 6, 10, 13, "Despatch" exped., 1886.

The characteristic *Nephtlys* of the Irish Sea, common along the N. Welsh, English and Scottish coasts bordering this basin, wherever sand occurs. Together with this constancy on all our shores it possesses a wide bathymetrical range, having been taken frequently with the dredge at varying depths. Thecate Infusoria are frequently met with parasitic upon the bristles. This is the *N. assimilis* of Malmgren and *N. longisetosa* of Oersted.

## Family.—GLYCERIDÆ.

*Glycera capitata*, Oersted.

Hab: P, S, 10. The *G. alba* of previous local lists.

\* *Glycera nigripes*, Johnston.

Hab: Puffin Island; 5 fathoms.

\* *Glycera dubia*, Blainville.

I have several times found traces of a large species—referred provisionally to *G. dubia*—within the stomachs of Cod. The length would be nearly six inches and the four stout black teeth present within each were of corresponding size.

\* *Glycera goësi*, Mgrn.

Hab: B, 10; common.

## Family.—SYLLIDÆ.

\* *Syllis (Eusyllis) tubifex*, Gosse.

Hab: 3, 12, 13, 10, 6.

Common in dredged material 3 to 21 fms.

*Syllis armillaris*, (O. F. Müller).

Found at low water Puffin Island, August, 1889.

Specific characters:—Dorsal cirri quite short, of 8—10 joints. Setæ falcate with entire apex. Two more or less interrupted transverse markings on the dorsum of each segment.

\* *Autolytus alexandri*, Malmgren.

Hab: Tow-netted off Puffin Island.

A single specimen, a male as shown by possessing the curious forked palps characteristic, as Verrill remarks, of the sex in this genus. The anterior falcate setæ-bearing segments numbered 14. The dorsal cirri were somewhat shorter than depicted by Verrill\* Length of body 12·5 mm.

This species has not before been recorded from British waters.

*Autolytus prolifer*, (O. F. Müller).

Recorded by Carrington as abundant at Southport.

*Ephesia gracilis*, H. Rathke.

Hab: S, P, 12, 14.

This aberrant annelid is not uncommon under stones at low water mark at Puffin Island. It is the *Sphærodorum flavum* of Oersted and the *Pollicita peripatus* of Johnston and Carrington.

Family.—HESIONIDÆ.

\* *Psamathe fusca*, Johnston.

Hab: Puffin Id., and Lavan sands, Bangor: under stones.

Two large specimens. The feet are uniramous, with compound bristles.

\* *Castalia punctata*, (Müller).

Dredged off Anglesey, Whitsuntide, 1890.

The foot is biramous, the notopodial setæ being simple, the neuropodial compound, thus sharply marking the animal off from the preceding.

\* New England Annelida, 1881.



## Family.—PHYLLODOCIDÆ.

\* *Phyllodoce maculata*, (●. F. Müller).

Hab: Egremont, under stones in clay, near low water mark, and dredged of S. W. coast of Anglesey.

Malmgren's exclusion of Johnston's *P. maculata* is, I believe, incorrect. Many of the latter author's figures are very poorly drawn and in the case in question the figure does not agree with the letterpress, the markings on the back being represented while the dot on each lamellar process of the feet is omitted. I can easily reconcile my specimens with both author's figures and descriptions. Length 3.5 cm.

*Phyllodoce laminosa*, Sav.

Hab: P and M. Under stones, Laminarian zone.

Of a most lovely delicate yellow-tinged green in life. It is able to secrete very great quantities of mucus—from the large leaf-like lobes of the feet as in *Nereis virens*—which in spirit becomes very tough, enveloping and binding together the body and feet as in a web.

*Eulalia viridis*, (Müller).

Hab: P, M, Mp. Over the entire tidal zone.

This bright, dark grass-green *Phyllodoce* is unquestionably the characteristic errant annelid of Puffin Island, finding in the weathered and molluscan bored (*Saxicava rugosa*, L.) cavities and tunnels of the limestone rocks and boulders, the perfection of sheltering places always at hand to which to retreat on sign or suspicion of danger.

From my observations of annelid life characteristic of localities having different geological formations, I arrive at the inference that this species can appear in great abundance only in spots where its environment provides innumerable retreats always open. The honeycombed surface of limestone rocks answers such requirements admirably, and in this district such spots—of which

Puffin Island is typical—are homes of *Eulalia viridis*. The only other rock surroundings where I have found this species in any number was on rock surfaces encrusted with large *Balani* shells, many of which being dead and empty formed fairly good hiding places.

I cannot think that its bright green colour is in any way mimetic and protective as has been suggested. For it is most numerous on brown *Fucus*-covered rocks where green algæ are conspicuous by their absence. Besides its activity is incessant, and this alone prevents its enemies passing it unnoticed. Protectively coloured animals as far as I know, are usually sluggish in their movements, as for instance *Porcellana platycheles* as noted by Professor Herdman.

Family.—TOMOPTERIDÆ.

*Tomopteris onisciformis*, Esch.

Tow-netted off Puffin Island and Port Erin.

Section.—SEDENTARIA.

Family.—●PHELIADÆ.

\* *Ophelia limacina*, Rathke.

Hab: "Despatch" expedition, 1886, from 18 fms.

The dredge, during this expedition ("central area") brought up two individuals—the only ones I have been able to obtain in this district, although the species is not uncommon in the stomachs of Cod.

\* *Ammotrypane aulogaster*, H. Rathke.

Hab: 3, 6, 12. Dredged from 3—21 fms.

To judge by the great number of examples dredged at each of the above stations, this worm seems to be very plentiful in our local area. The great majority were collected in May, and these were in all cases minute, not exceeding 4 mm. in length.

## Family.—CAPITELLIDÆ.

\* *Capitella capitata*, (Fabr.).

Hab : Port Erin, and Lavan sands, Bangor.

Very numerous amid decaying *Fucus* under overturned boulders.

## Family.—TELETHUSIDÆ.

*Arenicola marina*, (Linn.).

Hab : S, E, NB, H, L, B, P, M, Mp.

Abundant everywhere, between tide marks wherever a patch of sand or mud occurs.

NOTE on the Embryology of *Arenicola* and *Scoloplos*  
(Plate XIV.)

Max Schultze in 1856 (*Entwicklung von Arenicola*) described certain egg-masses and embryos found on the Cuxhaven shore as belonging to *Arenicola*. In 1887 Cunningham and Ramage figured and described identical embryos in the Trans. Roy. Soc. of Edinburgh, Vol. XXXIII, part 3, (*Polychæta Sedentaria* of the Firth of Forth), but in the text they point to certain facts, chiefly connected with characteristics of form in the larvæ, which inclined them to believe that the parent was in reality *Scoloplos armiger* and not *Arenicola* as Schultze averred. These authors were, however, unable to describe either the embryos or the manner of spawning of *Arenicola*, though they give a sketch of immature ova taken from the body cavity in February. This gap I am fortunate enough to be able to fill up from observations made in 1890–91, and I am also able to confirm in its entirety, Cunningham and Ramage's correction of Schultze.

On 2nd March, 1890, I procured on the sandy beach at Egremont several small pear-shaped brownish egg-masses and a few larger green ones about the size and shape of a large grape. The latter were invariably associated with

*Arenicola* castings, while wherever I found the smaller the worm *Scolopos armiger* was sure to be present. Both kinds of egg-cocoons were anchored in the sand by a gelatinous cylindrical stalk descending some two or three inches into the sand. In the case of the green cocoons the stalk soon became ragged and shredded; in the brown, it continued perfectly cylindrical and entire for most of the distance traced.

I. Development of *Scoloplos*:—The small brown cocoons certainly appertain to this animal, for besides the fact that this worm is always found close to the egg masses—animals examined February 21st contained ova identical with those least developed in the cocoons. The size of the cocoons differed somewhat; the largest being 2 cm. by 1 cm., stalk 10 cm. at least. The later stages of development are well figured by Cunningham and Ramage and also by Schultze, and I have nothing to add to their descriptions. As to the progress of segmentation, hitherto undescribed, the following is a summary of what I have observed:—The ova are 0·25 mm. in diameter. Each shows a very distinct germinal vesicle. Two polar bodies are excluded and following quickly is the division of the vitellus into macromere and micromere (Pl. XIV, fig. 3). The latter very rapidly sub-divides into very small cells which gradually overspread the few large cells derived from the primitive macromere, until finally only a small opening—the blastopore—is left in the enveloping layer of micromeres. Usually the number of derived macromeres is either two or four at the stage of enclosure by the micromeres. These latter are, I believe, not all derived from the primitive micromere, being added to from time to time by small cells fissioned off from certain of the macromeres. (Salensky observed a similar process during his elaborate investigation of the embryology of *Nereis*

*cultrifera* and of *Psygmobranchus protensus*). This being so, it is evident that the primitive micromere in this case contains a part only, of the entire epiblastic material. The cocoons were found at various dates ranging from March 2nd to April 18th. (Pl. XIV, figs. 1—11).

II. Development of *Arenicola marina*:—The ova are deposited in vast numbers within a grape-shaped gelatinous matrix furnished with an anchoring stalk as described. The mass is delicate ulva-green in hue due to the colouration of the contained ova, the matrix being transparent and colourless. In size the masses vary from 2 to 2.5 cm. in length by 1.75 to 2 cm. in breadth. The ova are spherical and 0.08 mm. in diameter. Segmentation is unequal and a cephalotrochous embryo is the result. I was anxious to watch the stages of segmentation but beyond the bare fact noted nothing could be made out, owing to the opacity of the vitellus.

To describe the embryo (Pl. XIV, figs. 12—21):—The first appearance of cilia is in the form of an equatorial zone, and a tuft of long cilia at the anterior pole or apex of what eventually develops into the præoral segment. With the advent of these organs the embryo begins to rotate slowly within the gelatinous matrix of the cocoon; and shortly two reniform pinkish eye-spots appear on opposite sides above the zonal band of cilia: soon after this the embryo become free-swimming. Either upon liberation or it may be a little prior thereto, a ciliated pit—which eventually becomes the mouth—makes its appearance a little behind the zone of cilia, and this again becomes connected with the posterior pole by a band of short cilia. In this advanced stage—the latest I was able to observe—it is noteworthy that what was the apical tuft of cilia in the first stage has changed its position, moving a little distance ventrally; one of the cilia of this tuft has become extremely elongated

while the rest are shortened. When freed from the investing mass of the cocoon, this trochosphere moves through the water with a rotary motion, the long cilium of the anterior tuft conspicuously directed stiffly forwards, and apparently forming a larval sense organ. The most advanced embryos showed a decided lengthening of the body, chiefly of the post-oral part, and the beginning of a constriction a little behind the mouth.

Last year I observed these egg-masses of *Arenicola* about the middle of March, on the Egrement shore; April 4th, at Port Erin, I.O.M., and April 24th, at Hilbre Island. Mr. Sinel, of Jersey, has also sent me specimens gathered in that Island on February 29th. This year, on April 11th, I found large numbers of the usual bright green hue in sandy pools among the sandstone rocks of Hilbre Island associated with numerous castings. I noted on the last mentioned occasion and also in the Isle of Man, that no cocoons were to be seen on the exposed sandy flats, though castings innumerable were there, and in the pools where they were abundant were masses of *Uva* and of *Enteromorpha* to which the cocoons assimilated exactly in colour. On the other hand, the cocoons of *Scolopos* were frequently to be noticed anchored among the bare ripple-furrows of the sand expanses. Now these egg-masses of *Scolopos* are hardly to be distinguished in colour from the muddy sands, the surface of the cocoons becoming so coated with mud that the brownish contents themselves only a little darker than the sands—do not show through.

Family.—MALDANIDÆ.

\**Nicomache lumbicallis*, (Fabr.).

Hab: 10.

Three of the hindmost segments together with the characteristic equally lobed anal funnel, were dredged off

Holy Island, Anglesey, from 16 fathoms. Colour, rosy pink. The two ante-anal segments are without setæ.

\**Axiothea catenata*, Malmgren.

Hab: L.

Immense numbers live in the muddy, evil-smelling sands stretching out from Bangor into the Menai Straits. Cunningham and Ramage aptly remark on the similitude of the projecting ends of their numberless tubes to a miniature forest. A similar ragged appearance on a larger scale is given to the Egremont and New Brighton shore by the exposed ends of *Lanice conchilega* especially when a storm has removed some of the surface sand. Tubes 5—7 inches long and 1—1½ mm. broad. The anal funnel is distinguished from that of the preceding species by the fact that the processes are of unequal length, there being about seven long tapering ones, each separated from its neighbour by from one to three short ones, and instead of two ante-anal segments being without setæ four are naked in the present species.

Family.—AMMOCHARIDÆ.

*Owenia filiiformis*, Del. Chiaje.

Hab: 12, 13, 5, S, L.

Is plentiful at all these stations; but most numerous in the deep water. It ranges from extreme low water mark to 21 fathoms. It is the *Ammochares ottonis* of Grube; and is the worm described by Carrington under the name of *Ops digitata*.

Family.—ARICIDÆ.

\**Scoloplos armiger*, (Müller).

Hab: 1, 2, 6, E, NB, Mp.

A common species in sand from mid-tide mark to 6 fms.

From observations made in the beginning of March, 1890, and April, 1891, upon the egg-cocoons of this worm,

I confirm Cunningham and Ramage's statements and deductions (*loc. cit.*). Max Schültze\* certainly described the eggs and cocoons of *S. armiger* in error for those of *Arenicola marina*. His figures, if we remember them to represent *S. armiger*, are accurate and beautiful. For details of early embryology see notes under *Arenicola marina*, page 249.

Family.—CIRRATULIDÆ.

\**Cirratulus tentaculatus*, (Montagu).

Attains to a large size at Puffin Island, where it is commonly found under stones partly buried in mud near low water mark.

*Cirratulus cirratus*, (Müller).

Hab: P, M.

During Easter, 1890, I collected a large number of small specimens—about  $\frac{3}{4}$ —1 in. in length from narrow clefts in the schist rocks of Port Erin Bay, Isle of Man. The colour varied; very beautiful were a few where the entire body and long branchial filaments were intense black, relieved by the tentacular filaments of the anterior end being milk white.

This species can be distinguished from *C. tentaculatus* among other characteristics by (a) having a transverse series of tentacular filaments on the 1st setigerous somite and not on the 5th and 6th as in *C. tentaculatus*, (b) the lateral filaments are fewer and usually originate at a distance from the bases of the notopodia; in the other form they are more numerous and arise close to bases of notopodia; (c) annulations are much finer on buccal somite in *C. tentaculatus*.

Mr. Gibson enumerates, in this district two species of this family, viz:—*C. borealis*, Lamarck, and *C. cirratus*,

\* Entwick. von *Arenicola piscatorum*, 1856.



O. F. M. In fact, these two names are now accepted by all authorities as synonyms.

\**Chætozone setosa*, Malmgren.

Hab: Egremont, in clay between tide-marks.

Specimens found February 21st, 1891, contained ova quite ripe. An egg mass found on the same spot with these I believe belongs to this species. It was about the size and shape of a pea, of a faint green colour, and was anchored in the sand by means of a cylindrical stalk. The embryos which I was unfortunately unable to examine in detail appeared to be cephalotrochs approaching closely in form to those of *Arenicola*.

Family.—SPIONIDÆ.

Carrington (*loc. cit.*) mentions three species from Southport, viz:—*Spio seticornis*, (Fabricius), *Spio quadricornis*, Lamarck, and *Nerine coniocephala*, Johnston (= *N. foliosa*, Sars), and catalogues *N. vulgaris* as doubtful. I have not had the good fortune to find the second or the third of these, but on the other hand I have procured a number of specimens of *N. cirratulus* which previously has been but once recorded as British (Firth of Forth). I am also able to say with certainty that *N. vulgaris* is included in our local fauna.

*Spio seticornis*, (Fabr.).

Very abundant on the Mersey shore between Egremont and New Brighton—chiefly about or a little above mid-tide level. As half-an-inch of their fragile sand-tubes projects from the surface, their multitude gives some patches of sand quite a ragged appearance.

\**Nerine cirratulus*, (D. Chiaje).

Hab: Egremont (common between tide-marks).

Specimens found 1st March, 1890, were full of elliptical ova exhibiting the peculiar and characteristically marked vitelline membrane described by Claparede (*Chêt. du Golfe*

*de Naples*, 1868). This is so sculptured as to present the appearance of a network of hexagonal meshes, each mesh being a concavity.

Diagnosis:—the first setigerous somite bears no branchiæ. The lamina extends, at most, little more than half-way along the branchial process. In *N. coniocephala* the lamina extends to the tip of the branchia in the anterior somites.

*Nerine (Scolecolepis) vulgaris*, Johnston.

Hab: Port Erin and Southport.

Plentiful in mud, under stones, at the former locality. On none of the branchial filaments does the lamina extend to the tip. The first setigerous somite bears branchiæ, thus differing from *N. cirratulus*. There appears to me no sufficient reason for excluding this species from the genus *Nerine* as Malmgren has done. I revert to Johnston's nomenclature.

*Leucodore ciliata*, Johnston.

Hab: Port Erin and Southport.

A few were found living in narrow clefts in schist rock near low water mark. Also in old shells.

Family.—MAGELONIDÆ (Cunningham and Ramage).

*Magelona papillicornis*, Fr. Müller.

Hab: New Brighton and Southport.

Found not uncommonly in sand between tide-marks. The *Mæa mirabilis* of Johnston and Carrington.

Family.—CHÆTOPTERIDÆ.

*Chætopterus insignis*, Baird.

Hab: Beaumaris (low water); and Turbot Hole off Puffin Island (14 fms.).

An excellent illustration, together with figures of the various kinds of setæ, is given in a paper by Mr. J. Williams, published in vol. xviii of the Proc. of the Lit. and Phil. Soc. of Liverpool, 1864. A number of Mr.

Williams' specimens gathered from extreme low water at Beaumaris are now in the British Museum. Examination of the large specimen of "*Spirochaetopterus typicus*, Sars," described by Mr. R. J. H. Gibson (*loc. cit.*) as obtained at Beaumaris shows it to be in reality an example of *C. insignis*.

*Nychia cirrosa* and *Polynoë glabra*—one or other—are usually present in the tubes as commensals; *N. cirrosa* more frequently of the two in this district; *P. glabra* (*H. malmgreni* of Ray Lankester) in the Channel Islands.\*

Our local species is identical with specimens from Herm, Channel Islands. The species differs from Quatrefages' *C. valencinii* procured from St. Malo, in that the latter shows a bundle of black bristles on the 4th and 5th pairs of feet, whereas the Herm and the Beaumaris specimens have these on the 4th pairs of feet only. Quatrefages' species has also a larger number of segments in the posterior section of the body. A Herm specimen procured for me by Mr. Sinel of Jersey had about 21 segments in this part.

Family.—CHLORHÆMIDÆ.

\**Trophonia plumosa*, (Müller).

Hab: 6, 9, P. A few small specimens from 5 fathoms off Puffin Island; numbers from the deep water (45—57 fathoms) between Anglesey and the Isle of Man.

Parasitic thecate infusoria are occasionally to be seen on the head tuft of bristles and also much minute filamentous matter similar to that clogging the dorsal bristles and the fimbriæ of the elytra of *Lepidonotus squamatus*.

*Siphonostoma diplochaitos*, Otto.

Hab: H, P, 6, 7, 9.

The *S. gelatinosum* of Mr. Gibson's previous local list. It is more frequently taken on the littoral than *Trophonia*

\* On some new British Polynoina, 1866.

*plumosa*, indeed it is fairly common at low water at Puffin Island. After careful examination of specimens of the undoubted *S. diplochaïtos* obtained from the Naples Zoological Station and home specimens of *Flabelligera affinis*, Sars, I cannot but conclude that specifically they are identical. The slight differences there are, are amply accounted for by the varying states of contraction consequent upon divergent preservative agents and to the considerable difference in latitude between the two habitats. Quatrefages could certainly never have seen a specimen of the Naples *S. diplochaïtos* else he would not have defined the genus *Siphonostoma* as destitute of hairs or glandular papillæ.

Family.—TEREBELLIDÆ.

\**Amphitrite figulus*, (Dalyell).

Hab: Puffin Island and Egremont.

The *A. Johnstoni* of Malmgren according to Marenzeller. The presence of 24 pairs of notopodial fascicles of capillary setæ is characteristic of this species. Tube of mud, the corrugated end projecting about an inch above the surface of the mud-flat where it is found.

*Terebella nebulosa*, Montagu.

Dredged off Port Erin.

*Lanice conchilega*, (Pallas).

Abundant on the littoral, and taken frequently in the dredge.

*Thelepus cincinnatus*, (Fabr.)

Hab: 4, 8, 10, 13, 14, P. Littoral to 22 fms.

Shares with *Lanice conchilega* the honour of being the characteristic species of Terebellidæ of this district. It however has not so high a littoral range as the latter, but, on the other hand, it is, of the two, much the more frequently found in deep water.

Since Malmgren's time the name has continually been

spelled wrongly "*circinnata*." As Marenzeller points out (*loc. cit.*) Fabricius called the branchiæ "cincinni" (locks of crisped hair) hence the species "*cincinnata*." It is the *Venusia punctata* of Johnston.

\**Nicolea venustula*, (Montagu).

Hab: 12, 13, 14, i.e, the central area of the Irish Sea.

Dredgings in deep water (20—22 fms.) usually yield specimens of this worm—the *N. zostericola* of Malmgren.

The species seems subject to frequent variation in the number of bristle tufts and of branchiæ. Malmgren defines it as having 2 pairs of branchiæ and 15 pairs of bristle-bundles; Tauber (*Ann. danica*) gives 16—17 pairs of the latter and 3 pairs of the former. Again, R. Leuckart's *T. parvula* (= *N. venustula*, Mont.) is endowed with 15 pairs of bristle bundles and 3 pairs of branchiæ, while Marenzeller who first pointed out the agreement of *N. zostericola*, Malmgren, with the *Terebella venustula*, Mont., diagnoses the same species, from specimens gathered both at St. Malo and in the Adriatic as possessing 17 bristle-bearing fascicles and 2 pairs of branchiæ.\* Finally all of the individuals I have examined from the Irish Sea have had the characters as given by the last named author, with the exception of two half-grown ones which differed in having 15 pairs of fascicles.

Family.— AMPHARETIDÆ.

\**Ampharete grubei*, Malmgren.

Hab: Station 14. A single specimen.

Two species of the genus *Ampharete* have previously been reported as British, viz :—*A. gracilis*, and *A. arctica*. The former is characterized according to Malmgren—by elongated filiform branchiæ and apex of palmular setæ much attenuated; the latter by stout short branchiæ, the palmular setæ having a mucronate apex. The present

\* Zur Kenntniss der Adriat. Anneliden.

species (recorded now for the first time as British) has short branchiæ and apices of palmular setæ very much drawn out.

Family: AMPHICTENIDÆ.

This is a family wherein Malmgren has introduced much unnecessary sub-division. For instance, take his two genera *Amphictene* and *Pectinaria*, the former containing *P. auricoma*, the latter, *P. belgica*. His generic definitions for the two are nearly word for word the same, almost the only divergence being that he states that in *Amphictene* the margin of the post palmular area is cirrate-dentate whereas in *Pectinaria* the same region is entire. Again, the former constructs a curved tube—the latter a straight one—all which, while they may be good specific distinctions, seem to me altogether too trivial to possess generic value. Again, Malmgren erects the genus *Lagis* to contain species possessing 15 and 12 pairs of capillary and uncinigerous setæ respectively in contradistinction to *Amphictene* and *Pectinaria* with 17 and 13 pairs. This division is apparently founded upon an error as both *P. (Amphictene) auricoma* and *P. belgica* possess only 15 and 12 pairs. If Malmgren's *Lagis* really possesses the number of bristle bundles stated by him, then *Lagis* as a genus must cease to exist and must be merged into *Pectinaria*.

*Pectinaria (Amphictene) auricoma*, (Müller).

Hab: 12, 13.

Dredged from 20—22 fathoms in company with *P. belgica*, which they generally surpass in size. Not found at any time in great number. Malmgren gives the number of fascicles of capillary bristles as 17 pairs, and the uncinigerous rows as 13 pairs, but careful examination of all the specimens available showed but 15 pairs of the former and 12 pairs of the latter.

*Pectinaria belgica*, (Pallas).

Hab: 1, 2, 4, 12, 13, E. NB.

Immense numbers people the far-stretching sandbanks skirting the Lancashire and Cheshire coasts. The animals live head downwards in the sand, and range from mid-tide mark (exceptional) to a depth of 21 fathoms.

As in the preceding species there are 15 pairs of capillary fascicles and 12 pairs of uncinigerous rows, not 17 and 13 as stated by Malmgren, nor 15 and 11 pairs respectively as amended by Cunningham and Ramage.

Family.—HERMELLIDÆ.

*Sabellaria alveolata*, Linn.

Hab: S, E, NB, H.

Enormous encrusting masses attaining in favourable situations a thickness of quite two feet, occur at the tide-swept end of Hilbre Island. As the geological formation of the Island is soft Red Triassic sandstone liable to rapid denudation, these incrustations have an important retarding effect, as has been pointed out by Prof. Herdman.\* Damage wrought by storms on the brittle sand constructed tubes is very rapidly righted by the gregarious occupants. A species of mite is frequently found parasitic upon this species.

\* *Sabellaria spinulosa*, R. Leuckart.

Hab: 5, 8, 9, 10, 12, 13, 10—50 fms.

This animal is met with everywhere in deep water in our area often in considerable abundance, and is without doubt one of the commonest worms. It is brought up both in broken masses and also singly upon valves of dead shells. It appears to be confined pretty straitly to the depths of the sea and not to trench on the shallow water and littoral range of *S. alveolata*.

\*Proc. L'pool Biol. Soc. vol. II. p. 39.

## Family.—SERPULIDÆ.

## 1. Sub-family.—SABELLINÆ.

*Sabella pavonia*, Savigny.

Hab: 4, 7, 8, E, H, M.

I have found considerable variation in this species, both in size and in the colouration of the branchial filaments. In this district it ranges from some feet above low water level to 16 fathoms, but specimens which are ever left uncovered by the tide never attain to the largest size.

*Sabella pavonia*, var. *bicoronata*, n.

Hab: Rock pools at extreme low water at Hilbre Id.

This variety is found in considerable numbers as above. From the type it differs in *nothing* save the arrangement of the branchiæ. These are in two unequal tufts forming two closely superposed circles of filaments when expanded—nearly 4 in. in diameter in large specimens.

● Of the two fully grown specimens obtained one had 61 filaments in one tuft, and 30 in the other. The second had 55 and 37 respectively. The smaller tuft usually forms more than half a circle, the larger meets this on one side and forms the remainder of the outer circle and then curves inwards to make a more or less complete inner circle. The anterior part has 8—13 segments. At first I was inclined to form a new species for this animal and to place it in the genus *Spirographis* but for the present I incline to count it merely a variety. Numbers of normal *S. pavonia* are found associated. Probably many of the species of *Spirographis* described in various works will in time be eliminated and found to be varieties of different species of *Sabella*. In *Dasychone herdmani*, mentioned next a specimen is noted having unequal tufts after the same manner.



\**Dasychone herdmani*, n. sp. (Pl. XV, figs. 1—9.)

Hab: Puffin Island and off the coast of Anglesey, from low water to 18 fms. Stations 5, 6, 10, P.

The body is short and thick, composed of about 60 segments. The anterior or thoracic region is about as broad as long, having 8 bristle-bearing segments. The dorsal edges of the cephalic collar incline towards each other and nearly touch. Thence the collar is continued as a slightly everted rim of even height, terminating in two boldly everted lappets on each side of the median ventral line. A shallow notch separates the lappets from the rest of the collar laterally. The branchiæ are in two equal tufts of 15—20 filaments each. Apex of each radiole is naked, rather stout or digitate. The distal pinnæ rapidly diminish and end as mere bud-like eminences at the base of apex. At equal distances on the rachis are disposed paired eye-spots. Between each two pairs of eye-spots is a pair of dorsal appendages; usually the position is just behind one of the pairs, but in some specimens it is nearly midway between the two. In shape they are ample, long, and *broadly spathulate, the margin of the broad apex being puckered and indented*. There are in general 20—22 pairs of these processes on each filament and an equal number of eye-spots. The tentacula are two in number, channelled on the opposing faces, acuminate, about a third as long as the filaments.

Colour. Body of dark yellowish or brownish red; a dark brown spot below each tuft of capillary setæ in the thoracic region, but above each tuft in the posterior or abdominal portion of the body. Collar pale and uncoloured as are also the tentacula. The branchiæ are white, beautifully variegated with narrow bands of intense purple, brown and yellow.

The tube is short and corrugated, dark grey in colour

and chitinous in structure. Length about 3 to 5 cm. Animal about the same length.

This species while agreeing in all other essential details with the previously known British representative of this genus, *Dasychone dalyelli*, Kölliker (the *Sabella bombyx* of Johnston) is sharply differentiated by the shape of the dorsal processes. A similar difference marks it off from the Neapolitan *D. lucullana* with which species Mr. Gibson, in the previous local list erroneously identified the present. In both *D. dalyelli* and *D. lucullana*, which I fancy will be found to be one and the same species, the dorsal appendages have the form of elongated sublinear processes slightly dilated at the apices—giving them a graceful club-like form—totally different from the broad spathulate appendages of *D. herdmani*. This latter form approaches more closely to that seen in *D. infarcta*, (Kroyer), but Kroyer's species has no eye-spots.

In one specimen I noticed with interest a similar varietal departure from the normal arrangement of the branchiæ such as I elsewhere note concerning *Sabella pavonia*. In the individual I refer to, the left tuft of branchial filaments was much larger than the right—containing 33 filaments for the other's 16.

\**Amphicora (Othonia) fabricia*, (Müller).

It is to the courtesy of Mr. C. H. H. Walker that I am indebted for having my attention directed to this tiny tube builder as an inhabitant of this district. It is fairly numerous attached to the surface of seaweed, &c. at the extremity of Egremont slip than which no more prolific hunting-ground exists in the Mersey whenever the Ferry authorities for even a short period cease from troubling about repairs. *A. fabricia* is at times met with free—without trace of any protecting tube—crawling about among weed.

## 2. Sub-family:—SERPULINÆ.

*Filigrana implexa*, Berkeley.

Hab: N. E. coast of Anglesey and south coast of Isle of Man—Low water to 18 fms.

*Serpula vermicularis*, (Ellis).

Hab: Deep water area of Irish Sea, about 20 fms.

\* *Serpula reversa*, Montagu.

Hab:—P, 6, 12, 13.

From low water mark to 22 fathoms. The most abundant deep water Serpulid. I have seen a crab dredged up carrying two or three large ones upon its carapace; the usual situation is upon shells of dead molluscs. Probably the *Eupomatus pectinatus* of Philippi.

*Pomatoceros triqueter*, (Linn).

Hab: P, 5, 10. Common on the littoral, extending more sparingly to deep water—18 fms.

Apparently a variable species—in the colour of the branchiæ and in the shape of the operculum. Cunningham and Ramage are in error in giving *S. conica*, Johnston, as a synonym, unless indeed it be that the latter is found to be a variety *P. triqueter*. In any case Johnston's figure of the operculum of *S. conica* is not a typical form of that of *P. triqueter*, while that figured under the name of *S. armata* is perfectly characteristic, agreeing even with C. and R.'s own delineation of the operculum of the present species.

*Spirorbis borealis*, Mörch.

Hab:—On all our rocky shores and wherever it can find lodgment, characteristic of the littoral. *Fucus serratus* is its commonest host.

*Spirorbis lucidus*, (Mont), Mörch.

The characteristic *Spirorbis* of deep water. Its tiny translucent spirals frequently occur in rows along the stalk and branches of *Sertularia* dredged from various depths.

GEOGRAPHICAL and BATHYMETRICAL range of local  
POLYCHÆTOUS ANNELIDS.

NOTE.—The following abbreviations are used:—E = East coast of Great Britain; Ch = English Channel coasts; Ir = West and South coasts of Ireland; WS = West Scotland; Shet = Orkney, Shetland and Faroë region; UK = all British coasts. US = East coast N. America, south of Labrador and north of N. Carolina; Gr = Greenland and Arctic America; Sp = Spitzbergen; NZ = Nova Zembla; Sc = Scandinavian, Danish and German coasts; Med = Mediterranean Sea.

L = Littoral; O = Low water mark. (X) cast ashore by storms.

SPECIES.	Local—Irish Sea Area					Bathymetrical range.	RANGE in BRITISH SEA.	OTHER SEAS.
	Central Area.	Isle of Man.	N. Wales & Angsy.	Lancas. & Chesh.	Hilbre Island.			
<i>Aph. aculeata</i> .....	x	...	x	x	...	O—20	UK.	US, Sc, Med.
<i>Hermione hystrix</i> ...	x	x	x	...	...	15—40	Ch, Ir.	Sc, Med, C. Verde I.
<i>Lep. squamatus</i> .....	x	x	x	...	x	L—22	UK.	US, Gr, Sc, Azores.
<i>Nychia cirrosa</i> .....	...	..	x	..	...	●—18	E, Ch.	US, Gr, Sp, NZ, Sc.
<i>Polynoë imbricata</i> ...	...	x	x	...	...	L—5	UK.	US, Gr, Sp, NZ, Sc, S. Jpn, Ochotsk S, Sitcha
„ <i>halioti</i> .....	x	x	...	...	...	15	WS, Sh.	
„ <i>impar</i> .....	x	...	x	x	x	L—22	Sh, E, Ch.	US, Gr, NZ, Sc, off Gibraltar, Med (probably)
„ <i>extenuata</i> ...	...	x	x	...	...	L	...	Med.
„ <i>propinqua</i> ..	x	x	x	x	...	L—57	E, Shet.	US, Sc, Madeira.
„ <i>setosissima</i> ..	...	...	x	...	...	O	E, Ch.	Sc, Med (probably).
„ <i>castanea</i> ....	x	...	x	...	...	20—22	Shet, Ir, Ch.	
„ <i>flaccida</i> .....	...	x	...	...	...	L	E, Ch.	
„ <i>lunulata</i> .....	...	...	...	(x)	...	deepw	UK.	Med.
„ <i>johnstoni</i> .....	...	...	x	...	...	12—20	Sh, WS, Ch.	Sc. Ia Rochelle.
<i>Acholoë astericola</i> ..	x	...	...	(x)	...	14	Ir	Med
<i>Hal. gelatinosa</i> .....	...	...	x	...	...	O	E, WS, Ch.	Sc.

<i>Hermadion assimile</i>	x	x	...	...	10—21	E, Ir, Ch.	off C. de Gatte (M'I).
„ <i>pellucidum</i>	x	...	x	...	16—22	E, WS.	Med.
<i>Sthenelais bra.</i>	...	x	x	...	L	UK.	Sc.
„ <i>limicola</i>	x	...	...	...	20—22	Shet, E.	US.
„ <i>zetlandica (?)</i>	...	x	...	...	20	Shet.	
<i>Pholœ minuta</i>	...	...	x	x	...	E, Ch.	US, Gr, Sp, NZ, Sc.
<i>Spinther uniscoides</i>	...	...	x	...	17	WS, & Blfast	Sc.
<i>Eunice harassii</i>	x	...	...	...	20—22	Ch.	
<i>Onuphis conclilega</i>	x	...	...	...	20—22	UK.	US, Gr, Sp, NZ, Sc, Portugal.
<i>Lumbr. fragilis</i>	x	x	x	...	20—22	E, Shet.	US, Gr, Sp, NZ, Sc.
<i>Nereis pelagica</i>	x	x	x	x	L—20	UK.	US, Gr, Sp, NZ, Sc, Jn.
„ <i>diversicolor</i>	...	...	...	x	L	UK.	Gr, Sc, Med, Japan.
„ <i>dumerilii</i>	x	x	x	...	L—16	UK.	US, Sc, Med, Madeira, C. Verde Ids. & Japan.
„ <i>virens</i>	...	...	...	x	L	E, WS.	US, Sc.
„ <i>fucata</i>	x	x	x	...	L—18	E, Ch.	US, Sc.
<i>Nephtys caeca</i>	x	...	...	...	18	E, WS, Ch.	US, Gr, Sc.
„ <i>homburgi</i>	x	x	x	...	L—20	E, WS.	US, Gr, NZ, Sc.
<i>Goniada maculata</i>	...	...	...	x	L	E.	US, Sc.
<i>Glycera capitata</i>	...	x	x	...	L—17	E, WS, Ch.	US, Gr, Sp, NZ, Sc, Portugal and Azores.
„ <i>nigripes</i>	...	...	...	x	5	E.	
„ <i>dubia</i>	...	Stomachs of	...	...	...	E, WS, Ch.	
„ <i>goësi</i>	...	...	...	x	...	E.	Sc.
<i>Syllis tubifex</i>	x	x	x	...	3—21	E, WS, Ch.	N. Scotia, Madeira.
„ <i>armillaris</i>	...	...	...	x	O	E, Ch.	Sc.
<i>Autolytus alexandri</i>	Tow-	x	netted	...	...	...	US, Gr.
„ <i>prolifer</i>	...	...	...	x	...	E.	Sc.
<i>Ephesia gracilis</i>	x	x	x	...	O—25	UK.	Gr, Sp, NZ, Sc.
<i>Psamathe fusca</i>	...	...	...	x	L	E, Ch.	
<i>Castalia punctata</i>	...	...	...	x	18	E.	Sc, Iceland.
<i>Phyll. maculata</i>	...	...	...	x	O—18	E.	Iceland.
„ <i>laminosa</i>	x	x	...	...	O	E, Ch.	Med.
<i>Eulalia viridis</i>	x	x	...	...	L	E, Ch.	Gr. Sc.
<i>Tomopt. onisciformis</i>	x	x	To w-	netted	...	E, Ch, Shet.	?
<i>Ophelia limacina</i>	x	...	...	...	18	E.	Gr, Sp, NZ, Sc, US.
<i>Ammot. aulogaster</i>	x	x	...	...	3—21	E, WS.	Gr, Sp, NZ, Sc.
<i>Capitella capitata</i>	...	x	x	...	L	E, WS.	Gr, Sp, NZ, Sc, Med.
<i>Aenicola marina</i>	...	x	x	x	L	UK.	US, Gr, Sp, Sc, Med.
<i>Nic. lumbricolis</i>	...	...	...	x	...	E.	US, Gr, Sp, NZ, Sc.
<i>Axiothea catenata</i>	...	...	...	x	O	E, Shet.	US, Gr, Sp.
<i>Owenia filiformis</i>	x	x	x	...	O—22	E.	Gr, Med.
<i>Scoloplos armiger</i>	...	x	x	x	L—6	Sh, E, Ch.	US, Gr, Sp, NZ, Sc.
<i>Cirratulus cirratus</i>	...	...	...	x	O	UK.	US, Gr, NZ, Sc.
„ <i>tentaculatus</i>	x	x	...	...	L	E, Ch.	Med.
<i>Chaetozone setosa</i>	...	...	...	x	L	E.	US, Sp, NZ, Sc.
<i>Spio seticornis</i>	...	...	...	x	L	E, Ch.	Gr, Sc.
<i>Nerine cirratulus</i>	...	...	...	x	L	E.	Med.
„ <i>vulgaris</i>	x	x	...	...	L	E, Ch.	Sc.
<i>Leucodre ciliata</i>	x	x	...	...	L	E, Ch.	Iceland, Sc, Philippines & Australia (Haswell).
<i>Mag. papillicornis</i>	...	...	...	x	L	E.	
<i>Chaetopterus insignis</i>	...	...	...	x	O—14	WS, Ch.	
<i>Trophonia plumosa</i>	x	x	...	...	●—57	Sh, E, Ch.	Gr, Sp, NZ, Sc.
<i>Siphon. diplochaitos</i>	...	x	x	x	L—18	WS, E, Ch.	US, Gr, Sp, NZ, Sc Med
<i>Amphitrite figulus</i>	...	x	x	...	L	E.	US, Sc.
<i>Terebella nebulosa</i>	x	...	...	...	14	UK.	Sc, Med.

<i>Lanice conchilega</i> ....	x	x	x	x	x	L—22	E, Ch.	Cattegat, Belgium, Med, and Madeira.
<i>Thelepus cincinnatus</i>	x		x			L—22	UK.	US, Gr, Sp, NZ, Sc Med
<i>Nicolea venustula</i> ....	x					20—24	Sh, E, Ch.	Gr, Sc, Med.
<i>Ampharete grubei</i> ....	x						...	Gr, Sp, NZ, Sc.
<i>Pectin. auricoma</i> ....	x					20—22	E, WS.	Sc, Med.
„ <i>belgica</i> .....	x		x	x		O—22	UK.	Sc.
<i>Sabellaria alveolata</i> .				x	x	L	E, Ch.	Med.
<i>Sabellaria spinulosa</i>	x		x			10—50	E, Ch.	Sc.
<i>Sabella pavonia</i> .....		x	x	x	x	M—16	E, Sh, Ch WS	US, Sc.
<i>Dasychone herdmani</i>			x			O—18	...	
<i>Amphicora fabricia</i> ..				x		O	E, Ch, WS.	Gr, Sc,
<i>Filigrana implexa</i> ....		x	x			O—18	E, Ch.	US, Sc.
<i>Serpula vermicularis</i>	x					20	UK.	Sc, La Rochelle
„ <i>reversa</i> .....	x		x			O—22	E, Ch, Ir.	
„ <i>triqueter</i> ....			x			L—18	E, Ch.	Sc, Med.
<i>Spirorbis borealis</i> ....		x	x	x	x	Litt.	E, Ch.	US, Gr, Sc.
„ <i>lucidus</i> ....	x	x	x			10—20	E.	US, Gr, NZ.

## EXPLANATION OF PLATES.

## PLATE XIII.

- Fig. 1. Notopodial seta of *Polynoë propinqua*, × 250.  
 Fig. 2. „ „ „ *imbricata*, × 250.  
 Fig. 3. „ „ „ *impar*, × 250.  
 Fig. 4. „ „ „ *extenuata*, × 250.  
 Fig. 5. „ „ „ *halieti*, var. *hyænæ*, × 250.

(These figures show the minute but constant relative differences in the degree of serration exhibited by the bristles of the respective species.)

- Fig. 6. *Polynoë impar*. Portion of scale showing single large pear-shaped papilla, × 130.  
 Fig. 7. *Polynoë propinqua*. One of the large sub-globular margin processes, × 190.  
 Fig. 8. *Polynoë extenuata*. Entire scale, × 44.  
 Fig. 9. *Polynoë propinqua*. Parapodium, × 20.  
 Fig. 10. *Eunice harassii*. Parapodium and branchia from the 21st setigerous somite, × 20.

## PLATE XIV.

- Fig. 1. Egg capsule of *Scoloplos armiger*, nat. size.  
 Fig. 2. Ovum separated from capsule,  $\times 80$ .  
 Fig. 3. Extrusion of polar bodies,  $\times 80$ .  
 Figs. 4—11. Stages in segmentation of an ovum,  $\times 80$ .  
*p.b.* polar bodies; *mic.* micromeres; *mac.* macromeres.  
 Fig. 11. Shows macromeres entirely enclosed by micromeres except at the blastopore.  
 Fig. 12. Egg capsule of *Arenicola marina*, nat. size.  
 Figs. 13—18. Stages in the larval development of same,  $\times 225$ . *e.g.* eye-spots; *z.* zonar band of cilia; *a.* anterior tuft of cilia; *m.* mouth; *v.* ventral band of cilia; *c.* first segmental constriction of larval body.  
 Figs. 17, 18 are diagrams to show the ciliary arrangement.  
 Fig. 19. Appearance of zonar cilia as seen from above while the embryo is whirling rapidly,  $\times 225$ .  
 Figs. 20, 21. Most advanced embryos observed; *c.* first segmental constriction,  $\times 400$ .

## PLATE XV.

*Dasychone herdmani*, n. sp.

- Fig. 1. Entire animal, dorsal view,  $\times 3$ .  
 Fig. 2. Lateral view of anterior portion of body,  $\times 4\frac{1}{2}$ .  
 Fig. 3. Ventral view of same,  $\times 4\frac{1}{2}$ .  
 Fig. 4. Part of a branchial filament,  $\times 44$ . *a.* dorsal processes; *b.* eye-spots; *p.* pinnæ.  
 Fig. 5. Extremity of a radiole,  $\times 44$ .  
 Fig. 6. Dorsal process from a different specimen to Fig. 4; here the margin is less puckered,  $\times 60$ .  
 Figs. 7, 8. Capillary setæ. 7, superior; 8, inferior,  $\times 250$ .  
 Fig. 9. Uncinus,  $\times 250$ .



Fig. 1.



Fig. 2.

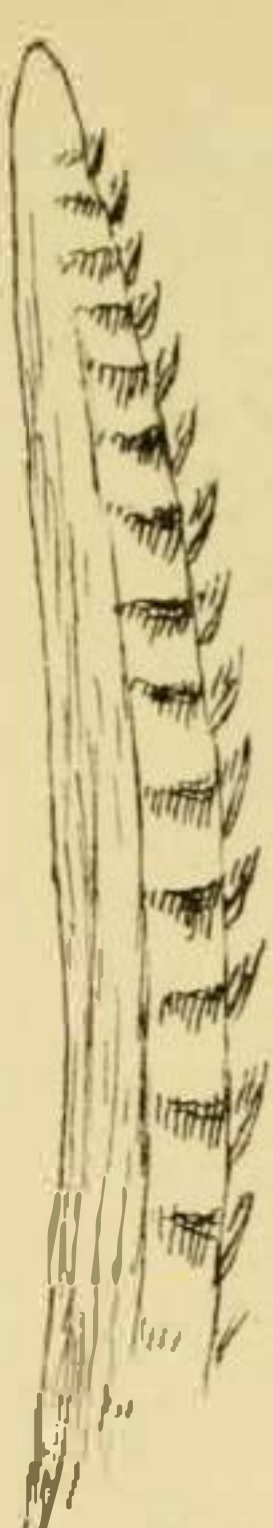


Fig. 3.



Fig. 4.



Fig. 5.

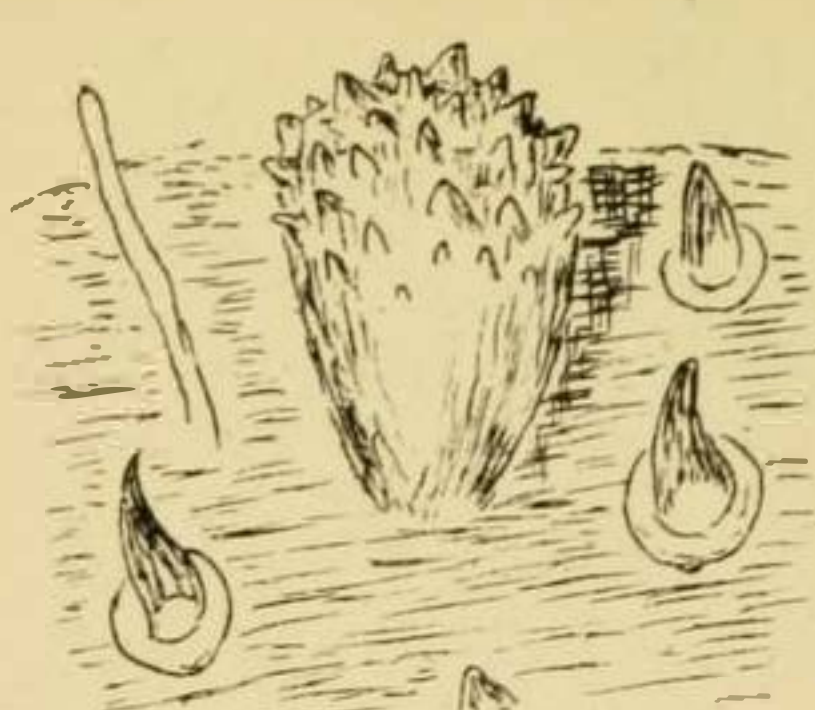


Fig. 6.

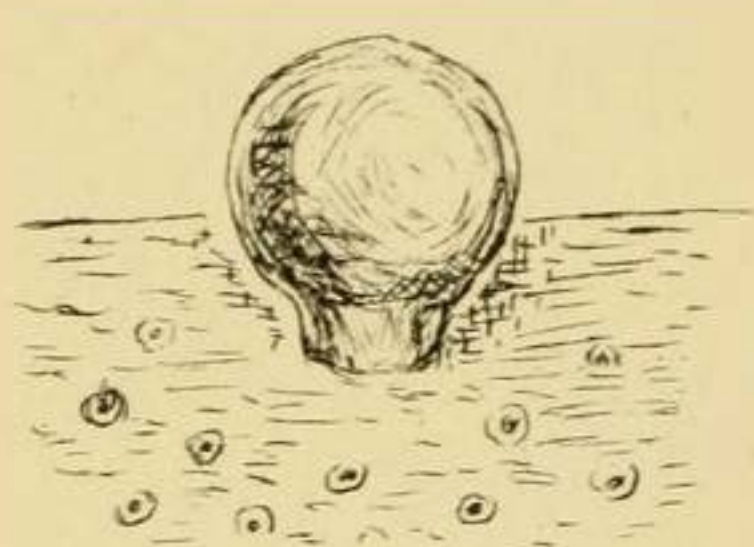


Fig. 7.



Fig. 8.

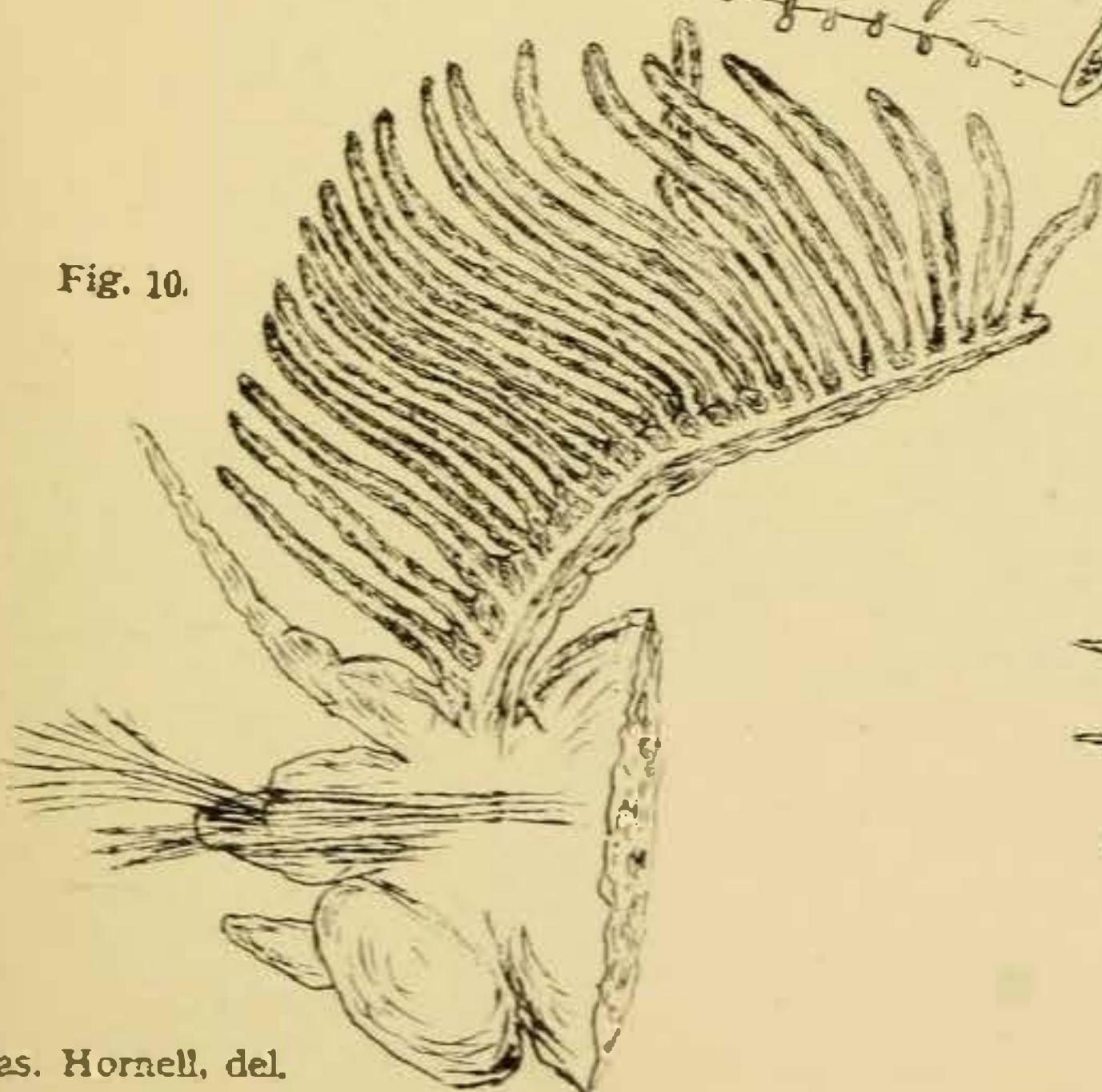


Fig. 10.

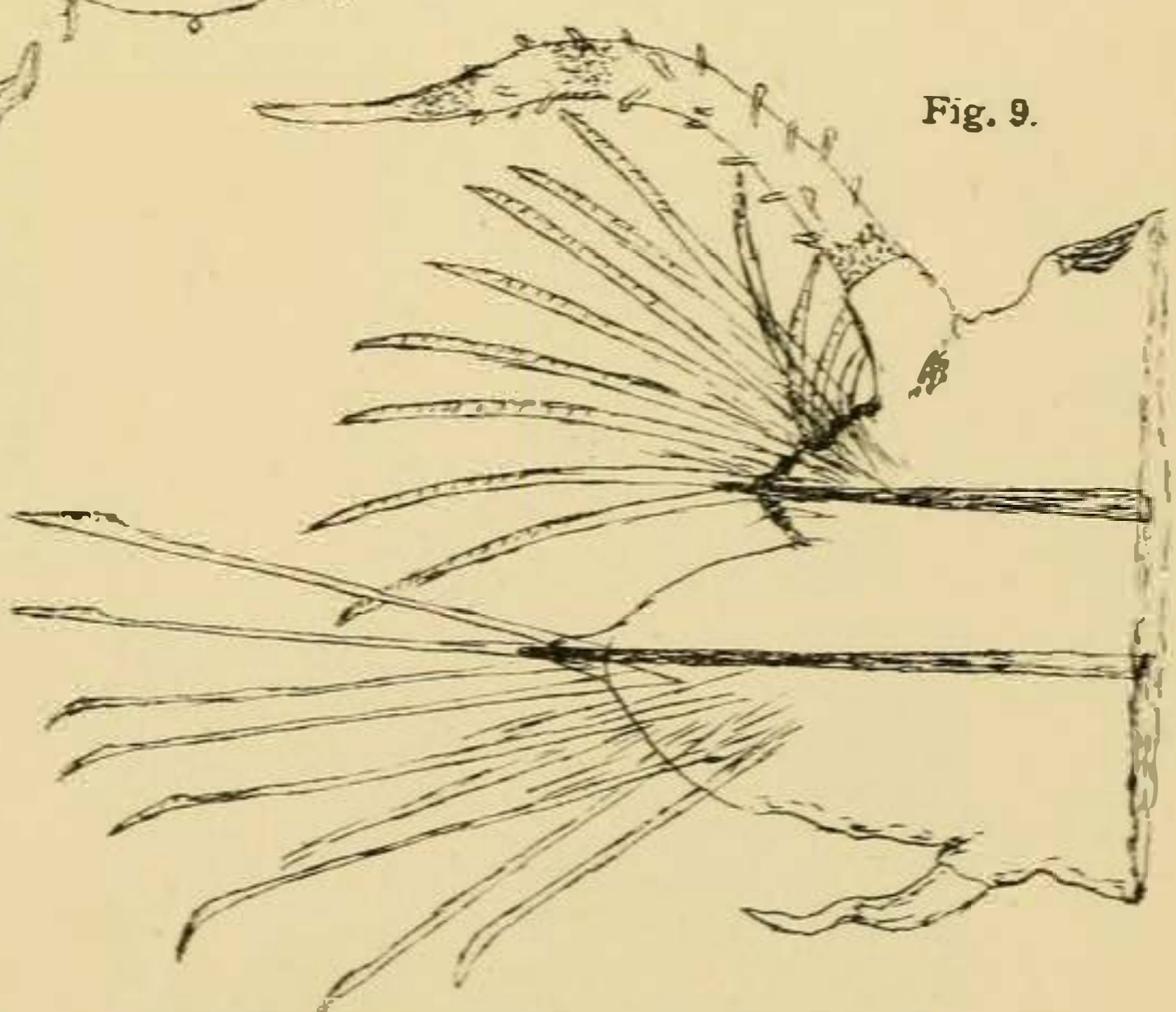
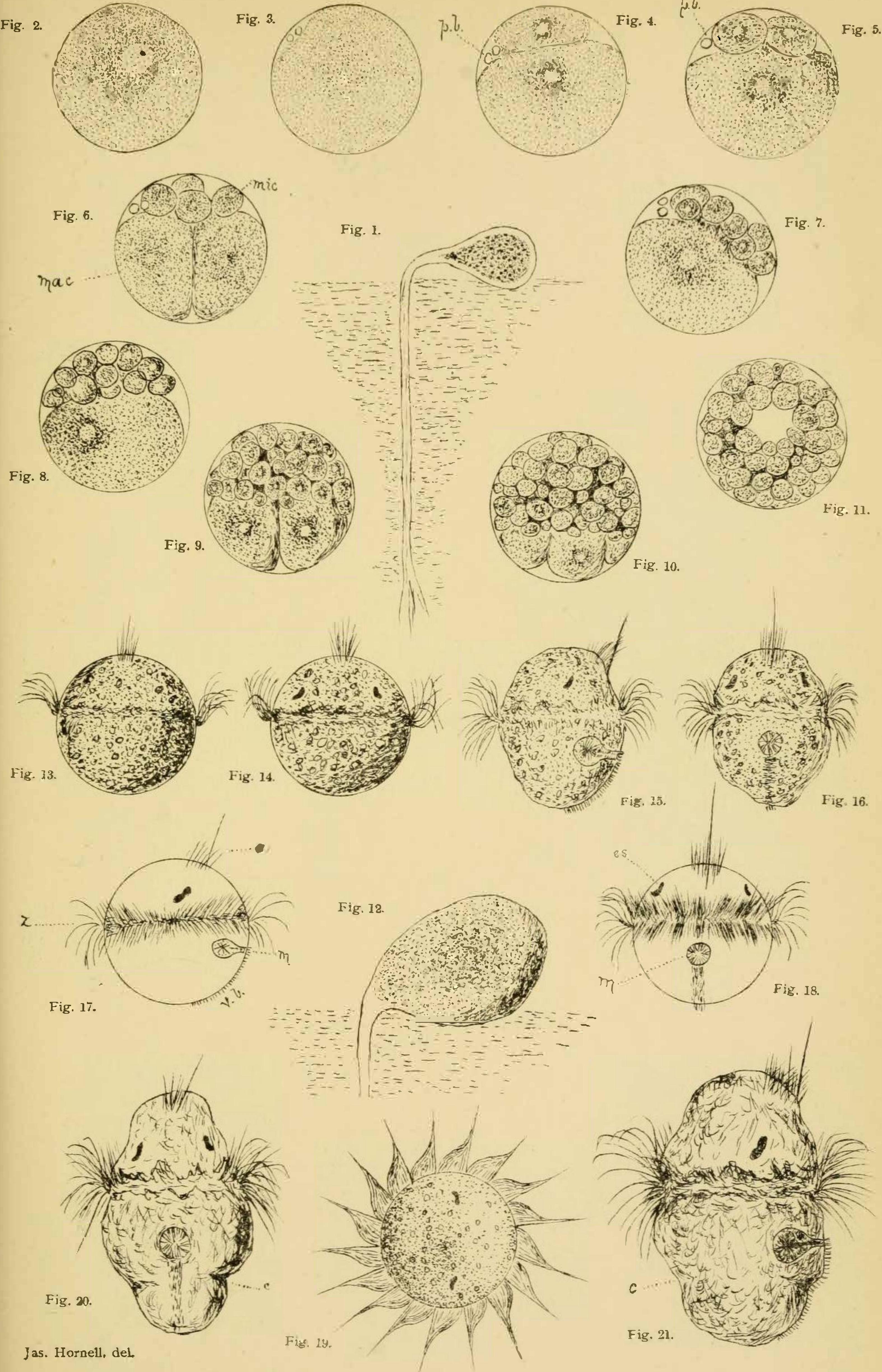


Fig. 9.

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POLYNOINÆ AND EUNICINÆ.





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EMBRYOLOGY OF SCOLOPLOS ARMIGER. AND ARENICOLA MARINA.

Fig. 1.

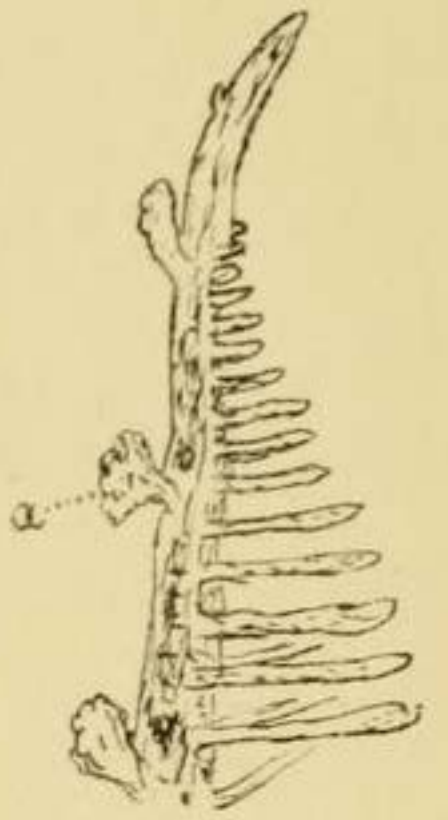
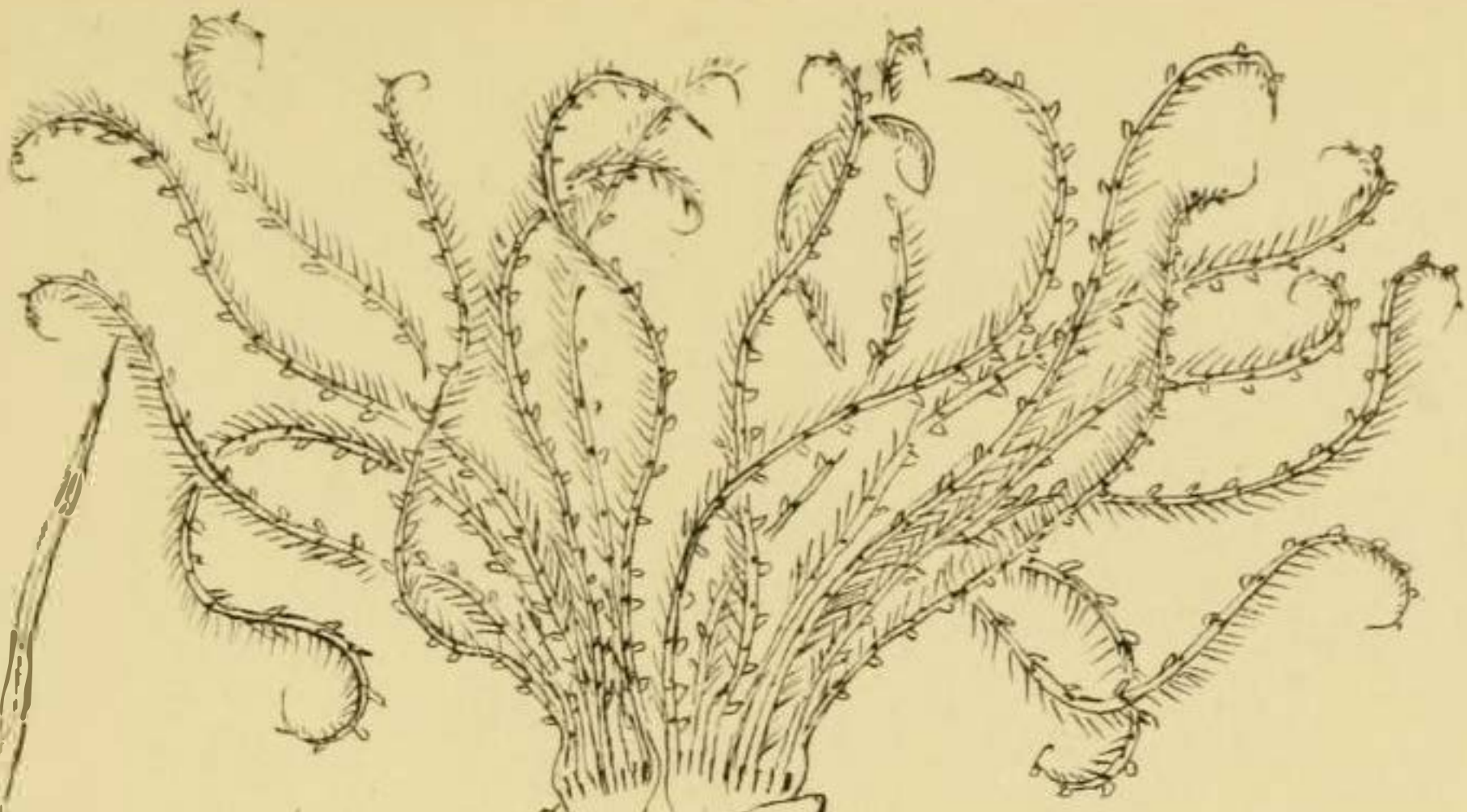


Fig. 5.

Fig. 7.

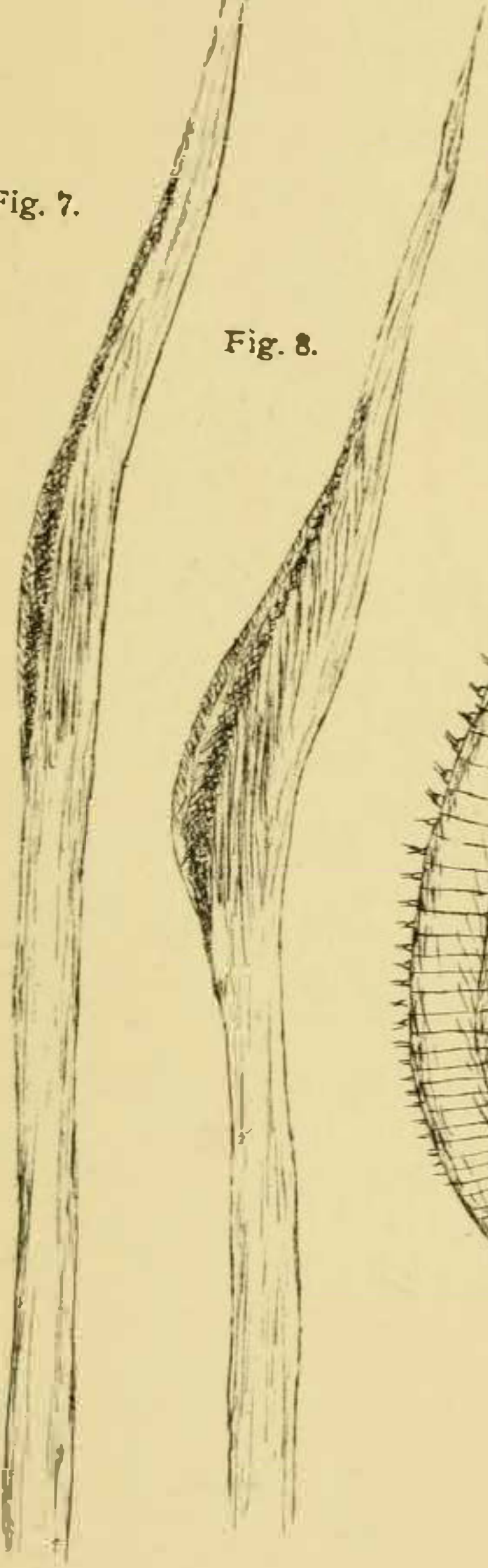


Fig. 8.

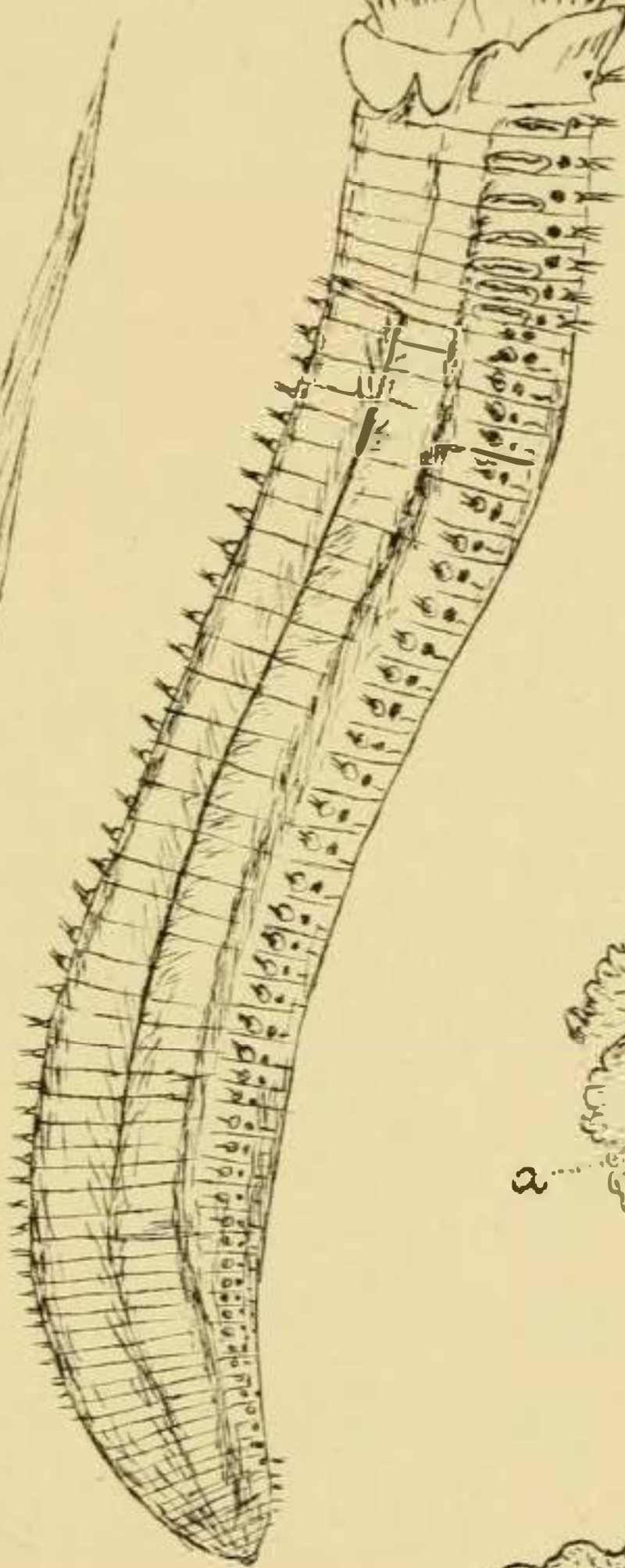


Fig. 6.

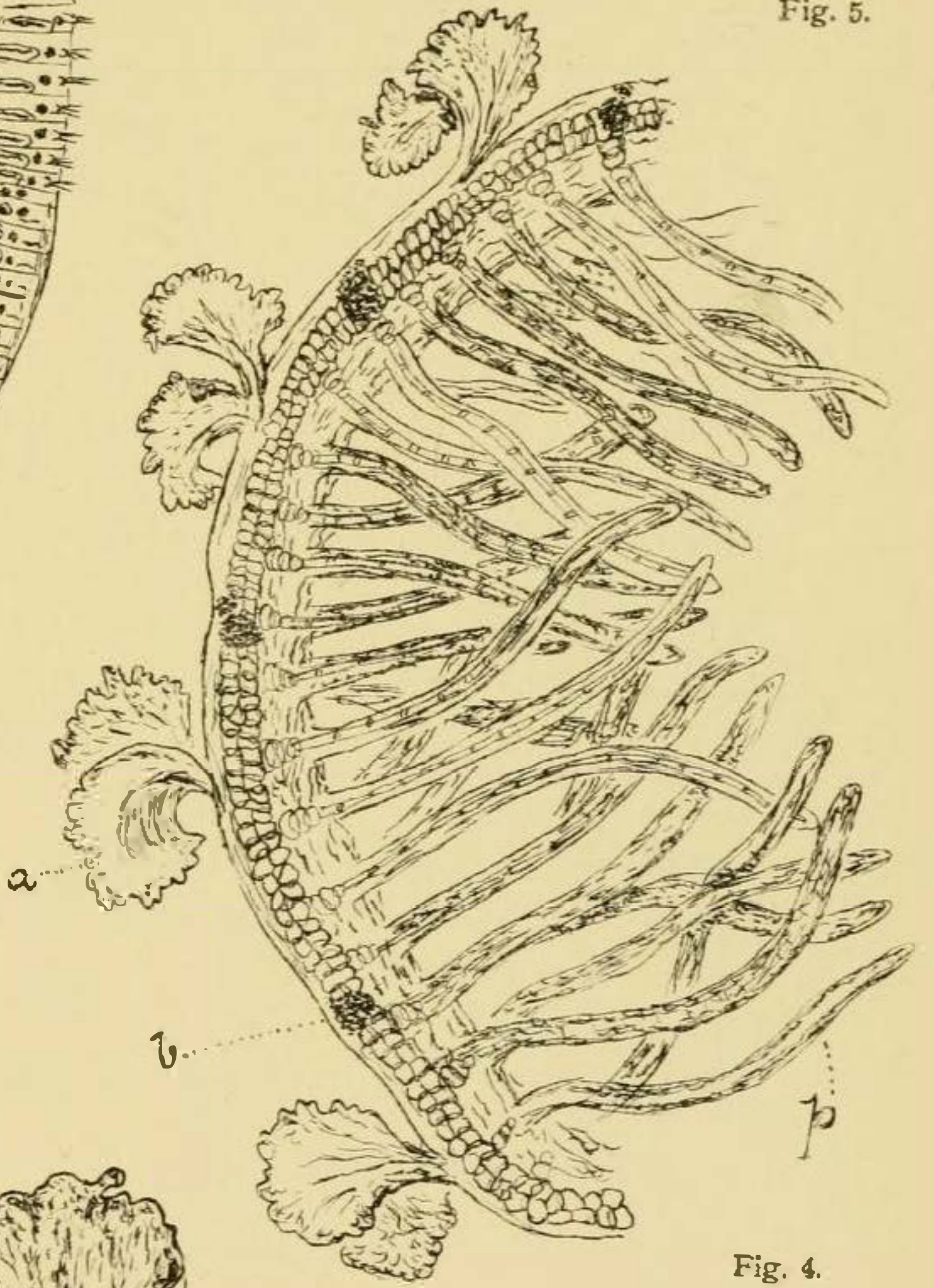


Fig. 4.

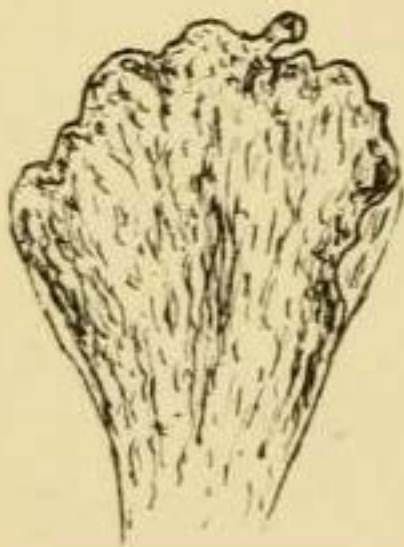


Fig. 2.

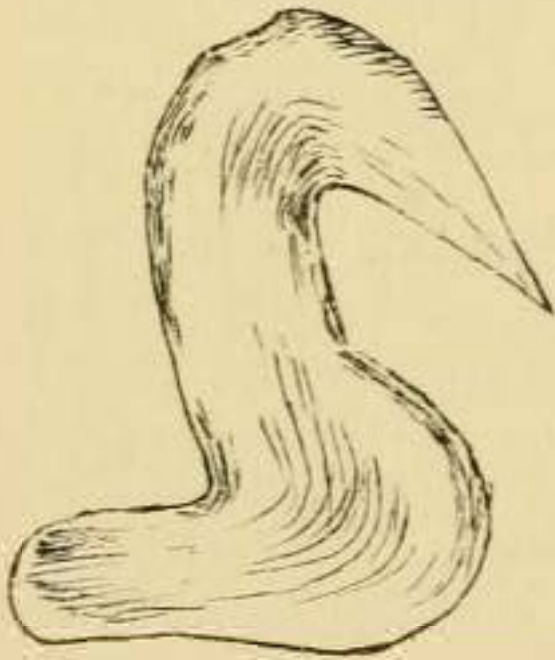
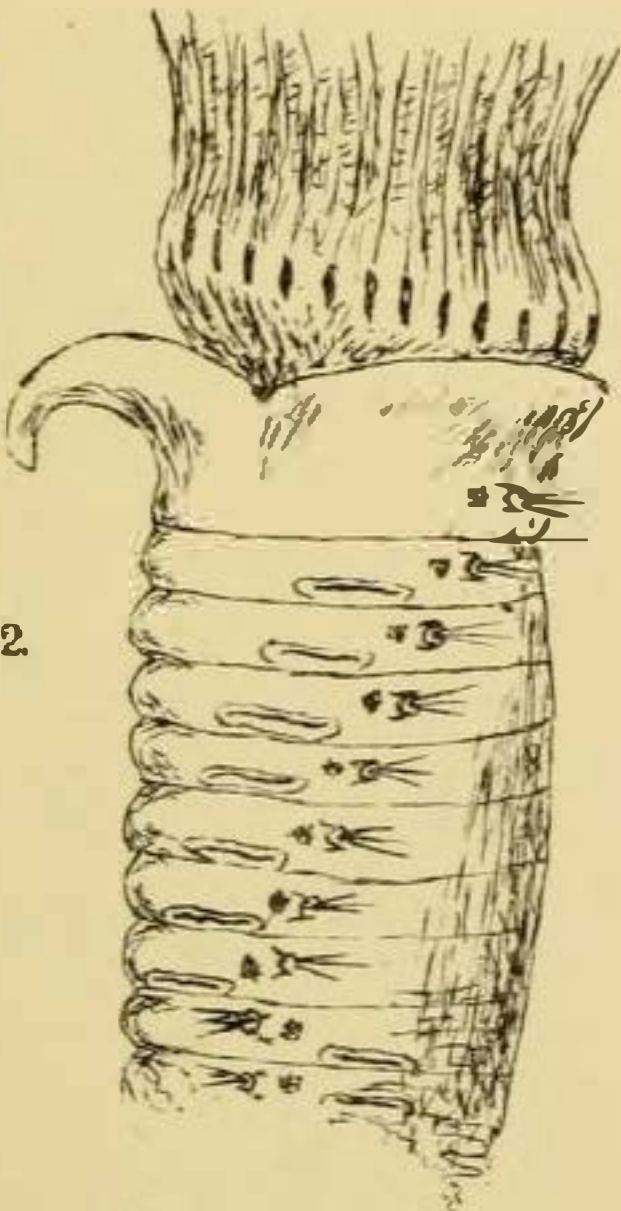


Fig. 9.

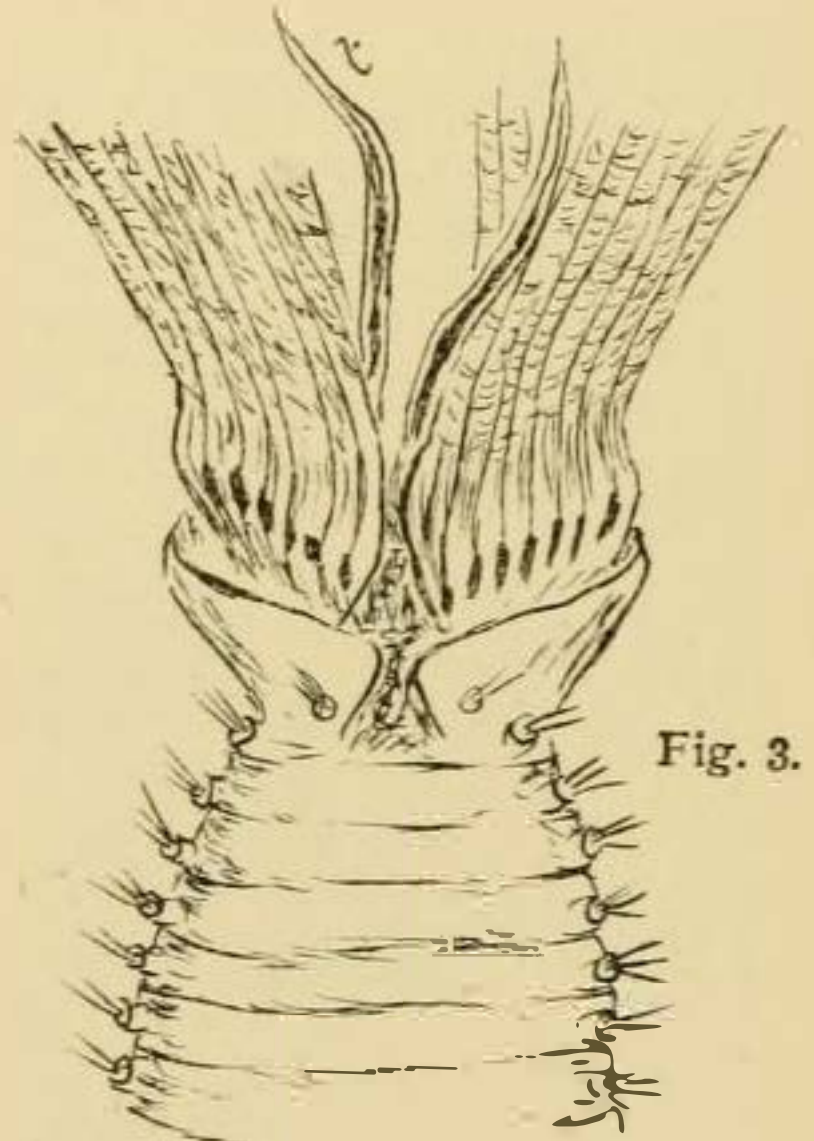


Fig. 3.

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