V. Report on the Polychæta obtained by the F.I.S. "Endeavour" on the coasts of New South Wales, Victoria, Tasmania and South Australia.

PART I.

BY

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Plates XXXVIII.–XLV.

REPORT ON THE POLYCHÆTA.

Part I.

I.—Introduction.

At the request of the Curator of the Australian Museum, Mr. R. Etheridge (acting for the Hon. the Minister for Trade and Customs), I undertook the examination of the series of Polychæta which were dredged by the Federal Investigation Ship "Endeavour," chiefly off the east coast of Tasmania and the southern and eastern coasts of Australia. Owing to my University duties, I have only a few months in the summer available for research work of a continuous character, so that it has only been possible to work through about two-thirds of the material. Hence any general summary of the results must stand over till the publication of the second part.

Our knowledge of the Polychæta of the Australian seas is very meagre. We know something of those occurring in Port Jackson from the work of Professor W. A. Haswell,[1] published a good many years ago in a series of papers in the "Proceedings of the Linnean Society of New South Wales." He includes an account of several of the species which had been previously described by Schmarda[2], who collected in this region and elsewhere, and by other early zoologists as Baird, Kinberg and de Quatrefages, each of whom had described one or more species which had been incidentally and occasionally collected by early voyagers or collectors.

As to the worms from deeper water, our knowledge is confined to what is recorded in that monumental volume in the series of "Challenger" Reports by Professor W. C. M'Intosh.[3]

It may be well to give this list of worms obtained during that voyage.

Station 158, considerably south of Australia, Lat. 50° 1′ S., Long. 123° 4′ E., 1800 fathoms; Globigerina ooze.

Hyalinoecia benthaliana, M'Intosh.
Grubianella antarctica, M'Intosh.

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1. Haswell—Proc. Linn. Soc. N.S. Wales, iii., 1879; *Id.*, *Ibid.*, vii., 1883; *Id.*, *Ibid.*, ix., 1885; *Id.*, *Ibid.*, x., 1886; *Id.*, *Ibid.*, (2), vi., 1892.
2. Schmarda—Neue Wirbellose Thiere, 1861.
3. M'Intosh—Chall. Rep., Zool., xii., 1885.

Station 160, south of Australia, Lat. 42° 42′ S., Long. 134° 10′ E., 2600 fathoms; red clay.

Eunoa abyssorum, M'Intosh.
Polynoe ascidioides, M'Intosh.

Station 162, Bass Strait, Lat. 39° 10′ S., Long. 146° 37′ E., 38 fathoms; sand and shells.

Polynoe platycirrus,[1] M'Intosh.
Thalanessa oculata, M'Intosh.
Staurocephalus australiensis, M'Intosh.
Eunice vittata, D. Chiaje.
Eunice pycnobranchiata, M'Intosh.
Eunice bassensis, M'Intosh.

Station 163A, Twofold Bay, Australia, 150 fathoms; green mud.

Phyllodoce duplex, M'Intosh.
Sabellaria (*Pallasia*) *giardi*, M'Intosh.
Terebella grubei, M'Intosh.

Station 163B, off Port Jackson, 35 fathoms; hard ground.

Aphrodita australis, Baird.
Thalanessa fimbriata, M'Intosh.
Eunice aphroditois, Pallas.
Sabella fusca, Grube.

Station 186, Torres Strait, Lat. 10° 30′ S., Long. 142° 18′ E., 8 fathoms; coral mud.

Lepidonotus cristatus, Grube.
Eupompe australiensis, M'Intosh.
Eunice torresiensis, M'Intosh.
Eunice tribranchiata, M'Intosh.
Hyalinoecia tubicola, Muller, var. *papuensis*, M'Intosh.
Thelepus, sp.

With the first and the last stations we have here no concern, as they lie outside the limits of the cruise of the "Endeavour."

But we may consider the remaining stations, for they were approximately covered by this vessel.

Out of the fifteen species obtained at these four stations by the "Challenger" at depths from 35-2600 fathoms, all but four were new to science.

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1. So written in the text, but in this list and in that of bathymetrical distribution it is written "*platycirrata*."

Of the twelve new species then found, so far as the present material has been examined, the "Endeavour" collection contains four, namely, *Stauronereis* (*Staurocephalus*) *australiensis*, *Polynoe platycirrus*, *Eunice pycnobranchiata*, and *E. bassensis*, the last, having been founded for a small fragment, it is now fully described for the first time.

Two world-wide species, *Eunice siciliensis* and *Hyalinoecia tubicola*, are also represented, while *Hesione splendida* and *Nephthys macrura* are known from other parts of the world.

New species of the interesting and rare Lumbriconereid genera, *Oenone* and *Lysarete* are here established. But perhaps the most interesting feature of the collection is the abundance of the polynoid genus *Physalidonotus*, originally discovered in New Zealand, and later on in Japanese waters. I find it necessary to make four new species, and it will probably be found to be widely distributed through the Pacific Ocean.

From the subjoined list it will be seen that I have found it necessary to establish eleven new species, while two others are possibly new to science.

Under each species here recorded I have added the geographical distribution so far as the literature at my disposal enables me to do so.

LIST OF SPECIES.

Family HESIONIDÆ.

Hesione splendida, Savigny.

Family APHRODITIDÆ.

Sub-family POLYNOINÆ.

Polynoe platycirrus, M'Intosh.
Lepidonotus hedleyi, sp. nov.
Lepidonotus willeyi, sp. nov.
Physalidonotus rugosus, sp. nov.
Physalidonotus laevis, sp. nov.
Physalidonotus turritus, sp. nov.
Physalidonotus paucibranchiatus, sp. nov.
Harmothoe etheridgei, sp. nov.
Scalisetosus australiensis, sp. nov.

Family SIGALIONIDÆ.

Sub-family SIGALIONINÆ.

Thalanessa oculata, M'Intosh.
Sigalion, sp. incert.

Sub-family ACOETINÆ.

Eupompe australiensis, M'Intosh.

Family ALCIOPIDÆ.

Halodora, sp. ?

Family NEPHTHYDIDÆ.

Nephthys macrura, Schmarda.

Family AMPHINOMIDÆ.

Chloeia inermis, Quatrefages.
Notopygos labiatus, M'Intosh.

Family STAURONEREIDÆ.

Stauronereis australiensis, M'Intosh.

Family EUNICIDÆ.

Sub-family EUNICINÆ.

Eunice siciliensis, Grube.
Eunice bassensis, M'Intosh.
Eunice pycnobranchiata, M'Intosh.

Sub-family ONUPHIDINÆ.

Hyalinoecia tubicola, Muller.

Family LUMBRICONEREIDÆ.

Lumbriconereis sphaerocephala, Schmarda.
Lumbriconereis guliclmi, sp. nov.
Oenone haswelli, sp. nov.
Lysarete australiensis, sp. nov.

II.—Description of the Genera and Species.

Family HESIONIDÆ.

Genus Hesione, *Savigny*.

Hesione splendida, *Savigny*.

Hesione splendida, Savigny, System. des Annelides, 1820, p. 40, pl. iii., fig. 3.

Hesione ceylonica, Grube, Proc. Zool. Soc., 1874, p. 327.

Hesione pacifica, M'Intosh, Chall. Rep., Zool., xii., 1885, p. 184.

Hesione ehlersi, Gravier, Nouvelles Archives de Museum Paris, 1900, p. 175.

A comparison of the descriptions of the above species inclines me very strongly to the opinion that they are synonymous. I can find no definite characters that serve to distinguish the one from the other. True, one author gives some detail that is not mentioned by another. In the case of Savigny's account, for example, an inspection of the figures alone has led some authors to regard that species as blind and as being without prostomial tentacles; but, as Grube has pointed out, these organs are mentioned in the diagnosis of the genus *Hesione* on the previous page of the work, and as this species is the type, eyes and tentacles must have been present, though overlooked by the artist. Grube has also, on more than one occasion, made it clear from a careful perusal of the diagnosis and of the figures, that the species has four pairs of peristomial cirri. I note that in the drawing, too, the preanal cirri are not included, though reference is made in the text to them.

M'Intosh notes that his species is nearly allied to Savigny's, though the "body is more elongate and the shape of the head is different."

Grube[1] writes of *H. ceylonica*:—"Species cum *Hesione splendida*, Sav., maxime congruens, sed dorso fuscius lineato, haud transverse sulcatc, cirrisque tentacularibus longioribus differens," and Willey[2] has that it "is probably a geographical form of *H. splendida*."

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1. Grube—Proc. Zool. Soc., 1874, p. 327.
2. Willey—Ceylon Pearl Oyster Fisheries, pt. iv., Suppl. Rep., xxx., —Polychæta, 1905, p. 266.

It is curious that Gravier in referring to Savigny's species on p. 179, repeats the error about the tentacles which had been pointed out previously by Ehlers and Grube.

So far as I can see the only differences are in reference to these errors and the dimensions of the various forms. They all agree in being uniformly coloured without pattern, such as occurs in most of the other species typified by *H. pantherina*, Risso.

A re-examination of the species is desirable.

The following is a description of the single specimen obtained by the "Endeavour":—

Length, 47 mm.; widest at mid-body, 8 mm., or including the parapodia 19 mm. From this point it tapers towards each end, the first segment measuring 4 mm. and the last 3 mm.

The anus is situated at the end of a funnel turned dorsally, and this funnel is preceded by a preanal segment, which is dark brown, the rest of the body being a pale yellowish tint. The worm is, perhaps, like Savigny's type, "margaritaceous" or "pearly" in life.

The usual division-lines are noticeable, separating a median dorsal area from lateral areas, and the sides are swollen at the points to which the parapodia are attached.

On the under surface the median area is dotted with brown pigment. This is not mentioned by other authors, but it does not seem to me a specific character; this dotted area is interrupted by pale circular spots at each intersegmental line (possibly over the ganglia).

The head is a good deal compressed owing to pressure against the bottom of the tube; the prostomium is broader than its length, and its width is about one-third that of the peristomium, which is intimately fused with its anterior end. It is bilobed, with two pairs of eyes, and anteriorly a pair of minute tentacles which are easily overlooked, but can be detected on using a Leitz dissecting microscope, No. 16. Each is a transparent somewhat elongated conical organ. The peristomium, composed of four segments fused, is as wide as the first chætigerous segment. It carries eight couples of long peristomial cirri on each side, the dorsal cirri being about twice as long as the ventral, and the longest reaching as far back as the fourth chætigerous. The first ventral cirrus is shorter than the others.

These cirri have enlarged cirrophores, and the flagellum is minutely annulated.

The 16 parapodia have the usual form, and each carries a long dorsal cirrus, springing from an enlarged cirrophore; the filament being about three times the length of the parapodium, that is, as long as the width of the body. The four anterior parapodia are smaller, the first much shorter, than the rest.

The chætophoral sac has at its antero-dorsal margin a short filamentous "ligule" into which the black aciculum projects. This is easily overlooked unless the foot is mounted with the anterior surface upwards. It is not shown in M'Intosh's figure of the foot.

The chætæ are pale yellow, and of the usual form.

The ventral cirrus reaches beyond the end of the parapodium almost to the tips of the chætæ.

The preanal segment carries dorsal and ventral cirri but no distinct parapodium. The subanal cirri, borne by the anal funnel, are as long as the dorsal cirri anteriorly.

Loc.—Off Babel Island, Bass Strait, 50-80 fathoms.

Distribution.—Red Sea, Indian Ocean, Pacific Ocean (Tongatabu).

Family APHRODITIDÆ.

Sub-Family POLYNOINÆ.

Genus POLYNOE (*sensu latu*),[1] *Savigny*.

POLYNOE PLATYCIRRUS, *M'Intosh*.

Polynoe platycirrus, M'Intosh, Chall. Rep., Zool., xii., 1885, p. 111, pl. iii., fig. 4, pl. xvi., fig. 2, pl. xix., fig. 3, pl. viiiA., figs. 14, 15, pl. ixA., fig. 1. *Id.*, Potts, Trans. Linn. Soc., Zool. xiii., 1910, p. 336.

The material consists of two entire individuals and the greater part (anterior end included) of a third.

A complete specimen measures 75 mm. in length by 9 mm. across the elytra and 12 mm. over the ventral chætæ.

1. The whole subject of the delimitation of the genera of the Polynoinæ seems almost in as much confusion as at the time Grube wrote his classic paper "Bermerkungen Fam. Aphroditen Polynoina," in 1875.

These differ from the type in the colour of the elytra, which are uniform pale pinkish brown. They lack the "four darker longitudinal belts" which, being continuous with those of the other elytra, give the striping which M'Intosh regarded as characteristic of the species.

I find also that there are 24 pairs of elytra in both the entire individuals, instead of "about 23 pairs" recorded by M'Intosh. They are on the parapodial segments 1, 3, 4, 6, 8, etc., up to 42, 44 and on 45. This last scale, then, is in an unusual position, being on a consecutive instead of on an alternate segment.

There are seven postelytral cirriferous segments, giving in all 52. M'Intosh's largest specimen measured only 45 mm. in length by 10 mm. "total breadth," and his drawing shows 48 parapodia on each side.

It is possible, then, that they were not fully grown. It is not unlikely, it seems to me, that in these species with longish bodies the number of segments and even of the elytra may increase with age. Thus Potts records that specimens measuring 30 and 33 mm. had 19 or 22 pairs of elytra respectively.

In all other respects my specimens agree with M'Intosh's, especially in the unique structure of the dorsal cirrus, which is flattened from side to side, so as to be band-like. This is of more weight than any trifling difference in size or colour.

I may add one or two notes in extension of the former accounts. The parapodium is practically uniramous, for the notopodium is represented by a very small lobe on the anterior of the upper surface containing an aciculum and some two or three very small chætæ such as M'Intosh figures and which recall those of *L. simplicipes*, Haswell.

The neuropodial lobe carries a large number of stout chætæ in two groups—a supra- and a sub-acicular group—which are distinctly separate when seen from the side of the animal. But all are alike in structure, the supra-acicular group consists of 4-5 horizontal rows, with 2-3 in a row, giving a total of about 14-15 chætæ in a middle foot.

The sub-acicular group are in 8-9 tiers, of three in the upper and lower tiers and five in the middle ones, a total of 38-40. These chætæ are bifid, with 20 pectinated frills, and agree precisely with M'Intosh's figure.

Locs.—Off Babel Island, Bass Strait, 50-80 fathoms.

Off Gabo Island, Victoria, 200 fathoms.

Distribution.—The "Challenger" specimens came from off East Moncœur Island, Bass Strait, 38 fathoms, and off Twofold Bay, New South Wales, in 120-150 fathoms. Another is recorded from 2,200 fathoms from Station 163, quite close to this latter locality.

These three "Challenger" stations, then, are practically the same as the two stations from which the "Endeavour" obtained the above material.

Indian Ocean (Potts).

Genus LEPIDONOTUS, *Leach* (*sensu stricto*), *Kinberg*.

LEPIDONOTUS HEDLEYI, *sp. nov.*

(Plate xxxviii., figs. 1-7.)

It is with some little hesitation that I make a new species for the single individual, which bears some resemblances to *L. lissolepis*, Haswell, and to *L. purpureus*, Potts, to which I refer below.

The specimen is ill preserved, and superficially resembles *Harmothoe etheridgei* in its grey colour.

It measures 20mm. by 9mm. over the chætæ, as measured on the ventral surface, for the animal is flattened, somewhat distorted, and the elytra displaced so that dorsal measurements are uncertain. The elytra are uniformly pale gray, translucent, oval, thin and a good deal crumpled; they overlap but slightly fore and aft, and do not entirely cover the back. The dorsal surface of the body is marked by transverse bands of dark pigment; each band is composed of a series of very narrow lines close together, crossing the body in the alternate annuli (for as in other Polynoids each segment is biannulate as in many Earthworms); and each band is of the same width as the intervening uncoloured band.

The elytra (Pl. xxxviii., fig. 1) appear to be smooth under a lens, but are really sparsely covered with uniformly arranged low conical tubercles which have an oval base, so that they present under a low magnification a characteristic appearance of elongated refringent dots with a slit along its middle (Pl. xxxviii., fig. 3).

Each elytron (Pl. xxxviii., fig. 1) is oval with a slight anterior emargination, and is rather broader externally; the circular white areola is nearly central. The anterior region

of each is pigmentless and transparent, the pigment is rather darker round the areola especially in the posterior region. The pigment occurs as minute black granules in certain round cells rather widely scattered amongst clear empty cells (Pl. xxxviii., fig. 2). There is no fringe.

The notopodium (Pl. xxxviii., fig. 4) is small, and contains about 12 pale almost colourless chætæ, all alike, with incomplete spiral frills : for in some aspects the serrulations appear to be limited to one side.

The neuropodium is bluntly pointed, with yellow-golden chætæ, thicker than the notopodials, about 24 or 25 in number ; these have a subapical tooth, and from 9 to 15 pectinated frills, according to their position in the bundle ; the most distal frill having large teeth (Pl. xxxviii., figs. 6, 7).

The dorsal cirrus is pale brown for about half way along its length, then white, with a dark band a little below the tip, giving the appearance of a subterminal swelling.

The prostomium is typically lepidonotan ; it is as long as its breadth. The anterior eyes are at its widest point ; the posterior pair are far back, close to the nuchal fold.

The tentacles are smooth ; the median is lacking. The laterals are long slender, and colourless, except for a pale grey ring below the subterminal swelling.

Remarks.—In *L. lissolepis*, Haswell, from Port Stephens, the elytra are described as "smooth, rather delicate, dark slatey-brown, the pigment being arranged in minute dense lobed corpuscles instead of in separate granules." This appears to be quite different from the arrangement above described, and his figure of the chætæ is too poor to be sure that it agrees, except in a rough way, with those of the present species.

L. purpureus, Potts,[1] is also only briefly described. Its colour, however, is said to be "purple brown," and the pigment is "concentrated in little masses" between clear cells, giving a honeycomb appearance.

The surface of the elytron is "strewn with little chitinous tubercles showing a slight median depression."

His figure is not very clear, though if the dark circular things are meant for the tubercles they do not agree with those before me.

But both these seem from other features to be nearly allied to one another and to the present.

1. Potts—*Loc. cit.*, p. 334.

Loc.—Forty miles west of Kingston, South Australia, 30 fathoms.

Lepidonotus willeyi, *sp. nov.*

(Plate xxxviii., figs. 8-15.)

? *Lepidonotus carinulatus*, Willey, Ceylon Pearl Oyster Fisheries, part iv., Suppl. Rep., xxx.,—Polychæta, 1905, p. 248. *Id.*, Potts, Trans. Linn. Soc., Zool., (2), xiii., 1910, p. 331.

A single imperfect specimen which measures 9mm. by 4mm. over the chætæ, and only 2·5 across the body ventrally. It is imperfect posteriorly, as it contains only 19 pairs of parapodia, and 10 elytrophores. The elytra are, with the exception of 3 or 4 pairs, lacking.

The specimen is a poorly preserved male.

Under a lens the colourless elytra are covered in their exposed regions by pale brown roundish tubercles of relatively large size on the lateral area, and on the areola, which is somewhat raised. A patch of pale reddish brown pigment occurs above the scar.

The anterior concealed region is covered with much smaller hemispherical tubercles (Pl. xxxviii., fig. 8). The large tubercles, which appear to be round under a lens, are on focussing seen to be polygonal at the base, and to be produced into a variable number, and variably arranged short blunt processes.

Perhaps these correspond to Willey's "echinulate" tubercles, though the spines shown by him are sharper at the point.

Towards the external margin there occur a few rows of "spinulate" tubercles, short columns of various sizes, terminating in a variable number of sharp spines (Pl. xxxviii., figs. 9, 11).

The elytra are fringed only on the external margin with coarse, relatively long cylindrical processes.

All these outgrowths of the elytra are covered by abundance of very fine particles, which masks their details to a great extent.

The prostomium is relatively long, narrowed posteriorly, with the anterior eye laterally at the greatest width, which is about midway along the side; the posterior eye is about midway between this and the hinder end of the prostomium

The median tentacle is broken, the laterals are relatively short, and, excluding the base, each is equal to the length of the prostomium; there is apparently no sub-terminal swelling, though as the animal is soft, it may be present in life; they are smooth and colourless. The palps are pale brown with a white tip.

The dorsal cirri have a subterminal swelling, though feebly developed, and the pigmented ring below it no doubt adds to the effect. The parapodium (Pl. xxxviii., fig. 12) consists of a small notopodium only slightly prominent, and a large neuropodium whose lower margin slopes upwards to meet the upper at a blunt point, at which is the short acicular ligule. The notopodial chætæ are of two kinds, which differ only slightly from one another. The upper (*a*) are about 12 in number, shorter than the second kind, but of unequal lengths; they are arranged in a semicircle above the bases of these. Each terminates in a blunt smooth apex, at a little distance from which the usual frills commence (Pl. xxxviii., fig. 13). The second kind (*b*) are about 7 in number, longer, but of the same diameter; the tip, however, is extremely fine, and appears to be flexible; the frills are continued to the apex (Pl. xxxviii., fig. 14).

The neuropodial chætæ are 24 in number, with a sub-apical tooth, and about five frills, of which the uppermost has stouter denticulations than the rest (Pl. xxxviii., figs. 15, 15a)

Remarks.—Willey described a species from Ceylon under the name *L. carinulatus*, Grube, and Potts identifies one from the Indian Ocean under the same name. And at first I supposed that I had a specimen of Grube's species before me, as it agrees very closely with the account given by these two zoologists.

The chief reason for disagreeing with Willey's determination of his species is the presence of a sub-apical tooth on the chætæ, for Grube makes no mention of it, either in his original diagnosis of the species, to which neither of the above authors refer, nor in his second account of specimens from the Philippines.

Indeed, the original account[1] contains the following description of the chætæ—"inferiores fere 24-nae, apice graciliori simplici—sub eo vix dilatatæ, dentibus 4 serratæ, extremo majore."

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1. Grube—Anneliden des rothen Meeres (Ehrenberg gesammelt). Monatsber. Kgl. Akad. Wiss. Berlin, 1869, p. 7.

He here speaks of a "simple apex." Had he meant to imply that there was a tooth below the apex, he would surely have used the words "apice bidente" as in his diagnosis of *P.* (*Harmothoe*) *grisea*, on p. 9.

Grube's account of the elytron in his second memoir[1], however, seems certainly to apply to that of the specimen before me, and to those which Willey and Potts describe. He says that they appear, under a feeble magnification ("schwach bewaffnet Augen"), as presenting a network of closely arranged tubercles, which appear rounded, but are in reality polygonal, and each is crossed by a small low "keel" or light stripe. But are we justified in identifying a worm as *L. carinulatus*, because it has elytra of apparently the same pattern, when the more important chætæ are so different?

I think, therefore, that Willey and Potts had before them specimens of this new species, *L. willeyi*, and not Grube's species. It is true that Willey describes on the elytra of his worm some large rounded tubercles as "echinulate," but Potts does not find any such marked echinulations, nor are they present in this individual. Probably the short rounded outgrowths above described represent these spines. Potts' account agrees precisely with what I have seen.

Loc.—Off Maria Island, Tasmania, 78 fathoms (with *Eunice pycnobranchiata*, *Physalidonotus rugosus*, and *Glycera*, sp.).

Genus PHYSALIDONOTUS, *Ehlers.*

The genus was established by Ehlers[2] for the reception of a worm described in detail by W. M. Thomson[3] in 1900 under the name of "*Lepidonotus giganteus*, Kirk," which had been previously named by Quatrefages "*Aphrodita squamosa.*" The leading peculiarity to which the Ehlers' term refers is the possession of branchial "papulæ" on the sides of the parapodia, such as occur in the Acoetan genus, *Eupolyodontes*, and the existence of a definite dorsal channel below the elytra for the passage of the respiratory current backwards to its exit between the last pair of elytra; the mesial portion of the elytra being supported by certain low tubercles or pads of (? muscular) tissue along the back.

1. Grube—Annulata Semperiana, 1878, p. 26.
2. Ehlers—Neuseeland. Annelid., 1904, p. 9.
3. Thomson—Proc. Zool. Soc., 1900, p. 974.

A translation of Ehlers' diagnosis is:—"Polynoinæ with 20 pairs of leathery, rugged elytra covering the back; three tentacles with large basal joints at the anterior margin of the prostomium; a nuchal caruncle; chætæ between the peristomial cirri; finely denticulated dorsal capillary chætæ on a short dorsal foot-lobe, and stout chætæ with serrate frills in the ventral lobe; with bladder-like evaginations around the base of the cirro- and elytro-phores."

Previous to Ehlers' memoir, Moore[1], in 1903, had described two species of *Lepidonotus* from the coastal slope of Japan, viz., *L. chitoniformis* (p. 405) and *L. branchiferus* (p. 409), which clearly belong to this same genus. He pointed out their "evident relationship to *L. giganteus*, Kirk, from New Zealand," and suggested that the three species "might very properly be segregated as a distinct generic group."[2]

Amongst the material from the "Endeavour" dredgings I find four new species of this remarkable branchiate genus, and am therefore able to add one or two characters to the diagnosis of Ehlers and to delete two.

In the first place he includes the presence of chætæ on the peristomium; but these Bourne[3] long ago showed to occur in the genus *Lepidonotus*, and other early authors have recorded them.

The "Nackencarunkel" is also attributed to the genus; but in this I fancy Ehlers was misled by Thomson's figure of the head (Pl. 51, fig. 4) where he shows the first of the series of dorsal tubercles or elytron supports, labelled "d.t.1," and which he explains as "the first dorsal tubercle in the respiratory channel." It overlaps the base of the prostomium, but is not analogous with the "caruncle" of Amphinomids.

Additional characters are as follows:—

(1.) All the species agree in having the elytra attached by a long, narrow oval cartilaginoid tissue in the elytrophore, which is set transversely to the body axis in line with the foot, and leaves a very distinct, long oval scar on the elytron; whereas in all other species of Polynoinæ and Aphroditinæ, so far as the figures inform me, the elytrophore and its scar is a more or less circular thing; but in *Iphione muricata*, Savigny shows (Pl. iii., fig. 1) them as oval.

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1. Moore—Proc. Acad. Nat. Sci. Philadelphia, 1903, p. 401.
2. He notes, too, that "*L. branchiata*, Treadwell (Bull. U.S. Fish. Comm., xx., 1903, p. 186), from Porto Rico, possesses similar branchiæ, but the setæ and elytra are different."
3. Bourne—Trans. Linn. Soc., Zool., ii., 1883, p. 347.

(2.) In all the species so far examined the elytron is fringed with long filamentous processes, usually termed "cilia," over the posterior, the lateral and part of the anterior margin.

(3.) The ventral chætæ are not as figured by Thomson, but are bearded, as correctly shown by Moore for his species; and a re-examination of several individuals of *P. squamosus* shows that the short "frills," so characteristic of the Polynoids, are in reality formed by the bases of these long hairs. It may be mentioned that Thomson, in his description of the chætæ (p. 981), writes :—"Rows of minute filiform spines, but bearing no comb-like plates," and his figure shows short hair-like processes. All the specimens at my disposal are of rather large size, and these hairs have been worn away, leaving short frills composed of very minute and very thin and numerous processes, of unequal lengths. It is clear that Thomson had this in view, and recognised that the chætæ differed from the usual type.

Such bearded chætæ occur also in *Iphione spinosa* as figured by M'Intosh in the "Challenger" Report.

(4.) It appears to be characteristic to possess on the upper surface of the cirriferous segments and encroaching on the feet large transversely oval cushions (the dorsal "tubercles" of Grube), similar to, but smaller than, the elytrophoral cushions. In the figures of Polynoids, of which the naked dorsal surface is carefully drawn, these, though present, are much less conspicuous. Their great development here seems to be related to the improved respiratory system, evidently serving to direct the incurrent water between the feet on its way to the respiratory channel on the back, and so ensuring that it passes over the gills which are set along the faces and upper surfaces of the feet.

(5.) In all the species the elytra are supported mesially by a series of small "pads" along the back[1]—two pairs or two single ones in each segment, which, as in other Polynoids, are biannulate.

The first two pads are median and belong to the first parapodial segment; then follows a double series, median in position and close together, which extends till the tenth, thirteenth, or even, in one species, to the fifteenth segment, after which comes a median series, which ceases in the nineteenth segment. The channel thus formed along each side of this row of pads continues till the last elytron on the

1. Similiar pads are shown in a few other Polynoids, e.g., *Harmothoe tuberosa*, Ehlers.

twenty-second segment, above which is the "excurrent aperture" noted by Thomson as being formed by excavations on the mesial margins of the last pair of elytra, which margins are slightly upturned to limit a definite aperture.

(6.) The large tufts of very fine dorsal chætæ are so arranged as to meet the neighbouring tufts, before and behind, and these chætæ are covered with numerous fine hairs or long denticulations in which the fine particles become entangled as they are being carried inwards by the current. They serve, in fact, as a filtering apparatus.

(7.) Again, around the base of the dorsal cirrus, in all the species, is a large gland from which the cylindrical cirrophore arises, and thus divides the gland into two portions.[1] This gland is separated from the dorsal cushion by a distinct space on which in some species are the dorsal gills. May it be that this gland secretes a mucous material which also entangles fine particles which have escaped the filtering action of the chætæ? One finds delicate strands of stuff, with entangled particles, in between the feet and between the cushions.

The genus is in one respect at least more nearly related to the Aphroditinæ than to the Polynoinæ, namely in the form of the intestinal cæca, which are long and branched, and the ends reflexed, and lying below the "cushion" and elytrophores, whereas in the Polynoinæ these organs are shorter, simpler, and apparently not bent backwards.

The genus is, then, a specialised Polynoid in which certain modifications have occurred in the feet as well as in other parts of the body in the direction of perfecting the respiratory functions; and it presents an interesting instance of adaptation to its mode of life.

All the species come from some depth. The New Zealand forms are usually found in from 20-40 fathoms of water, with a bottom of ooze or fine sand. It is true that we sometimes find the animal on shore, but it may be that it has been carried there after a storm, for they are only occasionally found when shore-collecting. I have found them inside fishes.

The two Japanese species were obtained from 30-63 fathoms; and the new species occur in deep water, down to 200 fathoms.

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1. A similar gland occurs in other Polynoid genera.

PHYSALIDONOTUS RUGOSUS, *sp. nov.*

(Plate xxxviii., figs. 16-22 ; Plate xxxix., figs. 23-25.)

A stout oval Polynoid, measuring 48 mm. in length by 22 mm. across the elytra, and 27 mm. over the ventral chætæ. The diameter of the body alone measured over the ventral surface is 10 mm. The height at about the middle is 9 mm.

The 12 pairs of elytra completely cover the back and overlap considerably in the fore and aft direction. They are attached firmly, are of a cartilaginoid consistency, shiny white below. The region of each which is covered by its predecessor is smooth and nearly white ; the rest of the exposed surface is extremely rough, with smaller and larger tubercles and papillæ of various shades of brown ; but a small area just in front of the " areola " is rather conspicuous, owing to the pale ground colour, with small, pale tubercles. The external or lateral region is thinner than the rest, and where it covers the parapodium may be folded upwards owing apparently to the contraction of the body wall and elytrophore.

The " areola," or scar as it is sometimes called—that is, the area by which it is attached to the elytrophore, is an elongated oval, transverse to the long axis of the body. At the mesial or upper end of this areola is a small group of 4-6 long sub-cylindrical spinose papillæ, terminating in an enlargement covered with conical spines (Pl. xxxviii., fig. 19). These " areolar papillæ " measure from 1.0 to 1.5 mm. in length.

In addition, there may be one or two isolated similar papillæ near the external end of the areola.

The entire free edge, *i.e.*, the lateral and posterior margins, is fringed with similar papillæ, shorter on the posterior but longer on the lateral edge, where they measure from 1.5 to 1.75 mm. Moreover, they are not confined to the latter edge, but some 2-3 rows of rather smaller papillæ occur on the surface of this region close to the edge (Pl. xxxviii., fig. 18).

These long laterally placed papillæ form a very conspicuous fringe overlying the notopodial chætæ. They are pale, transparent, and probably colourless in life.

The shape of the elytron in the mid-body is roughly a rectangle with rounded corners, and with a slight excavation on the anterior margin ; its long axis is transverse to that of the body.

The first elytron is sub-circular and bears the long papillæ on its anterior edge as well as in the usual position.

The second is reniform, having a very deep concave excavation of its anterior margin, which fits round the first elytrophore.

So much can be observed with the naked eye; microscopic examination reveals the fact that amongst the large tubercles and long papillæ are smaller tubercles, stellate in form, of various sizes and of various shades of brown and stages of development. Many have a radiate base, or with spines close to the base, from which springs a column, terminating in radiating spines 3-5 in number (Pl. xxxviii., figs. 20, 21).

The long marginal papillæ are in reality long inverted cones with a narrow base of attachment and slightly expanded end, which is produced into two or three or more long spines, and the sides also bear spines. In the type they are more numerous and blunt, and resemble the pictures in children's books of an ogre's club.

The actual margin of the elytron is fringed with delicate hair-like "cilia" around the lateral, posterior, and the outer portion of the anterior margin.

The gills.—The branchial organs are thin-walled, finger-shaped hollow outgrowths of the body-wall, and may be termed "papulæ" (a word in common use for similar organs in the Asteroidea). These papulæ commence on the third parapodium, where there is a single one on the anterior and on the posterior face, but they soon become more numerous; then for a few segments before ceasing they decrease in number, and die out after the 23rd segment, which carries the last pair of elytra.

The arrangement, which may be regarded as normal for this species, as seen at about the middle of the body (Pl. xxxix., fig. 25), is as follows:—

On the anterior face of the parapodium there is a row of four papulæ, commencing at the "cushion" and sloping downwards along the anterior limit of the upper surface of the foot, the most distal of the row lying close to the base of the notopodium. There is a second row at a lower level, consisting of two (or occasionally three) papulæ, of which the distal is the larger and lies below the upper distal papula; the proximal is removed by some little space from the axilla.

On the posterior face the arrangement is somewhat different; there is a row of three commencing at the cushion, and the distal papula is close to the base of the cirrus (in the

cirriferous segments). There may also be a couple of small papulæ springing from the posterior face of the cushion. A lower row of two, the proximal near the axilla, the distal about half-way down the side of the foot. This row is nearly vertical, running down the axillary angle between the two feet (Pl. xxxviii., fig. 22).

The arrangement on the elytriferous segments is nearly the same, though there are usually three papulæ in the lower row on the posterior face, the proximal or uppermost being close to the axilla.

The parapodium has the form represented by Thomson's figure and illustrated here on Pl. xxxix., fig. 38—it possesses two bundles of chætæ; the notopodial bundle consists of a very large number of closely set, very fine, almost silky and very flexible bristles, which project as a pencil or brush, spreading outwards in all directions, and touching those of the neighbouring feet (Pl. xxxix., fig. 25). Under the microscope they are seen to bear a double series of very fine and rather long "cilia" or short hairs, which are covered with fine particles of mud, and evidently act as a sieve.

The neuropodial chætæ are stout and brown, about 30 in number, arranged in 10-12 tiers of 2-3 in a tier. They differ remarkably from the normal Polynoid chætæ, and resemble those figured by Moore for *P. chitoniformis*.

The usual "pectinated frills" (of A. G. Bourne) are replaced by transverse rows of very long, very fine hairs, which spread out on each side. It is impossible, I find, to count the rows, as they successively overlap, but there are at least 12-15 or perhaps more (Pl. xxxix., figs. 23, 24).

The aciculum of the neuropodium pierces the foot near its upper margin, and there is here above it a short tongue-shaped lip. There are only about five or six chætæ above the aciculum.

The dorsal cirrus arises from a swollen base, which appears to be a gland; it is more largely developed behind than in front of the base. The usual cirrophore and style are distinguishable in the cirrus, which presents no structural characteristic.

The cirrus is slender in proportion to the size of the animal.

The head agrees in general with that figured by Thomson for *P. squamosus*.

The prostomium (Pl. xxxviii., fig. 16) is about as broad as its length, widest behind the middle, and limited anteriorly

by a slightly impressed line across the bases of the lateral tentacles; it is notched for the insertion of the median tentacle.

Both pairs of eyes are far back; the anterior eye on each side is at the widest part of the prostomium, and forms a distinct protuberance; the posterior is just behind it.

The tentacles are pale brown, for about half their length from the base, followed by a colourless region, with a narrow band of darker pigment below the swelling. The palp is ciliated in seven rows, as figured by Thomson. The relative proportions of the parts are shown in the figure.

The "elytral pads" on the dorsum are double over the 2nd to 13th parapodial segments.

Other specimens measured have the following dimensions:—

(1) 20 mm. by 11 mm. over the elytra, and 15 mm over the chætæ.

(2) 25 mm. by 14 mm. over the elytra, and 17 mm. over the chætæ.

(3) 40 mm. by 16 mm., with a height of 8 mm.

Remarks.—The species resembles *P. squamosus* in size and general appearance of the elytra, but that species lacks the supra-areolar papillæ, for in all my material of different sizes and from various localities around the New Zealand coasts, this region of the elytron is comparatively smooth, though there are a few rather large papillæ just posterior to this areola. But in the present species they form a very conspicuous tuft.

At the same time there is a fair range of variability as to the rugosity of the elytra, seen in the material from Tasmania.

In a specimen measuring 40 mm. by 16 mm., with a height of 8 mm., they are less strongly marked than in the type, as they are smaller, and to the naked eye not so distinctly marked off from the more posterior papillæ. One can easily trace a gradation in this individual between the posterior stellate tubercles and the longer papillæ which carry the spines.

The long papillæ which in the type cover the external portion of the surface of the lateral region, are here fewer and even absent on some elytra. But I find no feature that marks this individual off definitely from the type, such as any difference in the arrangement of the branchial papulæ.

In the smaller individuals the spines on the marginal papillæ are sharper and fewer than in the larger type.

The colour varies somewhat in tone ; some are paler, others darker ; in some the smaller tubercles are almost black, in others brown. But colour is not a thing of importance in these worms, and in an individual, the successive elytra present differences in these respects.

Locs.—Off Maria Island, Tasmania, 78 fathoms. A single specimen, which has been selected as the type.

East of Maria Island, Tasmania, 78 fathoms.

East of Babel Island, Bass Strait, about 70 fathoms.

South of Mt. Cann, Victoria, 75 fathoms.

East coast of Flinders Island, Bass Strait.

Physalidonotus laevis, *sp. nov.*

(Plate xxxix., figs. 26-32.)

Two specimens were obtained, the larger of which has the following dimensions:—Length, 32 mm. by 13 mm. across the elytra and 15 mm. over the chætæ, with a height near the middle of the body of 6 mm.

The second individual is darker in colour, and measures only 20 mm. by 10 mm. across the elytra.

The elytra are pale brown, and appear to the naked eye relatively smooth as compared with *P. rugosus* and others. The exposed surface is covered with small colourless stellate tubercles, which are quite minute anteriorly (Pl. xxxix., fig. 28) ; they increase in size towards the areola and the posterior border, but none attain the same large proportions found in *P. squamosus* or *P. rugosus*. Even those on the external margin are short.

Over the upper end of the areola these stellate tubercles are more densely aggregated, are slightly larger and taller than those in the posterior region, but not greatly so (Pl. xxxix., fig. 31).

The marginal papillæ are somewhat different from those in *P. rugosus* ; they are cylindrical rather than obconical, with a few large spines at the free end (Pl. xxxix., fig. 29) ; the largest of the spines is usually a continuation of the axis of the papilla, the others radiating more or less at right angles from it. But on the posterior margin many of the papillæ have five nearly equal spines radiating horizontally, one of which is larger than the rest.

As in other species, the ground colour of the elytron is white, and the surface covered with variously coloured stellate tubercles of a regular form, some of which may contain black pigment; these stars may be carried by short cylindrical bases. Near the external, anterior margin are a few soft, uncoloured, simple conical papillæ (Pl. xxxix., fig. 30).

In the larger individual the elytra are a good deal paler than in the shorter one, owing, of course, to the less amount of the black pigment in the tubercles, or rather to the fewer black stars.

The gills.—On the anterior face of the parapodia, there is a row of 3 or 4 papulæ in a line, starting from one at the outward corner of the cushion, the distal one of the row being near the notopod. There may also be, on the cirriferous segments, an additional papula at a lower level on the face of the foot about half way along. On the posterior face there is a large papula close to the cushion, larger than any of the others, which in cirriferous segments is clavate rather than finger-shaped (Pl. xxxix., fig. 32).

At a lower level is a row of smaller papulæ, commencing at the axilla, and inclined downwards; in the cirriferous there are two, and the elytriferous three, in this row.

The prostomium is as broad as its length, broadest almost at its hinder border. The two pairs of eyes are even further back than in *P. rugosus*, very close together, the anterior at rather a higher level than the posterior; they are oval in outline, with the longer axis vertical, and is best seen in side view (Pl. xxxix., figs. 26, 27).

The tentacles are broken off in the larger specimen (the type), and in the smaller only one lateral tentacle remains. This is reddish brown right up to the swelling, which is white; the tentaculophore is vandyke-brown.

The tentacle is proportionately as long as that of *P. rugosus*.

As in other species, the hinder margin of the prostomium is overlapped by the first "pad" for the elytra.

The double "pads" occur on segments 2-13 inclusive.

Locs.—Twenty-five miles south-west of Cape Everard, Victoria. This specimen has been selected as the type.

Off Gabo Island, Victoria, 200 fathoms, with *P. pauci-branchiatus*.

PHYSALIDONOTUS TURRITUS[1], *sp. nov.*

(Plate xxxix., figs. 33-35.)

Four specimens of this small species, one of which measures 12 mm. in length by 6 mm. across the elytra.

The characteristic marginal obconical papillæ are relatively large for the size of the worm ; they are shorter and wider than those in the preceding species.

There is a row of 3-4 large cylindrical papillæ over the areola ; each springs from a distinctly stellate base, and terminates in a crown of rounded lobes, rather than spines. The width of these papillæ is less than half the height (Pl. xxxix., fig. 33).

Along the posterior margin there is a row of very irregular spinose papillæ, and at the external margin a few large papillæ, some of which, towards the anterior edge, are nearly cylindrical, others towards the posterior side are inverted cones, with a very narrow base of attachment, widening out terminally. All these bear blunt spines.

The general surface of the elytron is covered by closely arranged low stellate tubercles, small in the anterior region, larger towards the areola, and still larger on the posterior region, where they are also of more irregular form and size. In colour they are varied, some being nearly black.

On the covered portion the tubercles are very small and rounded.

The margin, as usual in the genus, is fringed with relatively long "cilia," longer on the external than on the posterior margin.

The gills.—On the anterior face there are two papulæ close together, about midway along the foot, and one shorter one on the cushion. On the posterior face there is only one papula, that a long one springing from the base of the cushion, but in a cirriferous segment there is, in addition, a second one close to the base of the cirrus (Pl. xxxix., fig. 35).

The prostomium is broader than long, widest at its middle, where the anterior pair of eyes is situated, the other pair lies immediately behind them (Pl. xxxix., fig. 34).

The tentacles are uniformly pale brown, the median more than twice the length of the laterals. (In these measurements the basal "tentaculophore" is not included).

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1. "Furnished with towers," so named from the castle-like form of the large papillæ on the elytra.

The elytral "pads" on the dorsum are double in segments, 2-13.

Loc.—Twenty miles east of Babel Island, Bass Strait, 65 fathoms.

PHYSALIDONOTUS PAUCIBRANCHIATUS[1], *sp. nov.*

(Plate xxxix., figs. 36-38; Plate xl., figs. 39-42.)

A single individual measuring 23 mm. in length by 9 mm. over the elytra, and 11 mm. over the chætæ.

The shape is similar to that of the other species, a broad oval. The elytra are pale, almost white, with a pinkish tint, or even a faint purplish tint in some of the anterior elytra.

In the pre-areolar region the tubercles are small and dark, many nearly black, stellate, and very sparsely distributed, as, indeed, they are all over the elytron.

There are no special areolar papillæ, but just behind this region is a row of 5-6 much larger multiradiate papillæ, most of which are dark greenish, nearly black to the naked eye, which show up conspicuously on the pale background.

These large papillæ are close together in a line running along the length of the elytron, reaching nearly from the mesial and to the external border.

The posterior region is almost free from tubercles, as they are few and scattered, stellate in form, much smaller than those in the post-areolar row; but close to the posterior margin is a single row of large papillæ about half the size of the post-areolar row, the number and distribution of which naturally varies. In some of the elytra this posterior series extends nearly to the mesial border, but usually ceases at the upper end of the level of the areola.

The mesial surface above the areola is sparsely covered with small dark spiny tubercles.

Further, the lateral region, especially towards the anterior border, has very few tubercles, but is sparsely covered by long filamentous processes similar to those constituting the marginal fringe, but of greater length (Pl. xl., fig. 42); a few of shorter length are found also in the external portion of the posterior region.

The papillæ are much shorter than in the previous species, even the largest are short, low cylindrical columns of considerable width, terminating in a nearly flat top, wider than the base, the margin of which is produced into a variable number of short rays. In those of slightly less size, these

1. In reference to the fewness of the branchial papulæ.

rays are more sharply pointed, suggesting that those of the larger are worn down. The low tubercles behind the areola have a rounded attachment, and are terminally dilated and produced into three or more, rarely four, sharp spines.

The impression conveyed by a close study of the series is that the larger are derived from the smaller by increase in number of rays or spines.

The branchial papulæ are much less developed than in the other species (Pl. xxxix., fig. 37). On all the feet, within the branchial region of the body, there is a couple of short papulæ close together on the anterior face, the distal being somewhat the larger.

On the posterior face of the cirriferous feet there is a single short papula springing from the cushion, but this is absent in the elytriferous feet.

The **chæta** has a construction just below the "frilled" region, which does not occur in the other species (Pl. xxxix., fig. 36).

The **head.**—The prostomium is as broad as its length, perhaps rather broader; the tentacles are broken.

But a characteristic feature about the eyes is their approximation (Pl. xl., figs. 39, 40). The two on each side are in contact, near the hinder part of the side. When seen from above only one pair appears to exist, but from the side an anterior eye is seen lower down the side, and rather smaller than the posterior. It may be that it is the anterior eye that has travelled backwards, if one may judge from the relative size of the eyes.

The double elytral "pads" extend on to the 15th segment.

Loc.—Off Gabo Island, Victoria, 200 fathoms, with *Polynoe platycirrus* and *Physalidonotus laevis*.

Genus Harmothoe (*sensu latu*), *Kinberg*.[1]

Harmothoe (Eunoa) etheridgei, *sp. nov.*

(Plate xl., figs. 43-51.)

A single individual whose body is of the usual shape, the sides almost parallel, and nearly equally tapering at each

1. Malmgren's genera, as has been pointed out by others, are founded on such points as the relative size of the notopodium, the presence or absence of a tooth on the neuropodial chaeta, and the presence or absence of a fringe to the elytra. It is well known that these features all occur in various species of *Lepidonotus*, yet no one, I think, has attempted to subdivide that genus on these minute differences. Hence I follow Willey ("Southern Cross" Polychæta, 1902, p. 263) among others, in using *Harmothoe*, rather in Kinberg's sense, though it is not easy to distinguish that from his *Antinoe*.

end, though the posterior is slightly narrower than the anterior.

The worm measures 25 mm. by 8 mm. over the elytra, and 9 mm. over the neuropodial chætæ.

It has 38 parapodial segments, and 15 pairs of elytra. The elytra are on the usual segments 1, 3, 4, 6 - - - 20, 22, 25, 28, 30, the last elytron is followed by 5 parapodial segments.

Most of the dorsal cirri, as well as the subanal cirri are absent.

The body wall is unpigmented ; the chætæ are pale yellow.

The elytra are grey, overlap fore and aft, as well as right and left, covering the back, and hiding even the bases of the notopodial chætæ.

They are rather soft to the touch, and are fringed. The first one is grey all over, rather darker near the dorsal region.

The rest have the anterior region white, the exposed region pale grey, becoming darker towards the dorsal region, and posteriorly, but paler again in the lateral region.

This exposed portion is covered sparsely with small dark rounded conical tubercles (Pl. xl., fig. 47). Near the posterior margin there is a row of widely separated white. *i.e.*, unpigmented, and probably transparent in life, long, finger-shaped papillæ. These are absent on the first elytron. On the anterior elytra there may be as many as eight of these soft papillæ ; on the majority I note some 4-6, while on the posterior ones only three are present. When viewed under a microscope the tip of each is seen to be formed by a short conical cap of highly refringent chitin ; at the base, too, is a ring of chitin, the greater part of which is thin and evidently pliable, for many of them are bent (Pl. xl., fig. 48). There are also now seen a number of short filamentous processes, on the surface near the posterior margin, similar to the fringe, but of less length. The fringe extends on to the hinder margin, but the filaments are shorter and less crowded than on the external margin.

The areola is white, circular and subcentral. The elytra are subcircular, with the usual anterior emargination.

The parapodia.—The neuropodium is produced into a long rounded point, which bears at its apex a small digitiform supra-acicular "ligule" (Pl. xl., fig. 51). On its upper surface the neuropodium carries the sessile notopodium. The chætæ in both lobes are very numerous.

The notopodial chætæ, about 50 in number, are stouter than the neuropodial, and are radiately arranged; the upper and anterior are shorter than the rest, but of the same form; they have a blunt point below which is a large number of rows of minutely pectinated frills (Pl. xl., fig. 49).

The neuropodial chætæ, about 70 in number, are in 7 or 8 tiers, with 3-6 (or even 7) in each tier (Pl. xl., fig. 50); the smaller number in the upper and lower, the larger number in the middle tiers. There are some 23-25 frills in the longer upper chætæ. The lower chætæ have, as is usual, fewer frills than the upper, and are altogether shorter.

There is no evidence of a subapical tooth (therefore it would be placed in Malmgren's genus, *Eunoa*). Nor are there any stout pectinations in the distal frill.

The dorsal cirri are covered with short cylindrical papillæ.

The head is typically Harmothoid, but the peaks are rather widely separated (Pl. xl., fig. 46). The prostomium is longer than broad, the anterior eyes are lateral at about the middle of the side, and the posterior are far back, close to the hinder margin.

The tentacles are finely ciliated, the subterminal swelling feebly marked. The median tentacle is much stouter than the laterals, and about twice their length.

The palps are longer than the median, as also are the peristomial cirri. The tentacles, like the cirri, are transparent.

Yellow chætæ are visible on the upper side of the base of the peristomial cirri.

Remarks.—M'Intosh described in the "Challenger" Report a species, *Eunoa abyssorum*, from the south of Australia, in 2000 fathoms, which in some respects seems to resemble the present species. But as that individual had no elytra, and as the chætæ differ in some details, and the form was eyeless, it seemed desirable to establish a new species for it.

In *Eunoa opalina*, from the Strait of Magellan, M'Intosh describes and figures "soft papillæ" on the elytra, but they are short and broad. He refers also to the "pellucid" tentacles, and the widely separated peaks of the prostomium.

But his figures of the chætæ show differences in that the apex of the neuropodial is much more hooked and sharper at the tip, and that of the notopodial is longer and sharper than in the present.

Loc.—Off Gabo Island, Victoria, 200 fathoms, with *Polynoe platycirrus*, *Physalidonotus laevis*, and *P. paucibranchiatus*.

Genus SCALISETOSUS, *M'Intosh.*

SCALISETOSUS AUSTRALIENSIS, *sp. nov.*

(Plate xliv., figs. 114-117.)

A very poorly preserved fragment, deprived of its elytra, most of the prostomial outgrowths, all its dorsal cirri, while many of the parapodia are injured. It is pale in colour, without any pigment. The 28 segments measure 10 mm. in length, with a diameter of 2 mm. across the body, and 3·25 mm. over the parapodia.

The prostomium (Pl. xliv., fig. 114) consists of a pair of oval lobes separated by a wide deep groove; the anterior margin is well marked, and the tentacles spring from below it. Only the bases of these remain, the median rises at a rather higher level than the laterals, and the tentaculophores appear to be very short. The two pairs of eyes have a pale brown colour.

The elytrophores occur on the chætigerous segments 1, 3, 4, 6, 8, etc. I cannot say where the change, if any, occurs, owing to the damage in the hinder segments of the fragment.

Both the elytrophores and cirrophores overhang the parapodia much more than is usual in the family, indeed, they overhang the notopodia, which is a small lobe (Pl. xliv., fig. 115). The neuropodium has a long anterior pointed lip. The ventral cirri are narrow filaments.

The chætæ are colourless; they are alike in form in both lobes, but those in the dorsal lobe are much shorter. These chætæ are quite characteristic of the genus (Pl. xliv., fig. 116); at the point where the shaft commences to bear the pectinated frills, it is distinctly enlarged, and bears a conspicuous single large frill, which under a low power looks like a tooth, but fine grains of mud are present in the cup formed by it. The remaining frills have the appearance of a series of small teeth. The apex is free, and in the dorsals simple, but in many of the ventral chætæ there is a minute subapical tooth.

The frills (Pl. xliv., fig. 117) are very short and delicate, and each has but little height, is very indistinct, and slopes downwards more abruptly than is usual in the family.

The genus was formed by M'Intosh for a single specimen, *S. ceramensis*,[1] and Moore has found it off the coast of Japan, his species, *S. formosus*,[2] is, like mine and the type species, very imperfect, and we know nothing of the elytra in the genus. But the chætæ are so characteristic that there is no mistaking it.

Loc.—Southern coast of Australia.

Family SIGALIONIDÆ.

Genus THALANESSA, *Baird.*

THALANESSA OCULATA, *M'Intosh.*

(Plate xlv., figs. 118-123.)

Thalanessa oculata, M'Intosh, Chall. Rep., Zool., xii., 1885, p. 142. *Id.*, Treadwell, Bull. U.S. Fish. Comm., xxiii., 3, 1906, p. 1157.

A single individual was obtained which is smaller than the type. It measures 30 mm. in length by 1 mm. across the body, and 3 mm. over the parapodia. It is a good deal shrunken, as if it had been placed in very strong spirit. There are 61 segments, but it is apparently imperfect.

The account in the "Challenger" is so full that I need not add any further data, but I have given figures in addition to those already published, namely of a typical foot (Pl. xlv., figs. 119, 120), and of the peculiar anterior feet, in which the membranous expansion of the neuropod and digitate noto-podial processes are so well developed. The parapodia are remarkably long; their appearance will be gathered from the figures herewith (Pl. xlv., figs. 121-123).

M'Intosh's figure of the elytron is not quite typical; it represents an anterior one, while those in the greater part of the body are not exactly "reniform," as he describes them. Each has a deep excavation on the anterior margin, but the outer or ventral boundary is much longer than the upper, and the scale covers almost four segments as shown (Pl. xlv., fig. 118). It is attached to the elytrophore near its anterior dorsal margin.

I find that the body-wall is splashed with pale nut-brown markings on each side of the anterior segments, which are visible through the transparent elytra, which themselves

1. M'Intosh—Chall. Rep., Zool., xii., 1885, p. 103.
2. Moore—Proc. Acad. Nat. Sci. Philadelphia, 1903, p. 403.

have a patch of paler brown at the anterior lobe and along the posterior margin; otherwise they are colourless and transparent.

M'Intosh states that the number of processes to the elytral papillæ are five or six; I find that in the mid-body elytra there may be as many as eight or nine in those papillæ in the middle of the series.

Remarks.—Haswell's *T. microceras* differs in a number of features.

Loc.—South of St. Francis Island, South Australia, 35 fathoms.

Distribution.—Off East Moncœur Island, Bass Strait, 38 fathoms; Tongatabu, 18 fathoms; off Hawaii, 20-142 fathoms.

Genus SIGALION, *Milne-Edwards.*

SIGALION, *sp. incert.*

A fragment without head or tail, consisting of about 50 segments of a diameter of 1.5 mm. across the body and 3 mm. over the parapodia. Its length it is difficult to estimate, as it is much curved. I am unwilling to name the present fragment, but it does not agree precisely with any hitherto recorded.

Loc.—Forty miles south of Cape Wiles, South Australia, 100 fathoms.

Sub-Family ACOETINÆ.

Genus EUPOMPE, *Kinberg.*

EUPOMPE AUSTRALIENSIS, *M'Intosh.*

Eupompe australiensis, M'Intosh, Chall. Rep., Zool., xii., 1885, p. 135.

A single specimen, imperfect posteriorly, was in an extraordinary condition. It consists of the anterior end with 30 segments, but only the last five were visible, as the worm was completely turned inside out, with the head forwards and inwards. It was only on slitting open the mass of apparent muscle, which I supposed to be the partly digested body-wall, that I discovered the head and all its outgrowths well preserved inside.

The pharynx was attached to this mass by a long ligamentous cord, formed apparently by the buccal cuticle drawn out into a filament.

Loc.—Twenty miles east of Babel Island, Bass Strait, 65 fathoms.

Distribution.—M'Intosh records it from "Station 168 (apparently off Cape York, Australia, and probably in Endeavour Strait)."

Family NEPHTHYDIDÆ.[1]

Genus NEPHTHYS, *Cuvier.*

NEPHTHYS MACRURA, *Schmarda.*

(Plate xl., fig. 57.)

Nephthys macrura, Schmarda, Neue Wirbellose Thiere, i., 2, 1861, p. 91. *Id.*, Ehlers, Neuseeland. Annelid., 1904, p. 14.

Nephthys virigini, Kinberg, Annulata nova, 1865, p. 239.

Nephthys trissophyllus, Grube, Monatsber. Akad. Wiss. Berlin, 1877, p. 533. *Id.*, M'Intosh, Chall. Rep., Zool., xii., 1885, p. 159.

Ehlers has been able by comparison with the types of the three authors to establish the synonymy as above.

In spite of certain differences between the fragment described below and the accounts of the authors above cited, I identify it with this species, with which it agrees, in the characters of the foot especially, more closely than it does with any other species in the literature available to me.

A cephalic fragment containing 30 chætigerous segments measures 15 mm. in length by 2.75 mm. across the body and 3.5 mm. over the parapodia.

The colour is a uniform pale pinkish brown.

The prostomium, which is without eyes, is shield shaped, truncated in front, pointed behind; its length is to its breadth rather more than as 3 : 2 (Pl. xl., fig. 57). On each side near the hinder end is a rounded "nuchal organ." The anterior angles are produced into a pair of short triangular tentacles, and from the under surface two others arise of slightly greater size, directed outwards.

1. As the word "Nephthyidæ," sometimes used for this family, is employed for a family of Alcyonarians, the above form seems desirable.

The first segment carries a parapodium as usual, and the ventral cirrus is rather larger than that on the following.

The anterior eight feet differ from the rest in lacking the gill, which makes its appearance on the ninth.

The base of the foot is not quite so high as that of the body.

The pharynx was wholly withdrawn. On opening the body it is seen to reach to the eighteenth segment. The organ was slit open and mounted. The entrance to the pharynx is surrounded by a circle of 20 rather long, closely set, bifurcated, filamentous papillæ, with a single shorter one in the dorsal and ventral mid-line.

The buccal region presents 20-22 longitudinal rows of similar but shorter papillæ, which decrease in size towards the mouth. These rows commence at alternating levels (cf. M'Intosh, Pl. xxvi., fig. 4), and those on the dorsal surface commence immediately behind the pharyngeal papillæ ; those on the ventral a good deal further back. These rows diminish in number towards the mouth, where only 14 can be counted.

I cannot detect in the mounted preparation any evidence of the bifurcation of these rows of papillæ, as the mouth is approached, such as are figured by M'Intosh and by Ehlers ; though otherwise there is a considerable degree of agreement. May it be that as the animal grows the length of the buccal rows increase and then bifurcate ? It is difficult in this retracted state to compare their arrangement with that figured by M'Intosh of the everted organ.

About midway along the pharynx is the usual dorsal and ventral brown conical denticle.

I have stated that there are differences between this form and the accounts of the species. Not only so, but the figures given by M'Intosh are not altogether in accord with those of Ehlers.

In the first place the shape of the prostomium is longer in the fragment before me than in most of the figures. In M'Intosh's figures the proportion of length to breadth differs according to the state of eversion of the pharynx—explicable perhaps by the fact that when fully averted the prostomium is stretched laterally (cf. Pl. xxvi., figs. 1, 3, 5).

In fig. 3 the length to breadth is about as 3:2 ; but in others the two approximate, and in Ehlers' (Pl. 1., fig. 10) the breadth is the greater. Moreover, he does not show an angle at the posterior end, which is distinct enough in M'Intosh's

drawings ; and Grube in his diagnosis of *N. trissophyllus* writes :—" Lobus cephalicus. parvus, quadratus, segmento buccali penitus impressus," which I read to mean that it impinges " deeply " into the buccal segment.

Again, there are details about the lobes of the notopodium in which exact agreement is lacking ; for instance, Ehlers shows two smaller lobes below the large one ; only one is figured in M'Intosh ; nor did I find a second in this individual. At the same time Ehlers notes that in the abundant material that he had the variations in details are so great that if they had been found separately different species might have been established.

The colour of the larger individuals is, according to Ehlers and Grube, somewhat variegated, darker brown, either in lines or spots or over the dorsum generally, on a paler ground. But M'Intosh notes that amongst his material " the smaller examples are pale," and presumably of uniform tint.

Ehlers was able to compare his specimens with Kinberg's type, and to assure himself of the identification of Grube's with Kinberg's species (1897) and later with Schmarda's (1904).

If I am correct in this identification, the species is an interesting example of an Australio-subantarctic distribution, analogous with what Ehlers noted amongst the Polychætes of New Zealand and as I found amongst the Auckland Islands worms.[1]

Loc.—Forty miles east-north-east of Babel Island, Bass Strait, 1200 fathoms.

Distribution.—Kerguelen ; Fuegia ; Magellan Strait ; New Zealand.

Family AMPHINOMIDÆ.

Genus NOTOPYGOS, *Grube.*

NOTOPYGOS LABIATUS, *M'Intosh.*

Notopygos labiatus, M'Intosh, Chall. Rep., Zool., xii., 1885, p. 19. *Id.*, Treadwell, Bull. U.S. Fish. Comm., xxiii., 3, 1906, p. 1164.

Of two individuals of a worm which I refer to this species, one, well preserved, measures 39 mm. in length, so that it is larger than the type ; it is widest about the middle, where

1. Benham—Report on Polychæta, Subantarctic Islands of New Zealand, 1909, p. 236.

it is 9 mm. across the ventral surface, whence it tapers fore and aft. The width of the 4th chætigerous is 4 mm., and at the hinder end is 3 mm. It is pale in colour, with little sign of pigmentation; the caruncle is yellowish, and along the line of union of the crest with the basal lamella is a line of dark purple; the same colour is present on the cirrophores of the dorsal cirri and at the base of the branchial cirri.

The chætæ, which are said to be pale green in the type, are here colourless, glassy, though in a less well preserved specimen they are pale yellow.

This suggested that perhaps I had Haswell's *N. flavus*[1] before me, and the almost total absence of serrations on the chætæ inclined me to that view, but he states that amongst the dorsal bristles some are simple, while in the genus typically all are forked. I find no simple ones.

Potts[2] has recently tabulated the species according to the presence or absence of serrations. In the present case I can only find serrations on the ventral chætæ of the anterior segments, and then they are so ill-defined that under a low power (Leitz, Oc. 3, Obj. 3) they are not recognisable. Under a higher combination, however, there are seen, as M'Intosh figures them, as minute step-like interruptions in the margin of the larger prong.

Except for this small difference, my specimens agree with M'Intosh's so closely that I do not feel justified in making a new one.

Locs.—Southern coast of South Australia.
North of Cape Borda, Kangaroo Island, 40 fathoms.
Distribution.—South of the Philippine Islands; Hawaii.

Genus CHLOEIA, *Savigny.*

CHLOEIA INERMIS, *Quatrefages.*

Chloeia inermis, Quatrefages, Hist. Nat. des Annelides, i., 1865, p. 389.

This worm I have taken on several occasions on the coasts of New Zealand, though I do not think that it has been recorded since Quatrefages wrote his brief account of it. Its leading feature is the absence of bifurcation and of serrations on the chætæ.

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1. Haswell—Proc. Linn. Soc. N. S. Wales, III., 1879, p. 343.
2. Potts—Trans. Linn. Soc., Zool., xii., 1909, p. 358.

The present specimen measures 42 mm., with a diameter of 10 mm. at its broadest, which extends from about the 15th to 20th segments. It contains 29 segments.

The dorsal and ventral chætæ are alike, though the ventrals are much finer, straight, thick-walled, hollow, with a simple point. A few of the ventrals have a minute subapical tooth ; or this may be represented by a "step" where the tooth has been worn away.

Loc.—Off South Cape, Tasmania, 75 fathoms.

Distribution.—New Zealand.

Family ALCIOPIDÆ.

Genus HALODORA, *Greeff*.

HALODORA, SP. ?

(Plate xl., figs. 52-55 ; Plate xli., fig. 56.)

I have no recent literature on this group, so that I am unable to compare the present worm with those previously described. I attribute them to the genus *Halodora*, Greeff, as the head does not project beyond the eyes ; the introvert is without denticles, and there is no "cirriform lip" to the parapodia, while the chætæ are compound. It differs from *H. reynaudii*, Audouin & Milne-Edwards, in various respects.

The material consists of two cephalic fragments, two tails and an intermediate region of the body, belonging to one of the two individuals ; the portions are much coiled, and measurements are difficult to make with accuracy.[1] But the worm seems to be about 40 mm. in length, with a diameter of 1 mm. or 2 mm. over the parapodia. It is widest anteriorly where the width is 2 mm. over the eyes, and tapers slowly posteriorly.

The worm then is long and narrow, with large brown spots on each segment laterally, just behind the base of the parapodia ; the cephalic eye is of enormous size, and rich brown in colour, the pupil faces downwards and outwards.

Each of the anterior segments is crossed by a narrow band of brown pigment, of a width about equal to the antero-posterior width of a parapodium, and on the first seven or eight segments it is continued from side to side, linking the lateral spots ; but in the following segments it is broken in

1. One cephalic fragment has twenty-three segments and measures 12 mm. in length ; one head-less fragment has fifty segments followed by twenty-four very small regenerated segments.

the middle, and further back the length of each moiety of the band gets less and less, though they persist till nearly the hinder end, and at the same time the depth of the brown diminishes.

Neither caudal portion shows any anal cirri.

The whole worm shows evidence of much shrinkage due to the strong alcohol in which it is preserved.

The head.—The prostomium is depressed between the eyes, and is traversed by a convex ridge at its anterior end, which appears to represent a median tentacle, for I can see no definite appendage in the middle line (Pl. xl., fig. 55). The paired tentacles lie on the underside of the sloping prostomium; the upper pair is almost in line with the upper surface of it; each is very short, rounded, and nearly as broad as it is long. The lower pair are directed downwards; each is cylindrical and about 3-4 times as long as the upper one.

The peristomium.—The lower lip is a thin transverse fold notched in its middle, and somewhat produced on either side.

There are three pairs of "peristomial" (or better, "metastomial") cirri. Behind the peristomium is a segment, which bears on each side an oval thickened whitish pad, whence arise two cylindrical processes, one external and ventral, lying against the under surface of the eye; the other is much smaller, and directed outwards. Behind these again is a faintly marked segment, which bears a pair of larger and stouter cirri, directed backwards.

The next segment bears the first distinct parapodium, but I can detect no chætæ. The dorsal lobe is produced into a foliaceous process or dorsal cirrus, resting against the hind wall of the eye; the small ventral cirrus resembles the following. This segment is banded with brown dorsally, and has but a small lateral brown spot on each side.

The parapodium of the following segments is uniramous, with pointed lips (Pl. xl., figs. 52, 53); it bears dorsally and ventrally a large foliaceous cirrus, the former the larger. The aciculum is colourless, with a slightly curved tip; the chætæ are likewise colourless, of the usual delicacy: they are jointed, with a long simple appendix (Pl. xli., fig. 56).

Loc.—East coast of Flinders Island, Bass Strait.

Family STAURONEREIDÆ.

Genus STAURONEREIS,[1] *Verrill.*

STAURONEREIS AUSTRALIENSIS, *M'Intosh.*

(Plate xli., figs. 58-66.)

Staurocephalus australiensis, M'Intosh, Chall. Rep., Zool., xii., 1885, p. 232. *Id.*, Treadwell, Bull. U.S. Fish. Comm., xxiii., 3, 1906, p. 1173.

A single entire individual, which I believe belongs to this species, which M'Intosh founded on a posterior fragment.

The worm is nearly white, and is probably pink in life. It measures 75 mm. in length, with a diameter of 5 mm. over the body, and 10 mm. over the parapodia. It consists of a head with 145 chætigerous segments, whose length is about one-eighth the width of the body in the anterior half, and one-fifth posteriorly. The body is slightly wider anteriorly, tapering slowly backwards. The dorsal surface is convex; the ventral flat with a median furrow.

The semicircular prostomium is of small size, its base being about a quarter the width of the peristomium (Pl. xli., fig. 58).

The tentacles are moniliform, with 9 rings, terminally rounded, the last ring being longer than the others. They are relatively thick and short, scarcely reaching beyond the lateral margin of the body; or when pressed back, to the posterior margin of the first chætigerous.

There is a pair of downwardly directed palps, not moniliform, but the apex is constricted from the rest; the rest is smooth, but a good deal contracted so that irregular furrows cross it. It is only a little longer than the tentacle, but a good deal stouter (Pl. xli., fig. 60).

There are two pairs of eyes, the anterior pair, the larger, lie at the side of the prostomium, in front of the base of the tentacles; the hinder pair behind the tentacles, nearer to the midline. They lie below the edge of the peristomial margin, which overlaps the prostomium (Pl. xli., fig. 59). When this hood is lifted backwards the transverse slit-like openings to the nuchal organs are displayed, and in the middle line is seen the small rounded connection between the prostomium and peristomium.

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1. Ehlers points out why this name must take the place of Grube's *Staurocephalus* and *Anisoceras* (Die Polychæten d. magellan u. chilen. Strandes, 1901, p. 146).

The mouth is partially blocked up by a pair of large oval convex oral pads, separated by a deep groove in the middle line, as is figured by Ehlers in *S. cerasina*.

The peristomium is longer than the nuchal segment, dorsally and laterally, but on the ventral surface it is shorter, where it forms the lower lip, which, like the lateral lip, is longitudinally furrowed.

The parapodia are long, nearly half the width of the body, the dorsal cirri are longer, and as wide at the base as the length of the segment (Pl. xli., fig. 61); each is semi-cylindrical, being flattened on the under and convex on the upper surface, so as to appear "flattened"; it is constricted near its end into a knob-like appendix, which in posterior segments is wider than the main stem, so that the cirrus has the appearance of a penis.

The first parapodium is small, and is borne, of course, by the segment following the nuchal. It has no dorsal cirrus; the second foot has a relatively short cirrus, but on following segments the cirri are of practically uniform length, are directed nearly horizontally outwards, lying alongside the body like a fringe. The ventral cirrus is short, stumpy, and as wide as the segment is long.

The body carries at its hinder end two pairs of subanal cirri; the upper is annulated with 9 rings, and is as long as the dorsal cirrus of the penultimate segment; the lower cirri are short, smooth, and rather longer than the neighbouring ventral cirri.

The parapodia, seen under a lens, present three rounded lips, a larger posterior and two rather shorter anterior lips (Pl. xli., fig. 62).

A figure is given of the tenth foot. Studied under a microscope, the posterior lip is seen to be slightly notched. The parapodium is supported by a single golden aciculum, and a couple of very slender bristles enter the dorsal cirrus, and reach almost to the subterminal constriction.

The chætæ are in two bundles; the supra-acicular bundle contains about 6 long curved capilliform bristles, with fine serrations along its upper convex margin.

In the sub-acicular bundle there are about 30 chætæ, which are jointed, *i.e.*, "gomphotrichs"; the long appendix has a subapical tooth of nearly the same size as the terminal hook; the wing is finely denticulated along the greater part of its length (Pl. xli., fig. 64).

In the second foot the appendix of the gomphotrich is narrower and nearly twice as long as that on the tenth foot.

The jaws.—The lower jaws have a curved anterior edge, which is without denticulations. The pair are only feebly connected together. The upper series consists of the usual small black paragnaths, which are in three rows on each side (Pl. xli., fig. 65):—(*a*) The dorsal-most or internal row consists of about 30 relatively stout, prominent, curved denticles, the anterior few of which have lateral serrations on each side (Pl. xli., figs. 66a, 66b); the shape of these will be understood from the figures. (*b*) The outer row contains about twice as many denticles of much smaller size; they are straight, denticulated along both edges, and overlie the bases of the internal row; each is supported by a minute rectangular plate, the series of which are set close together, and form the ventral or innermost limit of the series (Pl. xli., fig. 66a). (*c*) A third row is made up of about 30 two-rooted pieces, with the divergent roots directed outwards, which seem to lie over the second row (Pl. xli., fig. 66d).

Remarks.—M'Intosh describes the species from a posterior fragment measuring 11 mm. in length by 5 mm. across its anterior truncated end. He figures the foot (Pl. xxxvi., fig. 6), which differs from the hinder foot of the present specimen, only in the apparently smaller size of the terminal knob of the dorsal cirrus. But he says that the cirri are "flattened," and as the chætæ agree, and the worm was obtained in the neighbourhood of East Moncœur Island, the probability is that we have the same worm before us.

It may be noted that Haswell[1] described a species under the name *Staurocephalus australis*, from Port Jackson, which, amongst other features, differs from *S. australiensis* in the proportions of the head, for the prostomium has a base nearly as wide as the peristomium, and narrowing forwards between the tentacles. But, as no doubt the drawing is made from a freshly killed specimen, while mine is from a much contracted one, the difference may be discounted to some extent. However, the neuropodial chætæ are stated to have an appendix which is only "obscurely notched" at its apex. As the species is littoral, I hesitate to identify it with M'Intosh's.

Haswell notes that *S. loveni*, Kinberg, was also obtained at Port Jackson in 12 fathoms, but it differs from *S. australis* in that the palps are twice the length of the tentacles.

1. Haswell—Proc. Linn. Soc. N. S. Wales, x., 1886, p. 747.

How far such proportions are useful systematic features apart from other more permanent characters is doubtful.

Ehlers[1] gives a fully illustrated account of *S. cerasina*, which in regard to the head, at any rate, resembles this species from Tasmania.

Loc.—Storm Bay, Tasmania.

Distribution.—Hawaii (Treadwell).

Family EUNICIDÆ.

Sub-Family EUNICINÆ.

Genus EUNICE, *Cuvier.*

EUNICE SICILIENSIS, *Grube.*

Eunice siciliensis, Grube, Actinien, Echinodermen, u. Wurmer, 1840, p. 83. *Id.*, Ehlers, Die Börstenwürmer, 1864-68, p. 353.

Eunice adriatica, Schmarda, Neue Wirbellose Thiere, i., 2, 1861, p. 124.

Eunice tænia, Claparede, Glan. Zool. parmi les Annelides, 1864, p. 120.

Eunice valida, Gravier, Nouv. Arch. Museum Paris, 1900, p. 264 (*fide* Crossland, Proc. Zool. Soc., i., 1904, p. 323).

This widely distributed species is represented by three fragments, one of which bears a head with 173 chætigerous segments, measuring 120 mm. by 8 mm.; the segments are very short, being about one-ninth of the diameter of the body.

The second fragment has neither head nor anus; consists of 180 segments measuring 90 mm.; the segments are still shorter, only about 1-18th of the diameter.

The third fragment contains 57 segments with a length of 50 mm.

In all details these agree with the accounts of the species, though it is larger than those that I have studied from the Kermadec Islands.

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1. Ehlers—Die Polychæten d. magellan. u. chilen. Strandes, 1901, p. 147.

From a second locality comes a dark green, ill-preserved female worm in eight fragments, the total length of which amounts to 1160 mm. without a head or tail, and the breadth is from 3.5 to 5 mm.

Locs.—Off Gabo Island, 200 fathoms.

South-west of Gabo Island, 75 fathoms.

Distribution.—Mediterranean; Red Sea; Indian Ocean; Pacific Ocean.

Eunice pycnobranchiata, *M'Intosh.*

(Plate **xlii.**, figs. 79, 80.)

Eunice pycnobranchiata, M'Intosh, Chall. Rep., Zool., xii., 1885, p. 294.

The twelve specimens obtained from various stations show, as M'Intosh indicated, a certain amount of variation in those features which are used for specific characterisation, and it may be as well to give a general account of the species, filling up a few of the lacunæ in the original description.

The colour of the preserved specimens is either a rich reddish or coppery brown with iridescence, or a paler flesh tint or even grey. In three individuals the pale ground colour is marked by irregular and irregularly distributed splotches of red, usually transversely disposed anteriorly, but becoming smaller and more numerous and more scattered in the mid-body and posterior segments.

In some cases the fourth chætigerous and in others the second is quite pale, probably white in life; while in the majority this pale segment is not present.

The size varies from 200 mm. by 8 mm. in a very soft specimen to 110 mm. by 5.5 mm. in hardened specimens for the same approximate number of segments, 146-150; while, of course, smaller specimens occur with fewer segments.

Taking for description a deep coppery brown individual, rather soft, measuring 190 mm. by 8 mm. across the body, the peristomium is 6 mm. and the breadth over the parapodia is 10 mm. There are 147 segments. The widest region is a short distance behind the peristomium, thence it tapers very slowly to the hinder end.

The fourth chætigerous is pale.

The tentacles are moniliform, rather deeply notched, and the furrows indicated by a pale brown line; even in those specimens in which, owing to preservation, the moniliform

character is not evident, the brown rings exist. The median tentacle has, in this case, 18 swellings, the admedian 16, and the lateral 8, and the length of the three has the same proportion; but in one other I noted 13, 10, and 8 respectively. It is likely that the tips are fragile, so that this detail and the relative lengths in regard to the number of segments, such as it is sometimes the custom to give for species of *Eunice*, has little importance, as Crossland has already remarked.

The palp is divided horizontally into a smaller upper lobe and a larger lower lobe.

The peristomium is as long as the nuchal and the first two chætigerous segments together; its diameter is 6 mm. and is much more than its length. The upper lateral edge of the lower lip is, as M'Intosh stated and figured, prominent and visible from above as it is separated from the side of the peristomium by a deeper notch than is usual in the genus (Pl. xlii., fig. 80).

The nuchal cirri are indistinctly moniliform, having about eight rings; generally they do not quite reach the anterior margin of the peristomium.

There is a pair of smooth subanal cirri equalling in length the last 10 segments.

The dorsal cirri are not annulated, but are irregularly constricted, especially in the anterior feet, in which they are of larger size than further back. Under a lens they have the appearance of annulation, but microscopic study shows that this is merely a result of muscular constriction; while it may be noted, by a comparison of successive cirri or of cirri on opposite sides of the body in the same segment, that these constrictions are quite irregular in their spacing and in their number. In the figure illustrating M'Intosh's account (Pl. xxxix., fig. 13) the cirri are shown annulated, but in that of the foot (figs. 14, 15) these annuli are not represented.

The gills in this individual commence on the fifth chætigerous segment.[1]

In the fifth there is but one filament, that is the axis of the future gill; on the seventh, there are four filaments; the maximum number is reached on the 10th, with six filaments; the lowest being here longer than the dorsal cirrus. This

1. I use the word "segment" always as meaning a "chætigerous segment," and exclude from the enumeration of segments the two first segments, the peristomial and nuchal.

maximum is retained till the 26th segment ; for the next 12 segments present five filaments ; the number then sinks to 4 (segments 39-70), to 3 (in segments 71-95), after which the number decreases rapidly, and only the last three or four segments are without gills.

The gill as a whole has a very characteristic appearance, indicated by the specific name—" thick-gilled " (Pl. xlii., fig. 79) ; the gill filaments, whether few or many, are coarse, arise from the axis close together, and even in some cases touching one another, and under a low-powered dissecting lens the gill has some resemblance to a folded or wrinkled membrane.

There is a considerable range of variation in detail, to which I refer later, but the above is generally typical, though the maximum number of filaments may reach 8 or even 10 in some individuals.

The gill may be described as " small," whether the number of filaments be few or many ; they only reach a short distance up the much arched side of the body even when placed upright against it. Usually they are not so directed in these specimens ; they are ranged alongside the body, usually with the free ends forwards.

The parapodia do not present any special features ; they are supported by two, or sometimes three, black acicula, and on the 30th segment or thereabouts (for this point varies) an inferior black bidentate acicular chæta appears, which is of course continued to the end of the body. Under the microscope this is seen to be a dark brown with golden margins, though under a dissecting lens it is black and very conspicuous. The chætæ are illustrated by M'Intosh, and need no further description.

The jaws are white below, the lower always, the upper jawlets sometimes, but the denticulations are always white tipped. On the right side the large dental plate (II) has six teeth, of which the proximal and the distal are smaller than their neighbours. Plate IV is hoodlike, with nine or ten rounded denticulations ; plate V has a singled tooth. On the left side, II has five teeth, IV is curved, has five, V has one, and the unpaired plate (III) has seven teeth.

The jaws, as is now well known, vary within limits as to the precise number of denticulations of the plates, and M'Intosh gives instances.

Remarks.—I have specimens from the coast and seas round New Zealand which belong to this species, though those which I sent to Ehlers for identification were named by him as *E. antennata*, Savigny. Those, however, which I have as duplicates agree precisely with these Australian forms, and if Crossland's analysis of Savigny's species be accurate, Ehlers' identification must be incorrect. In the first place Crossland[1] states that the acicula and tridentate acicular chætæ are not black but yellow, that the gills are "large," and that they are figured as nearly meeting across the back; that in the posterior segments, after a decrease in the number of gill filaments, which are quite slender, there is an increase before dying out at or near the hinder end. Ehlers[2] gives an account of a worm under the name *E. antennata* from Chilian shores (p. 126) which does not agree wholly with Crossland's account, for the acicula are black, and Ehlers says nothing about the increase in the posterior gills. Moreover, in *E. antennata*, Savigny, not only are the tentacles moniliform, but the dorsal cirr also, anteriorly multiannulate, posteriorly triannulate. At the same time the Australian species has the same lower lip as Crossland figures for *E. antennata*, and it appears that the two are pretty nearly allied.

Locs.—East of Maria Island, Tasmania, 78 fathoms.

Near Storm Bay, Tasmania.

Ten miles north of Circular Head, Tasmania.

East coast of Flinders Island, Bass Strait.

Off Babel Island, Bass Strait, 50-80 fathoms.

North-east of Babel Island, Bass Strait, 100-170 fathoms.

Fifteen miles north-west of Cape Jervis, South Australia, 17 fathoms.

Between Port Stephens and Newcastle, New South Wales.

Distribution.—New Zealand (Foveaux Strait; Massacre Bay, on west coast); Pegasus Bay, on east coast.

Variations.—The gills vary (*a*) as to the point of commencement, and (*b*) as to the maximum number of filaments. Out of the twelve anterior ends I find that in six they commence on the sixth chætigerous segment, in four on the fifth, while in two they do not begin till the seventh, and then as quite small stout filaments. The largest number of filaments usually occurs on about the eighth to the thirtieth segments; and it is only to the last two individuals in the list that this

1. Crossland—Proc. Zool. Soc., i., 1904, p. 316.
2. Ehlers—Die Polychœten des Magell. u. Chilen. Strandes, 1901, p. 126.

area of maximum development is more extensive, reaching to the seventieth. It may be noted that both these individuals are "spotted" with red, and are from the same locality; but No. 12 occurs with another more normal in colouration, and normal so far as the gills are concerned (No. 6). The maximum number of filaments in the fore body is usually five or six, but in one, otherwise normal (No. 3), it rises to seven, and even here and there to nine, while in another instance (No. 4) it is ten or occasionally eleven. On the other hand, in No. 5 the number of filaments is as low as two.

In all but one specimen, and that one of the "abnormals," the number of filaments decreases slowly and fairly regularly towards the hinder end, and the gill is continued to the extremity or is only absent on the last half-dozen segments, which are, of course, very small. In the abnormal individual (No. 11) the gill after decreasing, increases near the hinder end to seven filaments, and further back to eight before undergoing the usual terminal decrease.

The two "abnormals" differ then not only in the colouration but also in some matters concerning the gill; yet an examination of one of them (No. 12) the jaws are precisely like that which I studied in detail (No. 1), and in all other respects these two agree with the rest. It appears to be merely a local variation.

The form of the gill in all these twelve is very uniform: the filaments broad, closely set, nearly or quite touching one another, or in some case overlapping. When fully developed the lower filaments are longer than the dorsal cirrus; one or more of them may bifurcate; not infrequently the axis projects but slightly beyond the uppermost filament, as if it were capable of budding off additional filaments at this point. In one individual the gill is much smaller than usual (No. 10) and the filaments more delicate and further apart.

Other variations, such as length, depend on the state of preservation. The colour in some is copper. The white "collar," too, is remarkably sporadic; it might at first sight seem rather a characteristic feature, but such a "collar" appears as a variation in other species such as *E. aphroditois*. M'Intosh notes that in his specimens a "collar" exists on segment II in those from Twofold Bay, while it is absent in the Bass Strait specimens.

The segment in which the acicular chæta first occurs is also subject to variation, though usually somewhere about the thirtieth, it may occur either before or after that segment. These variations are tabulated below.

VARIATION IN GILLS IN *E. pycnobranchiata.*

Number of worm.	Commence in segment.	Maximum No. of filaments fore body.	Extent of maximum No. of filaments.	No. of filaments at about 80th segment.	Total number of segments.
1	V.	6	VIII. to XXVI.	3	146
2	V.	4	VII. to XXIII.	2	147
3	V.	7 (8.9)	VIII. to XXVI.	4 (on last)	68 (imp.)
4	V.	5 (6)	VIII. to XXV.	2 (on last)	70 (imp.)
5	VI.	2	VI. to XXXVI.	1 (on LXX)	78
6	VI.	9 (10.11)	XII. to XXVIII.	4	115
7	VI.	5	VIII. to XXX.	3 (on last)	71 (imp.)
8	VI.	4	VIII. to XXVII.	1	115 (imp.)
9	VI.	5	VIII. to XXI.	..	45 (imp.)
10	VI.	4	VII. to XXX.	2 (3)	100
11	VII.	6	XVI. to LXX. [1]	5	150 [2]
12	VII.	4	X. to LXX.	3	145

Numbers in brackets indicate that in their area of maximum development these numbers occur on occasional segments irregularly; (imp.) indicates that the worm is incomplete posteriorly.

VARIATIONS IN OTHER ORGANS IN *E. pycnobranchiata.*

Number of worm.	Dimensions in mm.	State of preservation.	Number of segments.	Colour.	White segment.	Segment at which acic. ch. appears.
						[3]
1	190×8	s	146	reddish brown	IV.	XXX. & XXXII.
2	110×5.5	h	147	,,	IV.	XXIX. [3]
3	80×8	h	68 (imp.)	,,	IV.	XXXII. & XXXIV.
4	75×5	s	70 (imp.)	,,	IV.	XXX.
5	38×3	s	78	pale r. br.	II.	XXII.
6	180×8	s	115	,,	0	XXIX.
7	60×5	h	71 (imp.)	,,	II.	XXIX.
8	110×6	h	115 (imp.)	pale grey	0	XXXI.
9	30×4	h	45 (imp.)	pale r. br.	0	XXVII.
10	70×4	h	100	nearly white	0	XXVII.
11	190×9	s	150	v. pale with red splotches	0	XXX.
12	200×8	s	145	,,	0	XXXIV.

h=hard, well preserved. s=soft, ill preserved.
imp.=incomplete posteriorly.
Nos. 1-5, Maria Island; 6, 12, Babel Island; 7, Cape Jervis; 8, Stores Bay; 9, Circular Head; 10, New South Wales coast; 11, north-east Babel Island.

1. The number of gill filaments is occasionally only five.
2. The number of gill filaments rises to seven on segment xc., it is eight at c; and then decreases to five at cxxx, and gradually dies out.
3. On the two sides.

Eunice bassensis, *M'Intosh.*

(Plate **xli.**, figs. 67-74 ; Plate **xlii.**, figs. 75-78.)

Eunice bassensis, M'Intosh, Chall. Rep., Zool., xii., 1885, p. 298.

It is with some hesitation that I attribute the material to this species, for M'Intosh's account is necessarily brief and imperfect, as he had only a single fragment of the posterior end of a worm upon which to found the characters of the species, which are thus drawn only from the structure of the foot and chætæ. But as that fragment was obtained from near the localities in which the "Endeavour" material was collected, and as these agree well with the few features mentioned by him, it seems probable that we are dealing with his species.

My material consists of one entire individual, eight cephalic fragments of less or greater length, two anal fragments, and three pieces from somewhere near the middle of the worm.

The entire individual was studied.

It is a fairly well preserved, though somewhat contracted, female, filled with eggs ; it measures 140 mm. in length, with a diameter of 5 mm. over the body, and a height of 5 mm. It contains 112 segments in addition to the "head."

Its colour is dark brown, highly iridescent, but the majority of the specimens are quite a pale grey.[1]

The prostomium has the usual ventral median furrow, and each lobe is traversed by an obliquely horizontal furrow separating a smaller upper from a larger lower lobe.

The tentacles are very definitely annulated, with deeply pigmented grooves between the swellings (Pl. xli., fig. 68). The proximal swellings are shorter and less rounded than the distal, due, perhaps, to differences of contraction. The median tentacle has 17+n swellings ; it isiincomplete here, the admedians 21 and the laterals 14, in addition, in each case, to the cylindrical cirrophore.

In another individual the numbers are 27, 21, and 12, and in a third 25, 20, and 15.

1. The dark tint of this individual may be due to it having been preserved in the same tube as some other organism from which the pigment has been dissolved and stained the worm ; for I have had specimens of pale Echinids, which have been preserved with Comatulas, and have become stained dark brown.

The peristomium and nuchal segment together are broader than their length, which is about equal to $2\frac{1}{2}$ chætigerous segments.

The peristomium is slightly excavated on the dorsal surface; the lower lip is not so deeply notched as it is in *E. pycnobranchiata*, and its upper margin is not visible from above (Pl. xli., fig. 67).

The nuchal cirri present 8 annulations; they fail to reach the anterior margin of the peristomium by a space about equal to the length of the nuchal segment.

The dorsal cirri are also distinctly moniliform, and relatively stout. Anteriorly, there are four dilations, the terminal being elongated, and under a dissecting lens may appear to be constricted, but in a preparation this is seen to be only a "bend," not really a constriction.

As in the tentacles, the furrows are pigmented.

After about the 6th segment, and throughout the rest of the body, only three dilations exist, but there appears to be some variation in this, for in some individuals, the feet of which were mounted, four appear (Pl. xli., fig. 70). The anterior dorsal cirri are particularly stout.

The ventral cirri of about the first half dozen feet are short, rounded sub-spherical lobes; further back this lobe bears a short stout bluntly rounded conical appendage, while over the greater part of the body the latter elongates and the basal lobe decreases.

The anal cirri, also moniliform, have a length equal to the last 10-12 segments.

The gills commence on the 6th chætigerous segment (in this and all the anterior ends available), and are continuous to the posterior end of the animal. In this individual the first gill has 4 filaments—the maximum is 10—and this number occurs over the segments 8-9, after which there is a gradual and fairly regular decrease, with here and there an occasional addition of one filament. Thus on segments 40-60 there are 4 filaments; on 61 only 3; on 90 the number is again 4, but on segment 100 the number once more scales to 3, and then to 2, and to 1 at the last few segments.

This cannot be regarded as a "posterior enlargement" of gills, such as occurs in one or two other species (see below).

As to the relation between the size of the gill, even at its maximum stage of development, one cannot regard them as

"large"; they only reach about half way up the side of the body towards the middle line, even when held vertically up by forceps (Pl. xli., fig. 69).

The filaments are rather thick, springing close together in this and other individuals, but in others they are relatively more delicate (*cf* Pl. xli., fig. 70; Pl. xlii., fig. 78).

The gill seems to be much contracted, and the lower filaments do not reach to the end of the dorsal cirrus, but in other specimens in which they are better preserved, the lower gill filaments are longer than the dorsal cirrus.

The chætæ present no special peculiarities. I find the following numbers, in addition to the 4 or 5 minute "combs" in the uppermost part of the bundle, there are 6 or 7 capilliforms without a flange, somewhat flattened and sword-shaped; then two golden acicula, with occasionally a third one, below which are 12 "gomphotrichs" (*i.e.*, jointed or compound chætæ), which decrease in number in the posterior feet (Pl. xli., fig. 71). After about the thirty-sixth foot a subchætal spine or acicular-chætæ appears.

The subchætal spine is golden, bidentate in the early segments, but tridentate in most of the feet (Pl. xli., figs. 72-74).

Owing to the golden colour of the spine it is difficult to detect on the worm under a dissecting lens, and thus difficult to state quite definitely the segment on which it occurs (but as this may vary, see above for *E. pycnobranchiata*). In this specimen it is not present on the thirty-sixth, but is on the fortieth segment; in another individual I find it in the thirty-sixth; in a third in the thirty-eighth.

The jaws.—The lower jaws have large thick white plates at the distal end, which are irregularly undulating at the free edge, so as to form three projections of irregular size (Pl. xlii., fig. 77).

The upper jaws are dark brown, but in smaller specimens a paler brown; the tip of the "forceps," and of the various denticulations of the other sclerites, are white and calcified.

The forceps (zange) are slender, with the tip curved upwards (Pl. xlii., fig. 76). The articulation between forceps and its carrier is marked by a dark brown band, which is very conspicuous when the jaws are of the paler tint.

The left dental plate (jawlets of the second pair) (II.), has 4 teeth, the distal largets, the others decreasing proximally (Pl. xlii., fig. 75).

The left unpaired (III.) has 6 teeth, the two proximal are quite small and less pointed than the rest. This plate lies alongside the large dental plate, as in some other species.

The fourth left is hoodlike, with 5 teeth; the base of the hood is dark brown.

The fifth is triangular, with a single recurved white tooth.

On the right side, the dental plate (II.) has 5 teeth, decreasing in size from the most anterior; the hoodlike fourth has 8 or 9 teeth, of which the one at each end of the series is very little developed; the fifth plate is like that on the left side. All the teeth are tipped with white.

In four individuals examined I find that these numbers are constant.

SOME COMPARATIVE MEASUREMENTS OF *E. bassensis*.

(Cephalic fragments.)

	Number of segments.	Dimensions in mm.	Maximum No. of gill filaments.
1	84	60 × 5	4
2	66	21 × 2	4
3	65	70 × 5	10
4	46	40 × 4	6
5	110	90 × 4	12
6	70	60 × 4	8 (9)
7	45	..	7 (8)

Nos. 1-4, 6, 7.—East coast Flinders Island; 5, Entrance to Oyster Bay.

Remarks.—Certain differences exist between my specimens and the fragmentary type. The foot figured by M'Intosh (Pl. xxxix., fig. 16), shows no prominent chætophoral sac, the chætæ seem to spring from the general contour of the body. Surely this must be an error of the artist, as it is totally unlike the general character of an Eunicid parapodium. But the most noticeable difference is in the size of the gill, which has nine filaments. Unfortunately M'Intosh gives us no idea of the size of the worm, nor does he say whether the foot figured came from the anterior end of the fragment or not. His fragment was two inches in length, and if one examines the present material at this distance from the anus, the gill has but six filaments. We must then presume that his specimen was portion of a larger worm.

At any rate, none of the other species obtained from this neighbourhood or elsewhere agrees so closely with ours.

In a recent article Crossland (1904) has tentatively suggested that *E. bassensis* is a synonym of *E. antennata*, Savigny (1820). But if my identification be correct, *E. bassensis* differs from that species as described and figured by the authors, Savigny, Gravier (1900), and Crossland, in the following features :—

(1) *E. antennata* appears to be a small species. Savigny[1] gives its length as 3 inches. Crossland states that those from Zanzibar are 100 by 5 mm. (including the feet), those from the Maldives are 80 x 4 mm., and less.

E. flaccida, Grube,[2] which Crossland identifies with this, was fragmentary ; the 67 segments measure 35 x 2 mm ; while Grube's variety *gracilis* measured 78 x 2.5 mm. for a worm with 85 segments. Compare this with our first individual, where the 84 segments measure 60 by 5 mm. In other words, this Tasmanian species is evidently a larger worm.

(2) Crossland[3], in his drawing of the head (Pl. xxii., fig. 1) from above, shows that the upper edge of the lower lip is prominent, and is visible from above, as in *E. pycnobranchiata*, while there is no excavation of the anterior margin of the peristomium.

(3) The gills are shown as nearly meeting dorsally, which is far from being the case in any of our individuals.

(4) The form of the ventral cirrus, as given by him, is represented (text fig. 60, p. 317) in the 10th segment as long and narrow, without the swollen base which is so evident in ours, and it projects further beyond the lip of the chætophoral sac than in ours.

(5) The dorsal cirrus is apparently much more slender.

(6) The nuchal cirrus is shorter.

(7) According to Crossland's figure of the acicular chæta the main tooth forms nearly a right angle with the axis, and it may be noted that Gravier's[4] figure of *E. flaccida* (p. 256) is less than a right angle, whereas in the present species this angle is much more open.

(8) The jaws of *E. antennata* show a considerable range of variation ; and if I understand Crossland's formulæ on p. 316 "6—7 : 10+9—8" to mean "left dental plate (II) has six

1. Savigny—System. Annelides, 1820, p. 50, pl. v., fig. 1.
2. Grube—Annel. d. rothen Meeres, Monatsber. k. preuss. Akad. Berlin, 1889, p. 491 (separate copy, p. 11).
3. Crossland—Proc. Zool. Soc., 1904, I., p. 312.
4. Gravier—Nouv. Arch. Mus. Paris, 1900, p. 255.

teeth, the right seven, the unpaired (III) has ten, the left anterior (IV) nine, and the right eight—then none of his variations of the dental plate have so few teeth as 4-5, which appears to be constant in the present species, and though the anterior plate (IV) varies, none of them agree with ours, which show no variation amongst themselves.

Some of these differences may be due to age or to the mode of preservation, but others, such as the chæta and the jaws, seem diagnostic, and the accumulation of the small differences as well as the geographical distribution justifies one in making a new species. At the same time it is clearly allied closely to Savigny's species from the Red Sea and the Indian Ocean.

E. antennata is a Red Sea and Indian Ocean species, and though Ehlers[1] records a worm under this name from the Chilian coast, he states that it has black acicular chætæ instead of the golden that characterises *E. antennata*, as Savigny noted in his account; and it presents one or two other differences, as in the jaws. The same author[2] has also recorded this species from the New Zealand coasts (1907, p. 12), but my material from which I sent him the specimen belongs to *E. pycnobranchiata*.

Crossland's ground for including Australia in the distribution of *E. antennata* rests on his examination of the specimen labelled by Grube himself as "*E. paucibranchiata*," which was obtained from this region. He gives no reference to the paper in which Grube describes a species under this name. Grube[3] himself named a species "*paucibranchis*" but in a later article[4] identifies this with *E. australis*, Quatrefages[5] (which belongs to a different group of the genus in which the gills are limited to a few segments in the anterior region of the body).

Now one of the characters of Savigny's species is said by Crossland to be the increase in size of the gill and in the number of its filaments behind the middle of the body immediately previous to the ultimate gradual decrease[6]. As I have stated, I find no evidence in my material for this

1. Ehlers—Die Polychæten d. Magell. u. chilen. Strandes, 1901, p. 126.
2. Ehlers—Neuseeland. Annel., 1907, p. 12.
3. Grube—Schless. gesellsch., 1866, p. 64.
4. Grube—Mittheil. ub. d. Fam. d. Euniceen—Schless. gesellsch., 1877, p. 20.
5. Quatrefages—Hist. Nat. d. Annel., p. 321.
6. Savigny does not show this phenomenon in his figure, nor mention it in the text, though he says that the gills may be absent in 20-30 last segments.

increase in size. It is true that there may be an increase in number of filaments by one over a variable and inconstant region of the body, but such increase seems to me to be a mere variation, and one knows it to occur in several species in which the gills extend over a long portion of the worm.

Locs.—East coast of Flinders Island, Bass Strait.
Entrance to Oyster Bay, Tasmania.
Oyster Bay, Tasmania, 20-40 fathoms.
Ten miles north of Circular Head, Tasmania.
Breaksea Island, Port Davy, Tasmania.
North of Cape Borda, Kangaroo Island, 40 fathoms.

Sub-Family ONUPHIDINÆ.

Genus HYALINOECIA, *Malmgren.*

HYALINOECIA TUBICOLA, *Muller.*

Nereis tubicola, Muller, Prodromus Zool. Dan., 1766, p. 217.

Onuphis tubicola, Audouin & Milne-Edwards, Ann. Sci. Nat., xxviii., 1833, p. 225. *Id.*, Ehlers, Die Börstenwürmer, 1864-68, p. 297 (with synonymy).

Northia tubicola, Johnston, Cat. Brit. Mus., 1865, p. 136.

Hyalinoecia tubicola, M'Intosh, Chall. Rep., Zool., xii., 1885, p. 335.

Three individuals in their transparent tubes, two of which measure 108 mm. by 5 mm. at the broader end and 4 mm. at the other: the third is rather shorter.

The worm removed from the tube is 50 mm. in length ; it consists of a head with 64 chætigerous segments ; another is 75 mm. in length ; the third is 55 mm. In this last the tentacles were stretched to the fullest, so were easily measured.

I suspected that the worm would be *H. benthaliana*, M'Intosh[1], and although his account is not very full and is in some respects unsatisfactory—for instance, he gives no measurements—after comparing the worms with the various accounts of the European species, I have no doubt that it is

1. M'Intosh—Chall. Rep., Zool., xii., 1885, p. 339.

the same. It is already known to be very widely distributed, and the details given for *H. benthaliana* seem to me scarcely sufficient to distinguish it from Muller's species.

It appears from the various accounts that the relative lengths of the three middle tentacles is subject to variation. By some authors they are described or shown as approximately equal, while others give a greater length for the median, as, for example, Ehlers[1]. Again, the size of the worm, the position of the first gill, the number of denticulations on the jaw plates, show a fair range of variability.

In the present case it may be as well to record the facts. The filamentous gill commences on the 22nd chætigerous segment. The jaw plates of the second pair (II) on the right side bear 11, on the left 12 denticulations ; IV have 8 and 9 or 10 respectively ; the unpaired one has 13.

The present worms agree more closely with the typical form as described by M'Intosh and St. Joseph[2] than with any of the "varieties" described by the former author ; especially in the denticulations of the jaw plates as well as in the segment on which the gills commence.

Loc.—Off Babel Island, Bass Strait, 50-80 fathoms.

Distribution.—The typical form and its "varieties" have been obtained in the European seas ; in the Atlantic ; from the Pacific ; on the coast of Japan (Moore)[3] and of California (Moore)[4] ; from New Zealand (Ehlers)[5] ; from Torres Strait (M'Intosh). I have no literature dealing in detail with other regions.

It has already been suggested by Willey[6] that *H. camiguina*, Grube[7], from the Philippines, Ceylon and the Indian Ocean (Crossland)[8] is merely "a local form" of the European species, and it seems not unlikely that *H. brevicirris*, Grube,[9] from Moreton Bay on the east coast of Australia is also a variety of this species, for the account only differs in one or two features of proportions of parts. If these two be included, then the species may be said to be distributed everywhere outside the Arctic and Antarctic seas.

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1. Ehlers—Die Börstenwürmer. 1864-68, p. 297.
2. St. Joseph—Am. Sci. Nat., (8), v., 1898, p. 241.
3. Moore—Proc. Acad. Nat. Sci. Philadelphia, 1903, p. 444.
4. Moore—*Loc. cit.*, 1911, p. 280.
5. Ehlers—Neuseeland. Annelid., 1907, p. 1D.
6. Willey—Ceylon Pearl Oyster Fisheries, pt. iv., Suppl. Rep., xxx.,—Polychæta, 1905, p. 274.
7. Grube—Annulata Semperiana, 1878, p. 42.
8. Crossland—Proc. Zool. Soc., 1904, p. 281.
9. Grube—Monatsber. Akad. Wiss. Berlin, 1877, p. 528.

Family LUMBRICONEREIDÆ.

Genus LUMBRICONEREIS, *Blainville*.

LUMBRICONEREIS SPHAEROCEPHALA, *Schmarda*.

Notocirrus sphaerocephala, Schmarda, Neue Wirbellose Thiere, I., 2, 1861, p. 116.

Lumbriconereis sphaerocephala, Ehlers, Abhandl. Gesell. Wiss. Gottingen, Neuseel. Annal., 1904, p. 33.

A single imperfect specimen of small size and dark coppery brown in colour, with a high iridescence, appears to belong to this species. The prostomium is, however, rather longer than broad, and, therefore, less nearly spherical than in Ehler's description; this may be a matter of preservation. I have preparations of this species, which is common on New Zealand coasts, and it agrees well with them.

Loc.—East of Babel Island, Bass Strait, about 70 fathoms.
Distribution.—New Zealand; Chatham Islands.

LUMBRICONEREIS GULIELMI,[1] *sp. nov.*

(Plate xlii., figs. 81-88; Plate xliii., figs. 89-94.)

Two imperfect individuals of large size, one consisting of the head and 58 chætigerous segments, measures 70 mm. in length, with a diameter of 7 mm. It is narrower anteriorly where it is only 3 mm. across the peristomium The other specimen consists of 133 segments and the head, and has a length of 99 mm. There is little evidence of a posterior tapering, for at its truncated end it still measures 6 mm. in width.

The worm is nearly cylindrical, its height being 6-7 mm. The segments are short as usual, being about 1-6th to 1-7th of the diameter of the body.

The colour is coppery brown, with a bright green iridescence and the chætæ are glistening brown.

The prostomium (Pl. xlii., figs. 81, 82) is a rounded cone as broad as its length, with no conspicuous eyes, but in their place a curved transverse row of 6-8 small black spots close together on each side of the base, and extending laterally so as to be visible from the side. In the second individual, which is in a better state of preservation, these pigment spots are less distinct; they form a row right across the base of the prostomium, and are not confined to the sides.

1. I have taken the liberty of naming this fine species after the veteran zoologist, Professor William C. M'Intosh.

On the underside the prostomium presents a pair of rounded lobes (? palps) immediately in front of the mouth (Pl. xlii., fig. 82).

The peristomium and nuchal segment are separated dorsally and laterally by a furrow, but merge into one another ventrally, as the furrow bends forwards on each side nearly at right angles, and thus delimits a ventral lip which is marked by longitudinal furrows.

The peristomium is about twice the length of the nuchal segment, whose length is equal to that of the first chætigerous. The parapodia of a few anterior segments have a representative of a dorsal cirrus in the form of a small rounded lobe into which a small bundle of fine bristles enter. The feet as seen from above under a dissecting lens have from the first a long posterior lip, which is antero-posteriorly compressed so as to be lamelliform; it is quite narrow in a well preserved specimen, but rather thicker in the other (Pl. xliii., fig. 89). In the latter this lip is bent upwards in many of the feet, but in the other specimen its bluntly rounded apex is directed outwards (Pl. xlii., figs. 86, 87); its upward bend is, I think, due to pressure against the wall of the containing tube. The upper margin is nearly horizontal, though it is slightly concave, while its lower margin slopes upwards from below. The feet in the first half-dozen segments are smaller than the following. The posterior lip is curved backwards in the greater part of the body. While the lip in the anterior segments is much compressed and very thin, it becomes, somewhere about the fortieth, shorter and thicker, and this proceeds till it is in the posterior segments short and quite thick (Pl. xliii., fig. 89). The anterior lip likewise changes somewhat in its form. Both lips are very vascular, but the vessels in the posterior lip are more numerous and more clearly seen owing to its thinness.

The capillary chætæ, many of which are brown and iridescent, project a good way beyond the larger lip, and this especially in the case of the upper chætæ. In the anterior 40-50 feet all the chætæ are flanged capilliforms, bent upwards from a point just below the commencement of the flange (Pl. xlii., fig. 86).

But at or about the 50th foot most of the lower capilliforms are replaced by hooks, with a long hood formed by a pair of wings (Pl. xlii., fig. 84); and by about the 60th the uppermost capilliforms are similarly replaced by one or usually by two hooded hooks (Pl. xlii., fig. 85).

Some of the capilliforms in the anterior feet have a flange on both sides, of which one is shorter than the other. In the hinder feet, however, the chæta itself is shorter and the flange less extensive (Pl. xliii., figs. 90, 91) The hooks have one large terminal rounded tooth which does not form a marked angle with the shaft ; on its back are some 5-6 very small closely set denticulations separated by parallel linear gaps, so as to resemble a comb (Pl xliii., figs. 92, 93). The shaft enlarges for a considerable distance before the end, it is then suddenly narrowed below the hook so as to form a deep bay. The wings are of still more considerable extent, arising below the enlarged region of the shaft, and projecting from the back as well as in front of the hook.

Further details as to the feet show that the 10th foot has about 20 long, upwardly curved flanged bristles terminating in a fine point beyond the flange. All are alike, but those above the acicula are longer (Pl. xliii., fig. 94), projecting beyond the tip of the posterior lip, while the lower ones do little more than reach this tip. The upper ones are golden brown, glistening in reflected light ; the lower are golden yellow. Between the two groups are 4-5 golden acicula whose points do not project beyond the skin.

In the 55th foot the uppermost chætæ are six in number, not so long as those in the anterior feet ; in the sub-acicular bundle are five hooks and one flanged capilliform (Pl. xlii., fig. 84).

The acicula now have brown tips.

In the 125th foot the supra-acicular part of the bundle contains only two large upwardly directed winged hooks (Pl. xlii., fig. 85), below which are three flanged capilliforms, differing somewhat from those anteriorly. In the sub-acicular bundle are 5-6 winged hooks, of the same structure as the upper ones, but slenderer. The acicula are now reduced to two, which are stouter than in the anterior feet ; one is golden, the other black.

The pharynx reaches to the 10th chætigerous segment. The lower jaws are brown, covered anteriorly with the usual thin white transparent plate of lime, which is marked on its upper surface with fine longitudinal lines, and on the under surface with a number of concentric lines ; the anterior edge is white, and obliquely curved ; the pair are united for nearly their whole length. The upper jawlets are black, each denticle being tipped with white. The forceps, that is the first pair, are relatively slender (Pl. xlii., fig. 88). The right

dental plate (II) has six teeth, the most distal of which is the smallest, the next is the largest, and, with the exception of the third, which is also small, they decrease regularly in size proximally. All are bluntly rounded. The left plate has five teeth. The third pair has two large rounded teeth; the fourth pair has one indistinct tooth.

Remarks.—The species is considerably larger than the majority, and although both individuals are imperfect the diameter indicates that the species is one of the largest. It has some resemblance to *L. heteropoda*, Marenzeller,[1] which is a Pacific species, especially in the character of the feet, from which, however, it differs most conspicuously in the fact that the jaws of Marenzeller's species have but four denticulations on each of the large dental plates.[2] The form, too, of the ventral hooks seems from the rather divergent figures of Marenzeller and of M'Intosh[3] to have a less extensive enlargement and less extensive wing; while the details of the apex are also unlike. It is also noteworthy that Marenzeller states that his species is eyeless, while M'Intosh finds a pair of eyes obliquely set but hidden by the anterior margin of the peristomium. The colour, according to the former author, is "yellowish grey, with a feeble bronze iridescence in the middle of the back," which is in marked contrast to the colouration of this species. But how far is colour important by itself? From a comparison of the feet I supposed that the present worms belonged to this species, but there is some discrepancy between the accounts and figures given by the two authors referred to, so that I have given a somewhat detailed account of the species. It may quite probably be synonymous.

Locs.—Oyster Bay, Tasmania, 26 fathoms.

Twenty miles east of Babel Island, Bass Strait.

Genus OENONE, *Savigny*.

OENONE HASWELLI, *sp. nov.*

(Plate xliii., figs. 95-102; Plate xliv., fig. 113.)

Four individuals, two of them are complete, two are anterior fragments. A complete specimen measures 140 mm.

1. Marenzeller—Denksch. Math. Naturwiss. Akad. Wien, xli., 1879, p. 30.
2. Moore (Proc. Acad. Nat. Sci. Philadelphia, 1908, p. 346) notes that the jaws vary somewhat in the number of denticulations, but gives no details.
3. M'Intosh—Chall. Rep., Zool., xii., 1885, p. 255.

in length, with a diameter of 6 mm. at its widest; across the feet it measures 9 mm., and the height is 6 mm. The body is convex dorsally and flat ventrally.

The segments are very short, being about one-tenth of the diameter of the body, and separated by deep furrows.

The worm contains 247 segments, tapering forward, from the 25th to a diameter at the peristomium of only 2·5 mm., and posteriorly where the last segment is 1 mm. in diameter. Its colour is brown, without any iridescence.

A second complete specimen measures 120 by 5 mm.; the jaws are partly protruded, and the appearance of the head from above recalls the drawing given by Savigny of *O. lucida*.

A third, fragmentary, is 50 by 5 mm.; the head is much retracted; and a fourth consists of head and 70 segments measuring 80 by 5 mm.

The prostomium is a bluntly rounded cone; its length is equal to its breadth; it carries three minute conical tentacles, hidden under the overhanging anterior margin of the peristomium (Pl. xliii., figs. 95, 96).

There are two pairs of eyes, the anterior larger, rather lateral in position and oval in shape; the posterior small, admedian and round, lying in front of the bases of the two admedian tentacles, and, like them, hidden.

It was not until I had slit open the dorsum, in order to study the jaws, that I detected the tentacles, but having discovered them, I found it possible to see their tips in other specimens, on forcing back the peristomial margin.

The under surface of the prostomium has a very deep median groove, which widens outwards posteriorly. There are no "palps" (Pl. xliii., fig. 97).

The peristomium (the only footless segment) is, on its dorsal surface, but little longer than the first chætigerous segment, but on the ventral surface it lengthens out posteriorly, so that in the mid-line it is about twice the length it has laterally. The median region, forming the lower lip, is marked out from the lateral by a pair of longitudinal furrows, starting from the anterior margin, and then curving outwards to die out. There is a slight median notch, which, however, is better seen in a specimen in which the prostomium is retracted, and therewith the peristomium stretched.

The sides of the peristomium are somewhat grooved, and these also are obliterated when the prostomium is retracted.

The parapodia are prominent; the dorsal cirri are relatively large from the first, are vertically extended and flattened antero-posteriorly, leaf-shaped in outline; constricted at the attachment, with rounded apex; the cirrus increases in size further back, so that by the 29th it is as long as the posterior lip of the chætophoral sac, and later comes to exceed this in length (Pl. xliii., fig. 99).

Seen under a dissecting lens the dorsal cirrus has the appearance of being folded along its length, as Savigny's drawing suggests; this appearance is due to the large size of the blood vessel which traverses it, and of the lateral vessels which spring in numbers from it. The internal margin, directed towards the body, rises nearly straight upwards, but the outer margin has a gentle convex curve, which suddenly turns inwards at the base, where it connects with the foot.

The chætophore has two fleshy lips, the posterior of which is at least twice as long as the anterior, and much higher; it is produced outwards as a somewhat conical lobe. There is no ventral cirrus.

The parapodium is supported by (usually) two yellow acicula; the chætæ are few. In the anterior feet they are all capilliform, but in the posterior feet two or three golden acicular chætæ replace some of the ventral capilliforms.

The capilliforms in the upper part of the bundle are longer than those below, decreasing gradually in length from above downwards. Those in the upper part are almost straight or with a gentle curve (which may be artifact), and have only a feebly developed, obliquely striated flange, but in the sub-acicular bundle the capilliforms are bent upwards near their end, and have a wider flange (Pl. xliii., fig. 100).

Somewhere about the 50th segment the acicular chætæ appear (most of the chætæ in the lower part of the feet are broken short so that it is difficult to be certain as to the exact segment). These are usually two in number, sometimes three, and the two are not alike; the upper one has the notch separating the two teeth, nearly in line with the axis, that it is almost terminal; but in the lower chætæ it is more lateral, and the teeth larger (Pl. xliii., figs. 101, 102).

From the 13th foot to the 25th, all the chætæ are capilliforms, arranged in supra-acicular and sub-acicular bundles; in the 25th the supra-acicular bundle consists of (*a*) an upper group of long bristles, 4-5, and (*b*) a lower of 4 rather shorter ones. The sub-acicular bristles are still shorter.

In the 53rd foot, the supra-acicular chætæ are—(*a*) 2 very long, and (*b*) 4 medium capilliforms. Sub-acicular—5 short capilliforms and 2 acicular chætæ.

53rd supra-acicular—(*a*) 2 very long, and (*b*) 4 medium capill. Sub-acic.—5 short capill. and two acicular chætæ.

The pharynx is long, narrow, cylindrical, extending to the 19th segment.

The lower jaw pieces are short and broad, with a large biting region, which in its outer half is transverse, and on its inner half obliquely inclined backwards. The area of union of the right and left pieces is about one-third of the total length.

The jaws are dead black, the supports are very slender rods, longer than the whole series of upper jawlets.

The upper series (Pl. xliv., fig. 113) consists of five pieces on each side : the basal pair (I.) are unlike ; the left one has an anterior long claw-like fang, the internal margin of the base is straight, and bears 12-13 short sharp denticulations.

The right piece (I.) has no claw ; it is a transversely disposed plate, with its internal margin produced fore and aft, so as to be nearly twice the length of the plate itself, and this edge bears 13 denticulations.

The next piece (II.) on the right side, extends alongside the basal piece, and under a dissecting lens might readily be overlooked. It is a broad clawed plate, the internal straight margin is produced into 12-13 teeth, the distal ones, small, commence close to the claw, the proximal larger. This internal toothed margin is bent upward, and thus is not readily seen till the plates are moved about.

The corresponding left plate (II.) has a long stout claw, with 9 denticulations, of which the proximal and the distal are small, and those in the middle stout.

On the left side, the next (III.) has a large claw with six teeth, the largest in the middle.

The fourth (IV.) similar, but rather smaller, with six teeth.

The fifth (V.) has a single terminal claw, and no subsidiary denticulations.

On the right side the plates III., IV., and V. are similar, but the third (III.) has seven teeth.

Remarks.—The existence of three tentacles would indicate that the worm belongs to the genus *Aglaurides*, but the

asymmetry of the jaws, especially the presence of the clawless plate on the right side, agrees with what occurs in the species of *Oenone*.

There appear to be only three species of this genus hitherto described, *O. lucida*, Savigny[1], *O. diphyllidia*, Schmarda[2], and *O. pacifica*, Fischli[3]. The worm described by Willey[4] from Ceylon as *Aglaurides fulgida*, Savigny, is not a a member of that genus according to the view of most zoologists, for it has the Oenonian arrangement of jaw plates, which in *Aglaurides* are more nearly symmetrical.

Willey seems to have overlooked the difference in the character of the jaws as diagnostic of *Oenone*, for he supposes that the only point of difference between the two genera lies in the presence or absence of the tentacles; and it is noteworthy that in order to see these, he had to cut the peristomium, as I have had to do. I suggest that it belongs to the genus *Oenone*.

Savigny, in his diagnosis of the genus *Oenone*, uses (p. 55), as Ehlers has already noted, the phrase "Antennes point saillantes et comme nulle." I understand this to mean that Savigny had recognised the existence of tentacles, and wished to emphasise their small size—so small are they that "they do not project; there appear to be none."

With the four species the present one cannot be confused, owing to the details of the teeth.

Aglaurides, too, has two distinct footless segments. *Oenone* has but one, which, however, is double ventrally, and the formation of the lower lip appears, from Ehlers' account, to differ.

From *O. diphyllidia*, as described by Ehlers[5], the present species differs in the form of the prostomium, in the shorter and thicker feet (compare his Pl. xxxiv., fig. 4), in the wider dorsal cirrus, and in details as to the number of denticulations on the various jaw plates.

Locs.—East coast of Flinders Island, Bass Strait.

Between Port Stephens and Newcastle, New South Wales, 20-60 fathoms.

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1. Savigny—System. Annelides, 1820, p. 55.
2. Schmarda—Neue Wirbellose Thiere, I., 2, 1861, p. 120.
3. Fischli—Abhandl. Senckenberg. Naturforsch. gesellsch., xxv., 1900, p. 108.
4. Willey—Ceylon Pearl Oyster Fisheries, pt. IV., Suppl. Rep., xxx.,—Polychæta, 1905, p. 284.
5. Ehlers—Mem. Mus. Comp. Zool. Harvard, xxxi., 1887, p. 109.

Genus LYSARETE, *Kinberg*.

LYSARETE AUSTRALIENSIS, *sp. nov.*

(Plate xliii., figs. 103-109 ; Plate xliv., figs. 110-112.)

An anterior fragment, consisting of the head and 70 chætigerous segments of what is evidently a very large worm. It measures 110 mm. in length, with a breadth of 10 mm. over the body, and 14 over the parapodia ; the height is 9 mm. The peristomium is 6 mm. across, and the diameter thence increases, till at the 10th segment it has attained its full measure, which is retained for the remainder of the fragment. The segments are 1-5th the diameter of the body.

The colour of the worm is a rich dark copper brown, with a well marked green iridescence.

The prostomium is a short rounded cone, slightly broader than long ; its length is equal to that of the peristomium, nuchal and first chætigerous segments (Pl. xliii., fig. 103). It bears three short cylindrical tentacles, which arise in a curve ; the median, which is inserted behind the others, is longer than the admedian and is nearly as long as the peristomium and nuchal segment. These tentacles lie backwards in a deep groove excavated in the upper surface of the peristomium, nuchal and first chætigerous segments. It is broad in front, where the overhanging margin of the peristomium is interrupted, while the posterior region of this segment is excavated, and this excavation is successively narrower in the two following segments (Pl. xliii., fig. 104).

There are two pairs of eyes, both of very small size ; the anterior are difficult to see owing to the deep pigmentation of the skin of the prostomium ; they lie outside the bases of the admedian tentacles. The second pair lie between the median and admedian tentacles, and can only be seen when these are turned forwards.

The surface of the first three segments is marked by numerous short irregular longitudinal furrows.

The under surface of the prostomium presents no groove, but at the base, on each side, is a large prominent convex lobe, triangular at its origin (Pl. xliii., fig. 105). One apex is directed backwards, the opposite side is forwards, a second side faces inwards ; the third, backwards and outwards. Between these palps and behind them are several transverse folds, probably due to the partial eversion of the pharynx.

The peristomium is slightly longer than the nuchal segment, from which it is separated by a definite furrow dorsally and laterally; but on the ventral surface the intersegmental furrow suddenly bends forwards to form the outline of a "processus oralis," so that the median part of the lower lip appears to be formed by the nuchal segment.

The lower lip is traversed by short longitudinal furrows along its ventral and lateral margins.

The body is nearly cylindrical (Pl. xliii., fig. 106); the parapodia are prominent and widely separated; the posterior lip of the chætophore is large, foliaceous, and pointed.

The dorsal cirrus in the earlier feet is small, being little more than a cylindrical papilla, much shorter than the anterior lip of the chætophore (Pl. xliv., fig. 110); it is not till about the 20th segment that it attains the length of this lip (Pl. xliv., fig. 111), and by about the 40th it is as long as the posterior lip and even longer. It has now lost its cylindrical form, has become flattened in the antero-posterior direction, and is highly vascular, and projects outwards almost horizontally (Pl. xliv., fig. 112).

A few small chætæ, as usual in the family, enter the base of the dorsal cirrus and are accompanied by a black aciculum. There is no ventral cirrus, unless the rounded side of the body is regarded as such; it is separated from the ventral region by a definite groove.

The chætæ, which are brown, are all capilliform (Pl. xliii., fig. 108), with a very slight flange, but are of two sizes: those in the supra-acicular bundle are much longer than the sub-acicular ones. There are usually four black acicula in the main part of the foot.

In the first and second feet I find the following numbers of chætæ:—The supra-acicular chætæ are 10, the sub-acicular 8-10; in the twenty-first 7 and 14 respectively; in the sixty-sixth foot the numbers are 6 and 8 respectively.

The jaws are very dark brown in colour; the "support" is quite short, not as long as the proximal upper jaw-plate; each half is a right-angled triangle, the vertical side of which is median, the hypothenuse external, and frayed out, as it were, into a number of delicate short threads.

The right and left jaw plates are symmetrical, five on each side. The proximal plate (I) on both sides is long and narrow, bidentate, or rather has two large claw-like fangs at its

anterior end, the posterior of which is only slightly smaller than the other. There are no marginal denticulations. II. has the ordinary form of a broad plate with five teeth. III. is short, with three teeth, the proximal being small. IV. is bidentate; and V. has but a single tooth.

The fifth plate is so closely placed against the fourth that on a first inspection they seemed part of a single plate.

The lower jaws are long and anteriorly broad; they lie wholly in front of the support of the upper jawlets, and each is divisible lengthwise into two approximately equal regions; the outer region is brown, the inner white, being calcified and marked by fine longitudinal lines.

Remarks.—This species differs from the only other species, *L. brasiliensis*, Kinberg[1] in the following features: in the number of teeth on the jaw plates, in the dimensions of the dorsal cirrus and posterior lip, both of which are narrower than in the present species. Ehlers,[2] who figures this species, says that the worm is whitish-grey.

Loc.—South by south-west of Mt. Cann, Victoria, 55-70 fathoms.

1. Kinberg—Annulata nova, 1864.
2. Ehlers—Florida Anneliden, 1887, p. 107.

EXPLANATION OF PLATE XXXVIII.

Lepidonotus hedleyi, sp. nov.

Fig. 1.—An elytron (× 8). *a*. the anterior margin. *e*. external margin.

Fig. 2.—A portion of its surface (× 250), showing the round pigment cells and empty cells; these lie at a lower level than the tubercles, two of which are shown.

Fig. 3.—Four tubercles from an elytron of different shapes (× 250).

Fig. 4.—A parapodium (× 20), seen from the anterior face; *gl*. Gland at the base of the dorsal cirrus.

Fig. 5.—A notopodial chæta (× 500). The pectinated frills in this and next figure are merely indicated by dotted lines.

Fig. 6.—A neuropodial chæta (× 250).

Fig. 7.—A neuropodial chæta from another aspect (× 250).

Lepidonotus willeyi, sp. nov.

Fig. 8.—An elytron (× 20), showing the limitation of the fringe to the external margin; *ant*. the anterior border.

Fig. 9.—Portion of the external margin of an elytron (× 250) showing some of the smaller tubercles.

Fig. 10.—Portion of the antero-dorsal area (× 250), with simple tubercles.

Fig. 11.—Some of the larger tubercles (× 250). *a*. from the external area; *b*. from near the middle; *c*. one of the largest in the posterior area.

Fig. 12.—A parapodium (× 35).

Fig. 13.—A notopodial chæta, with blunt apex (× 500). The pectinated frills where they cross the surface are omitted from this and the next.

Fig. 14.—One of the long notopodial chætæ, with a filamentous apex (× 500).

Figs. 15 and 15A.—Two aspects of a neuropodial chæta (× 360).

Physalidonotus rugosus, sp. nov.

Fig. 16.—The prostomium (× 10), the hinder border of which is overlapped by the first "pad" or elytral support.

Fig. 17.—An elytron (×$2\frac{1}{2}$), the characteristically elongated areola is indicated by dotted line. *Ant*., anterior margin.

Fig. 18.—A portion of the external area and margin of an elytron (× 20).

Fig. 19.—One of the supra-areolar tubercles (× 20).

Fig. 20.—A tubercle from the posterior area (× 35).

Fig. 21.—Another tubercle from the posterior area (× 35).

Fig. 22.—Base of a cirriferous parapodium from behind to show the branchial papulæ (enlarged).

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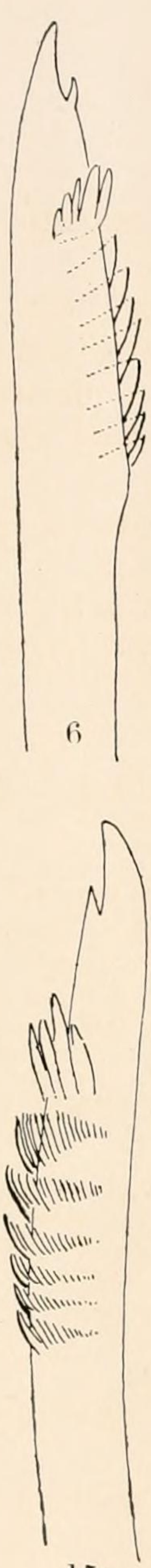

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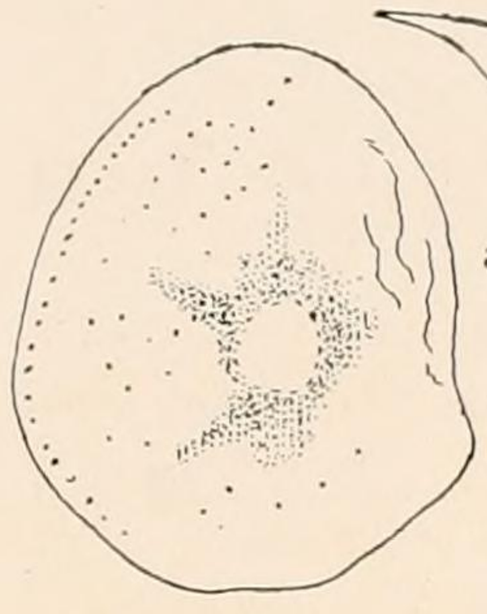

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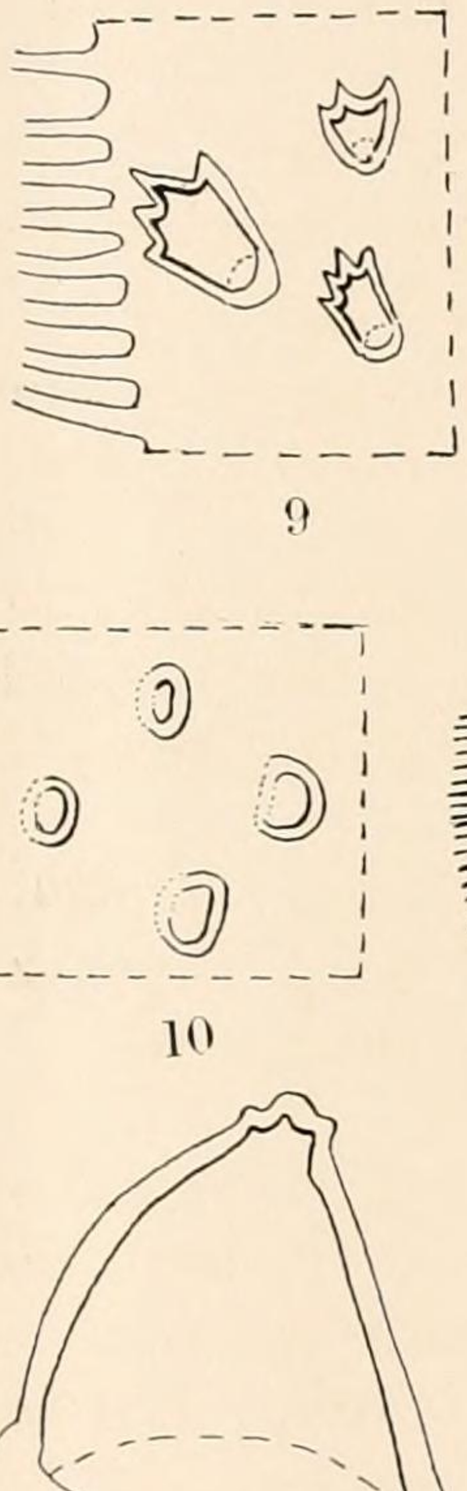

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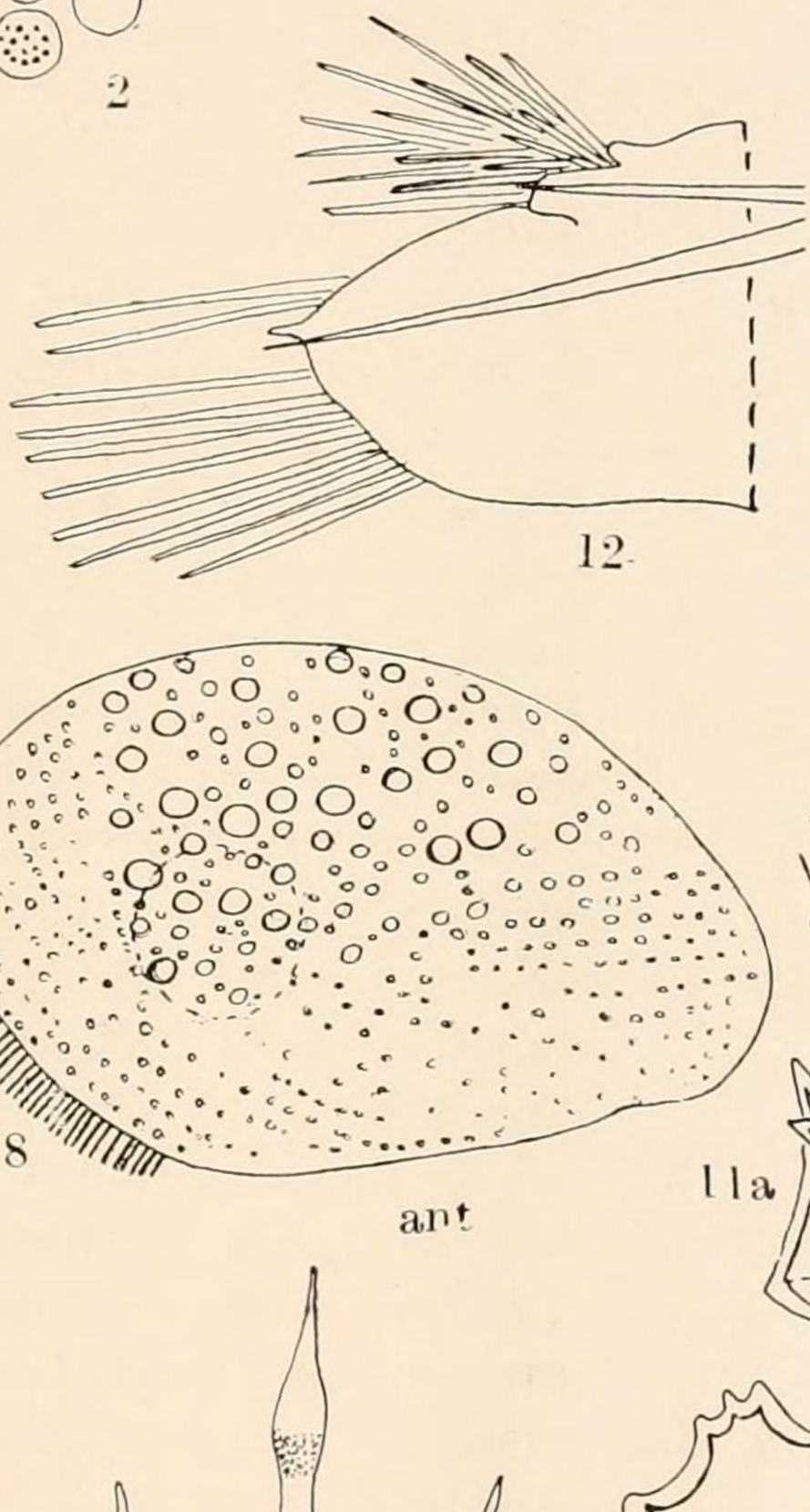

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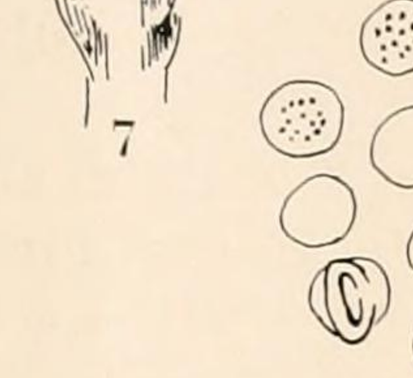

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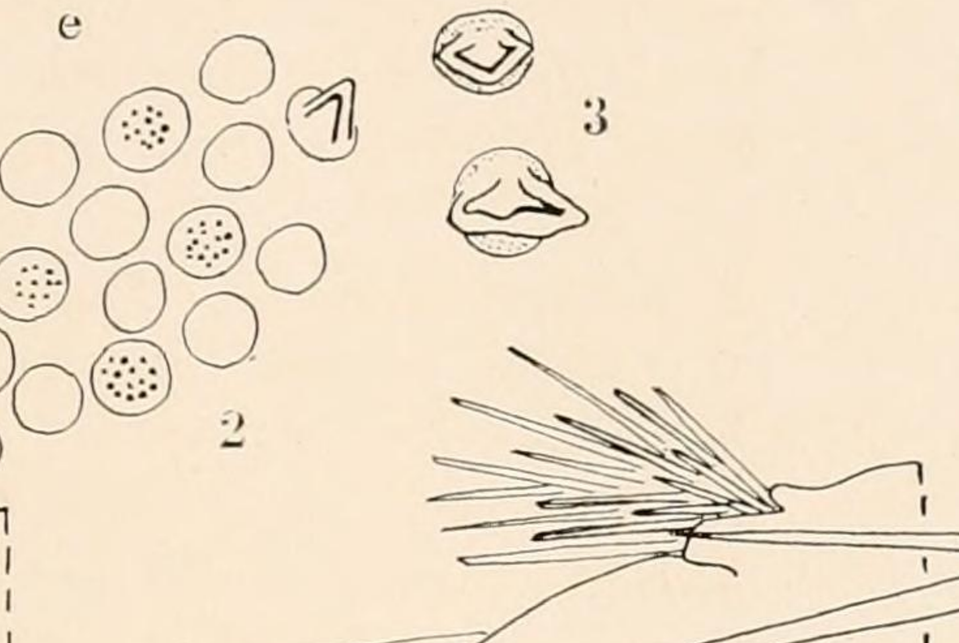

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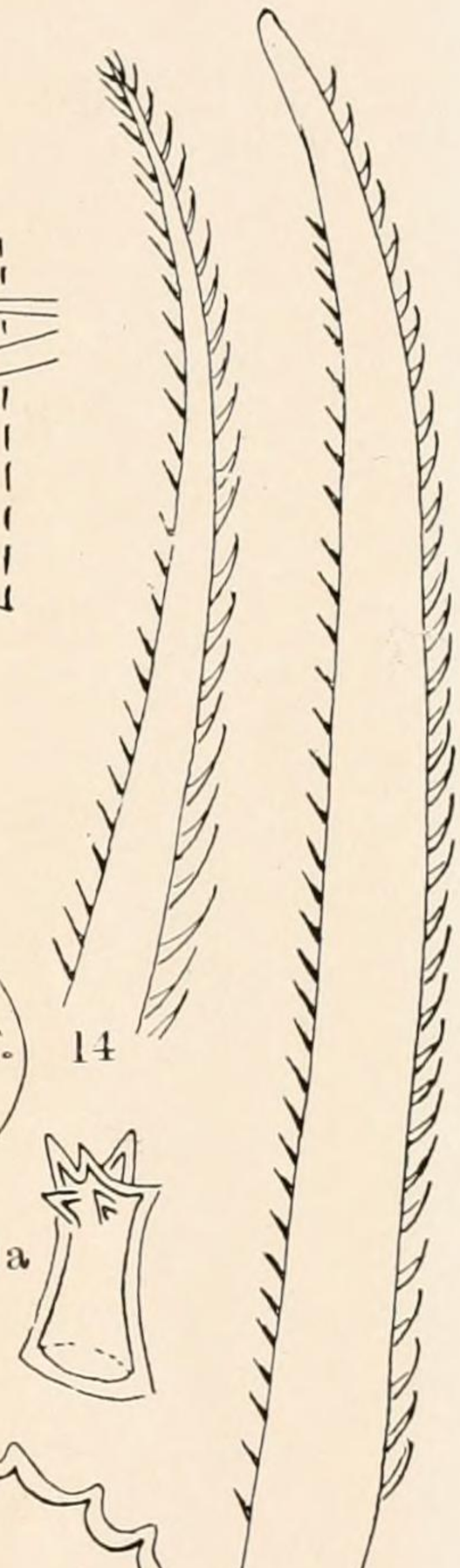

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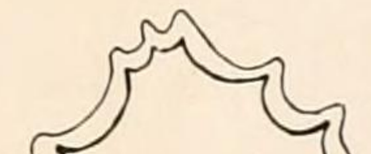

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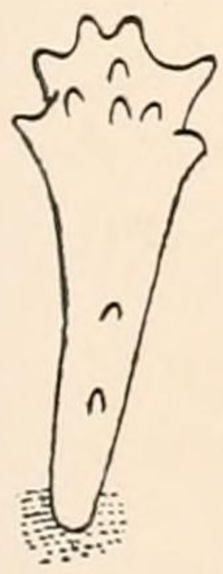

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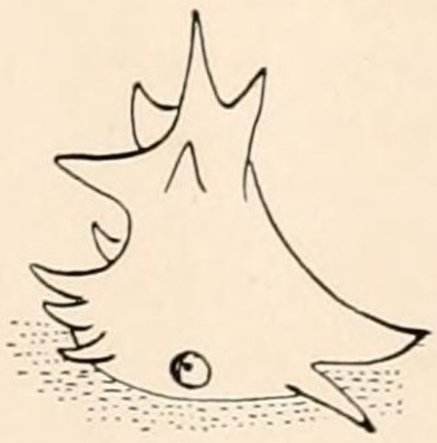

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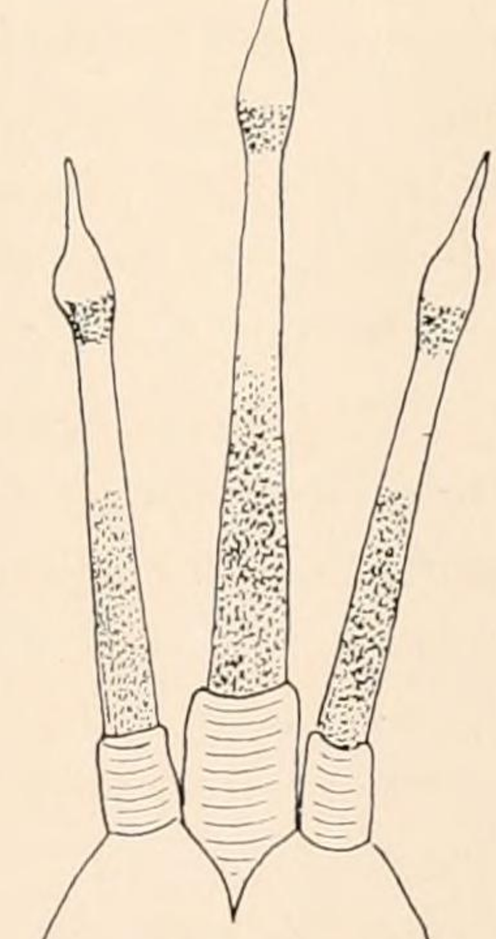

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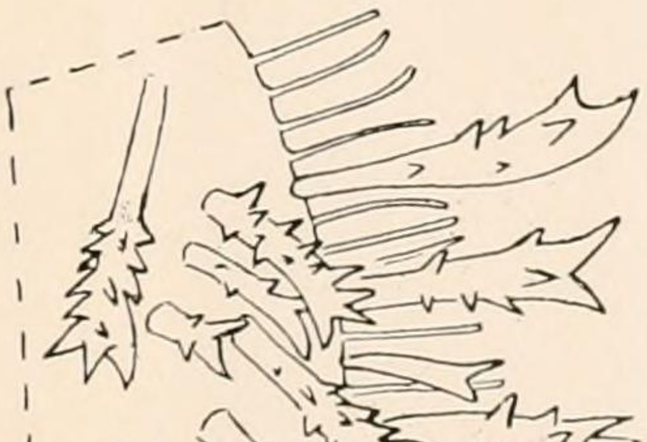

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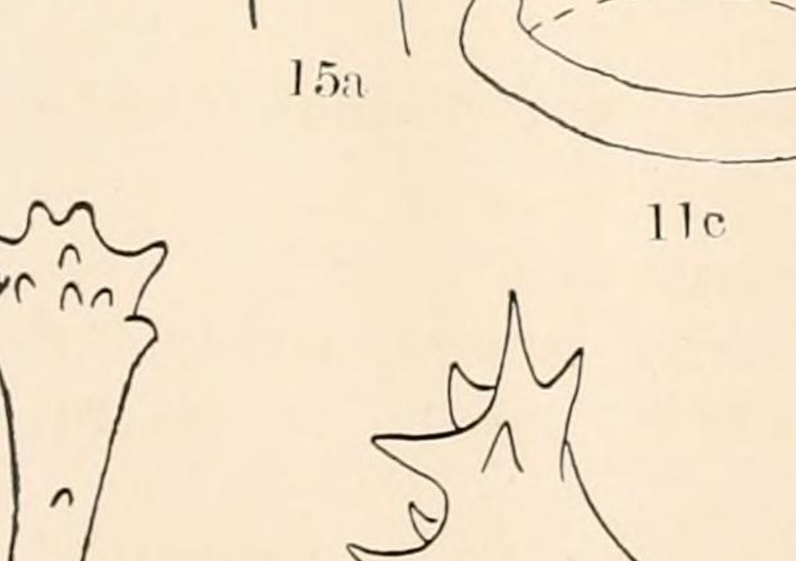

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W. B. BENHAM, del.

EXPLANATION OF PLATE XXXIX.

Physalidonotus rugosus, sp. nov.

Figs. 23-24.—A neuropodial chæta from two aspects (× 90).

Fig. 25.—Two parapodia seen from above (× 5), showing the disposition of the branchial papulæ, the shape of the elytrophore, the large dorsal swelling on the cirriferous foot, and the gland at the base of the dorsal cirrus.

Physalidonotus laevis, sp. nov.

Fig. 26.—The prostomium from the side (× 10).

Fig. 27.—The prostomium from above (× 10), the posterior border is overhung by the first dorsal pad.

Fig. 28.—An elytron (× 4). The lower margin of the figure is anterior.

Fig. 29.—A portion of its external area (× 45).

Fig. 30.—A portion of its anterior area (× 45), showing the soft conical tubercles near the margin.

Fig. 31.—A couple of tubercles from the supra-areolar area (× 45).

Fig. 32.—Two parapodia (× 5), showing the arrangement of the papulæ.

Physalidonotus turritus, sp. nov.

Fig. 33.—An elytron (× 20).

Fig. 34.—The prostomium (× 10), overhung by the first dorsal pad.

Fig. 35.—Two parapodia from above (enlarged), showing the papulæ.

Physalidonotus paucibranchiatus, sp. nov.

Fig. 16.—A neuropodial chæta (× 90), showing the constriction below the bearded region, characteristic of this species.

Fig. 37.—Two parapodia (× 10), showing the papulæ.

Fig. 38.—A parapodium (× 20), from its posterior face. This serves to illustrate the form characteristic for the genus.

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EXPLANATION OF PLATE XL.

Physalidonotus paucibranchiatus, sp. nov.

Fig. 39.—The prostomium from above (× 10).

Fig. 40.—The prostomium from the side (× 10).

Fig. 41.—An elytron (× 8). *Ant.* the anterior margin.

Fig. 42.—A portion of the surface near the external margin (× 20), showing the outer end of the areola (on the right), and the filamentous tubercles on the antero-external area.

Harmothoe etheridgei, sp. nov.

Fig. 43.—A neuropodial chæta (× 90).

Fig. 44.—A notopodial chæta (× 90).

Fig. 45.—One of the uppermost notopodial chætæ (× 90).

Fig. 46.—The prostomium and anterior segments (× 10).

Fig. 47.—The fifth elytron (× 10). *Ant.* anterior margin.

Fig. 48.—Tubercles of various shapes (× 45).

Fig. 49.—The tip of a notopodial chæta (× 360).

Fig. 50.—Tip of a neuropodial chæta (× 360).

Fig. 51.—A parapodium (× 20).

Halodora, sp. incert.

Fig. 52.—The fifth parapodium (× 35).

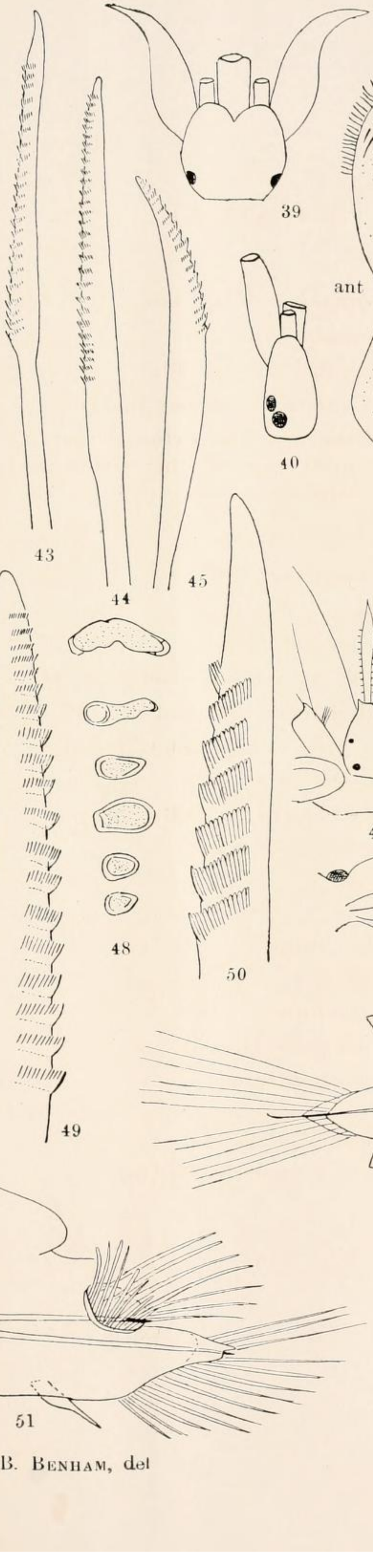
Fig. 53.—The fourteenth parapodium (× 35).

Fig. 54.—The head, ventral view (enlarged).

Fig. 55.—The head, dorsal view (enlarged).

Nephthys macrura, Schmarda.

Fig. 57.—The head (× 8), from a camera drawing.



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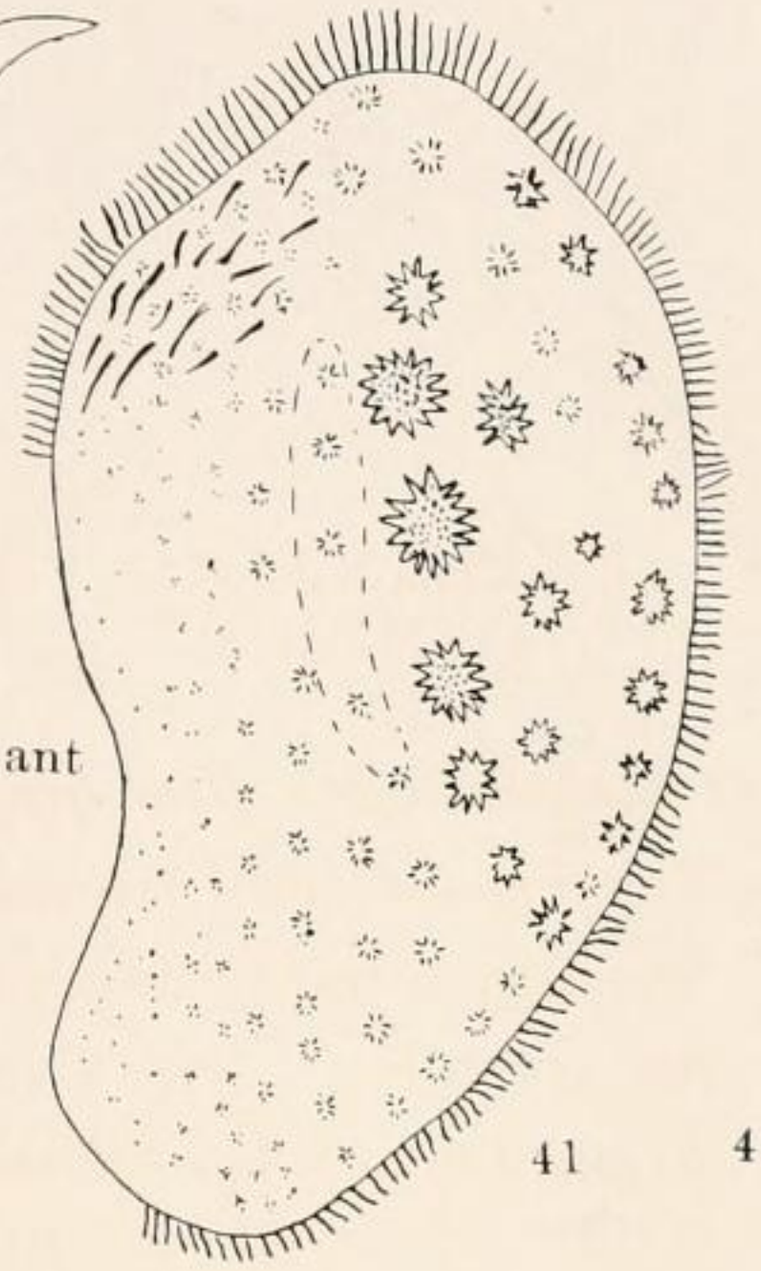

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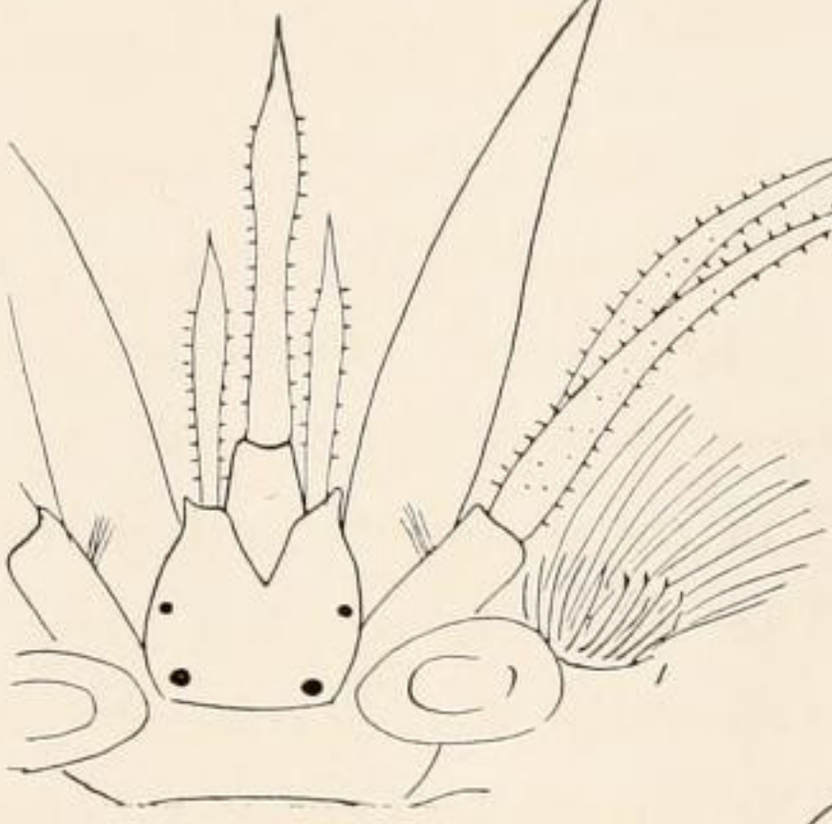

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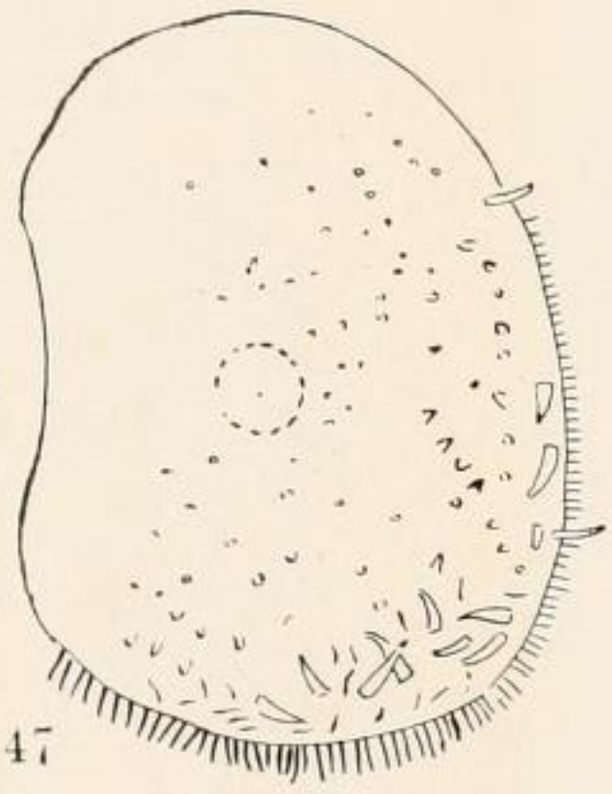

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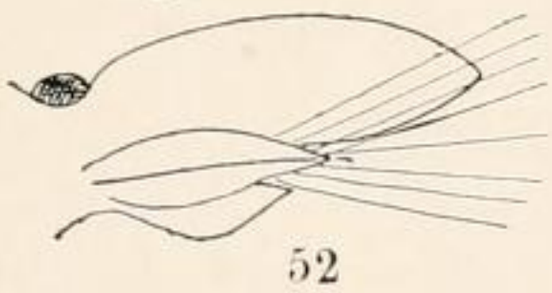

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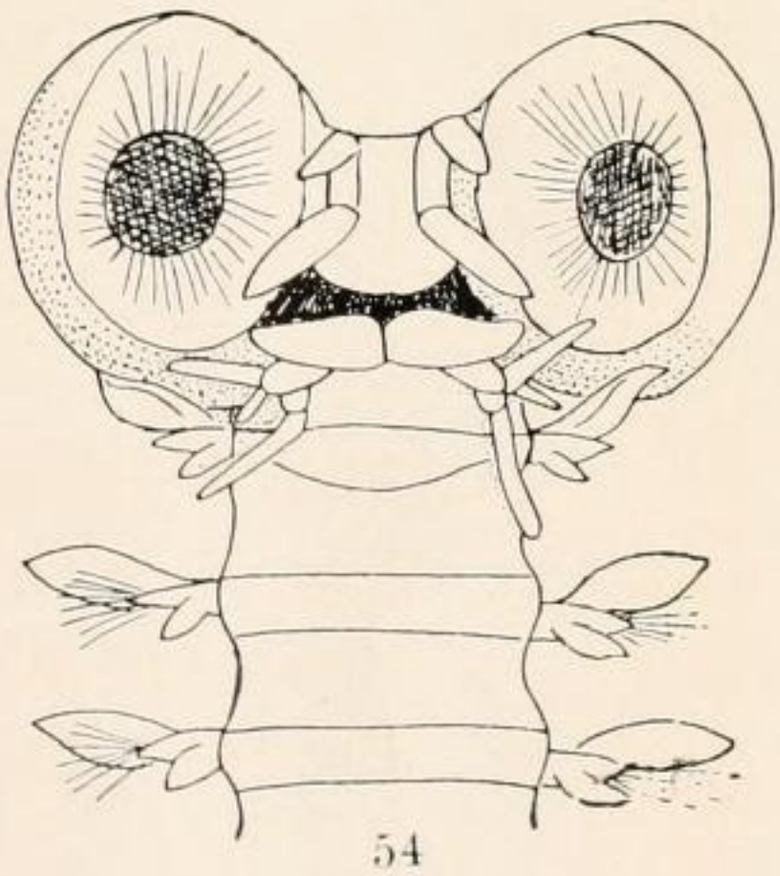

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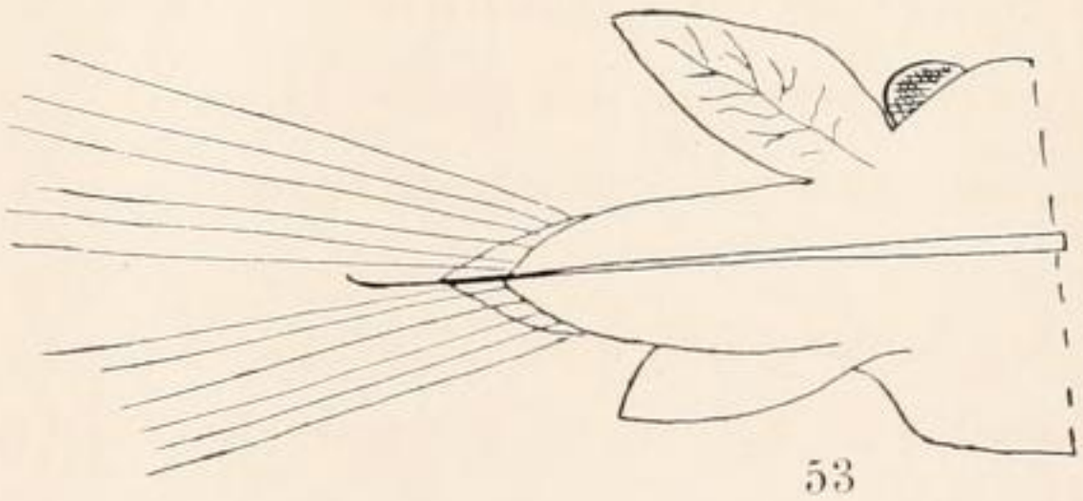

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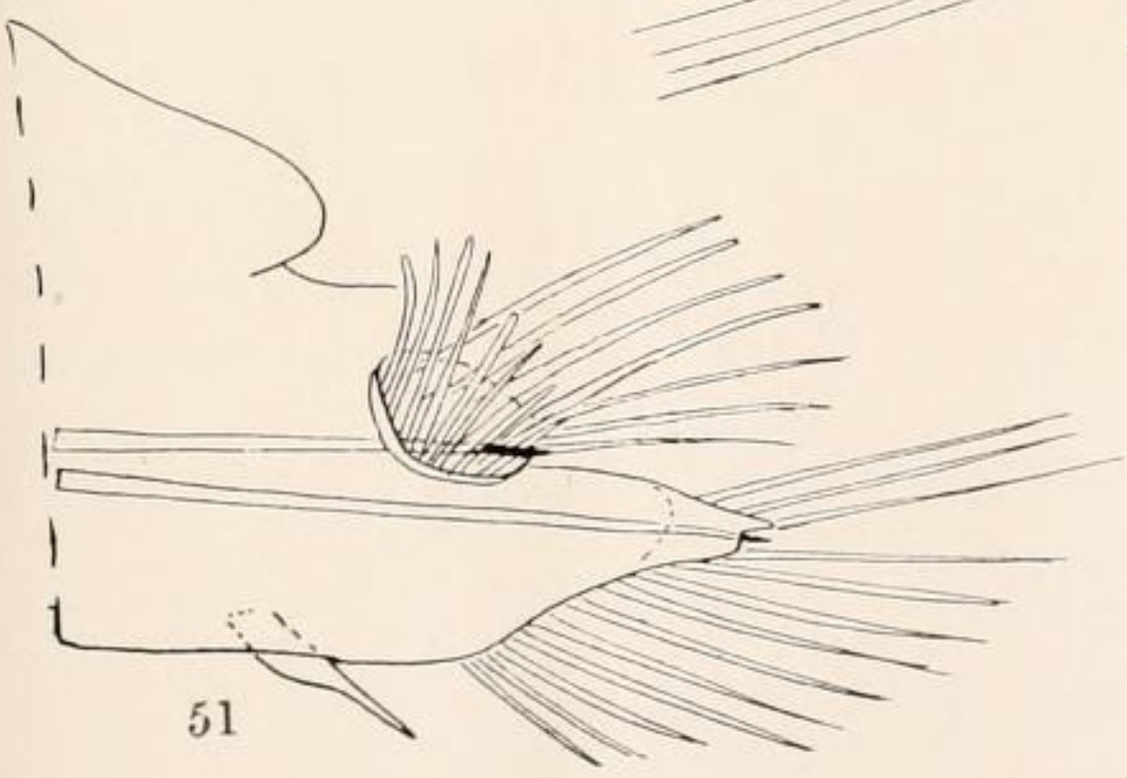

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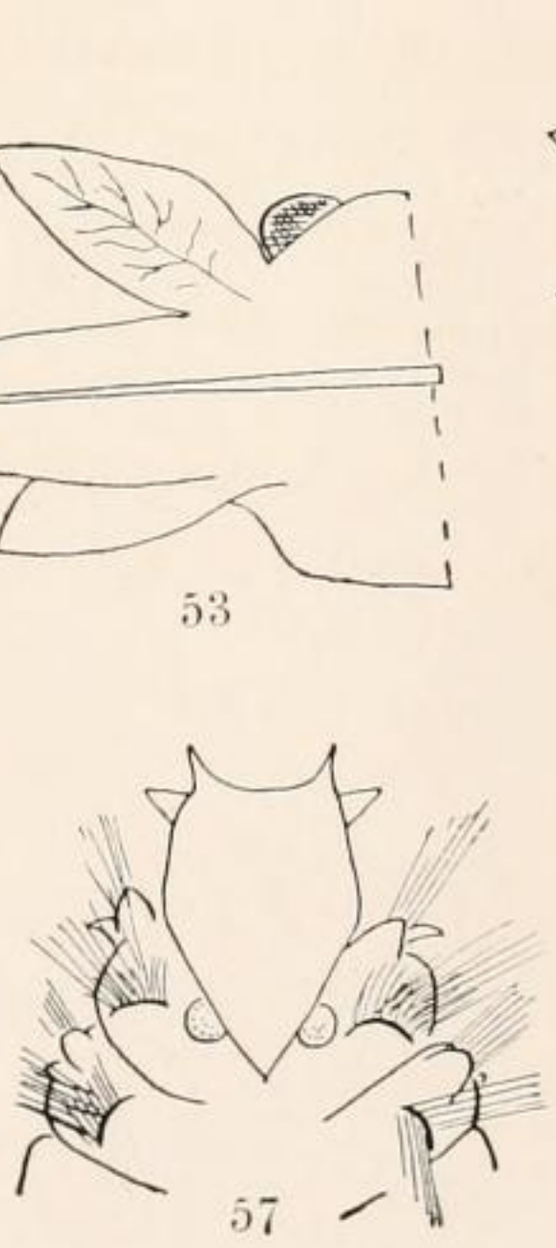

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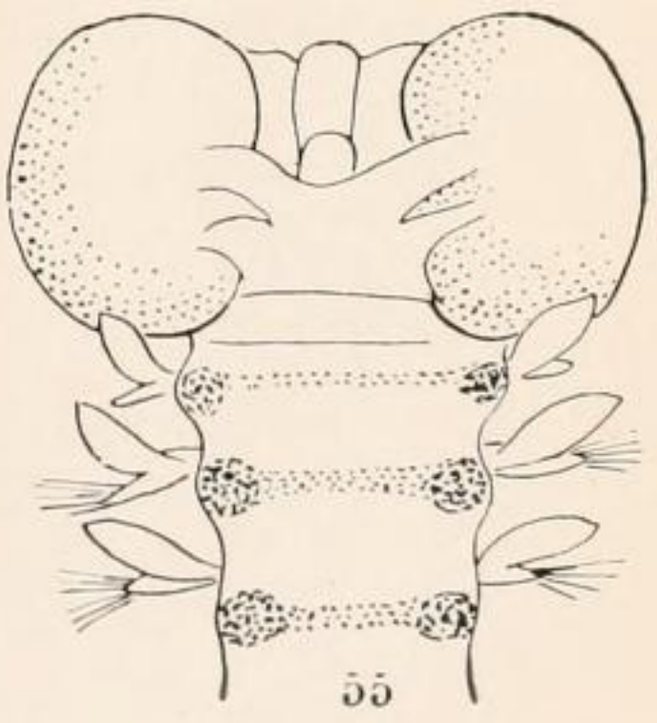

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EXPLANATION OF PLATE XLI.

Halodora, sp. incert.

Fig. 56.—The middle region of a jointed chæta (× 360).

Stauronereis australiensis, M'Intosh.

Fig. 58.—The head, dorsal view (enlarged).

Fig. 59.—Head, dorsal view (more enlarged), with the peristomial flap turned back to show the slit-like entrance to the nuchal organ on each side.

Fig. 60.—Head, ventral view (enlarged).

Fig. 61.—Six segments (× 4), with the parapodia of one side; the dorsal cirrus on the penultimate segment has been cut across to show the characteristic flattening in this species.

Fig. 62.—The 36th parapodium (× 20).

Fig. 63.—A sub-acicular chæta from the 36th parapodium (× 250).

Fig. 64.—A sub-acicular chæta from the 10th parapodium (× 250).

Fig. 65.—The upper series of jawlets of the right side, as seen *in situ* (× 20).

Fig. 66.—Isolated jawlets (× 35), *a*, a group of jawlets of the outer and inner series; *b*, one of the jawlets of the inner series; *c*, anterior jawlets of the inner series; *d*, a triangular piece which rests on the base of the outer and inner series.

Eunice bassensis, M'Intosh.

Fig. 67.—The head from the side (× 8).

Fig. 68.—The anterior end (× 8); the tentacles of the right side and the parapodia of the left have been omitted.

Fig. 69.—A segment from the side (× 8) to show the relatively small size of the gill at its maximum development.

Fig. 70.—The twelfth parapodium (× 20), from a well preserved specimen. (*Cf.* fig. 78).

Fig. 71.—A chæta from the 40th parapodium (× 360).

Fig. 72.—The tip of an acicular chæta from the 40th foot (× 250); it is bidentate, and the wings are present.

Fig. 73.—A tridentate acicular chæta from a posterior foot (× 250). The wings are omitted.

Fig. 74.—A tridentate acicular chæta from the 53rd foot (× 250), the wings are omitted.

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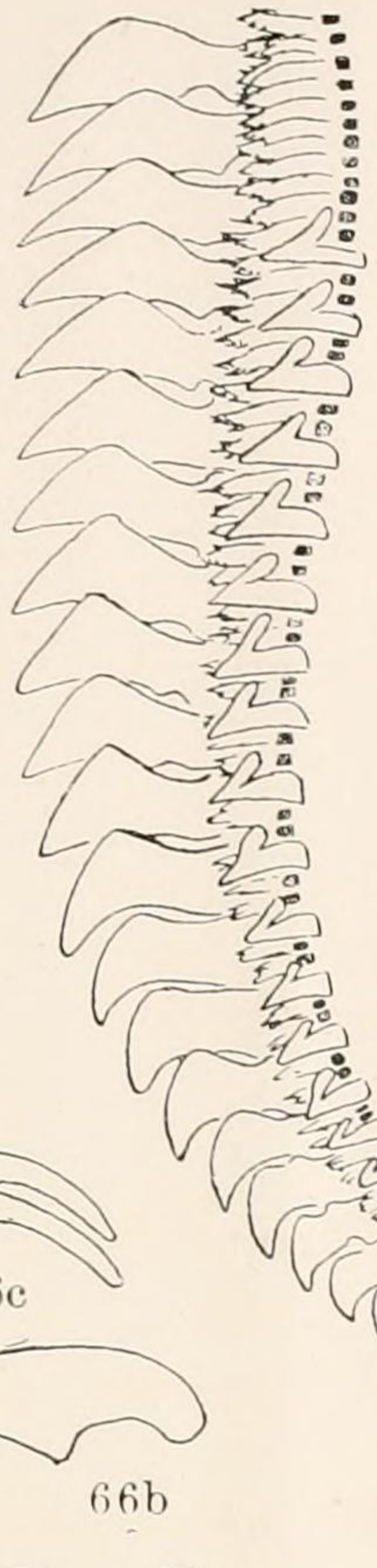

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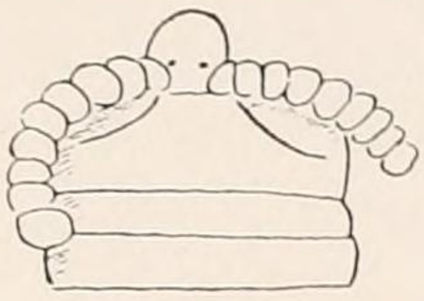

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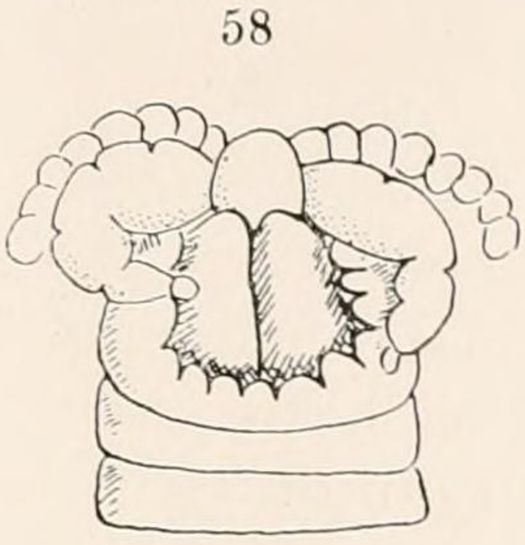

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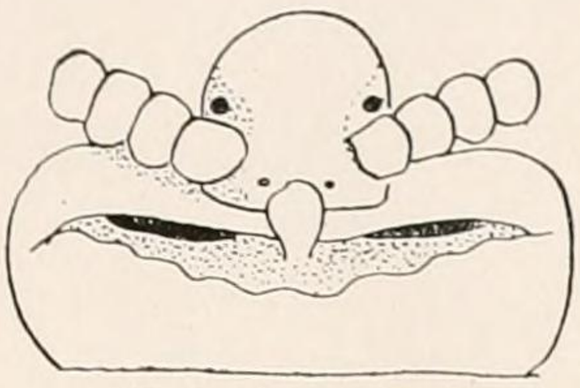

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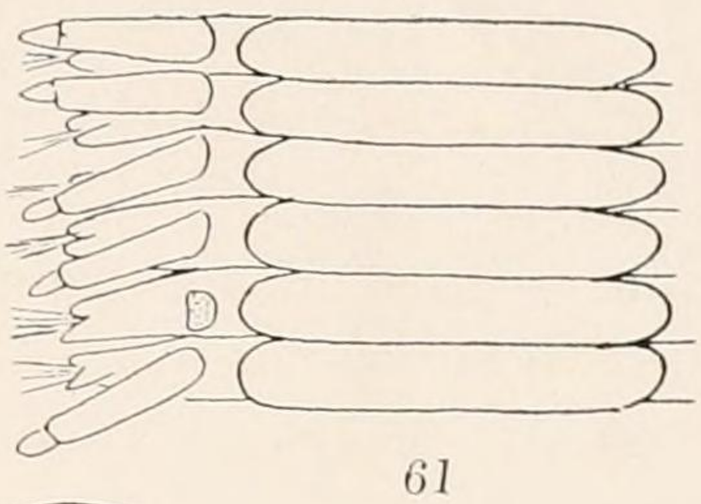

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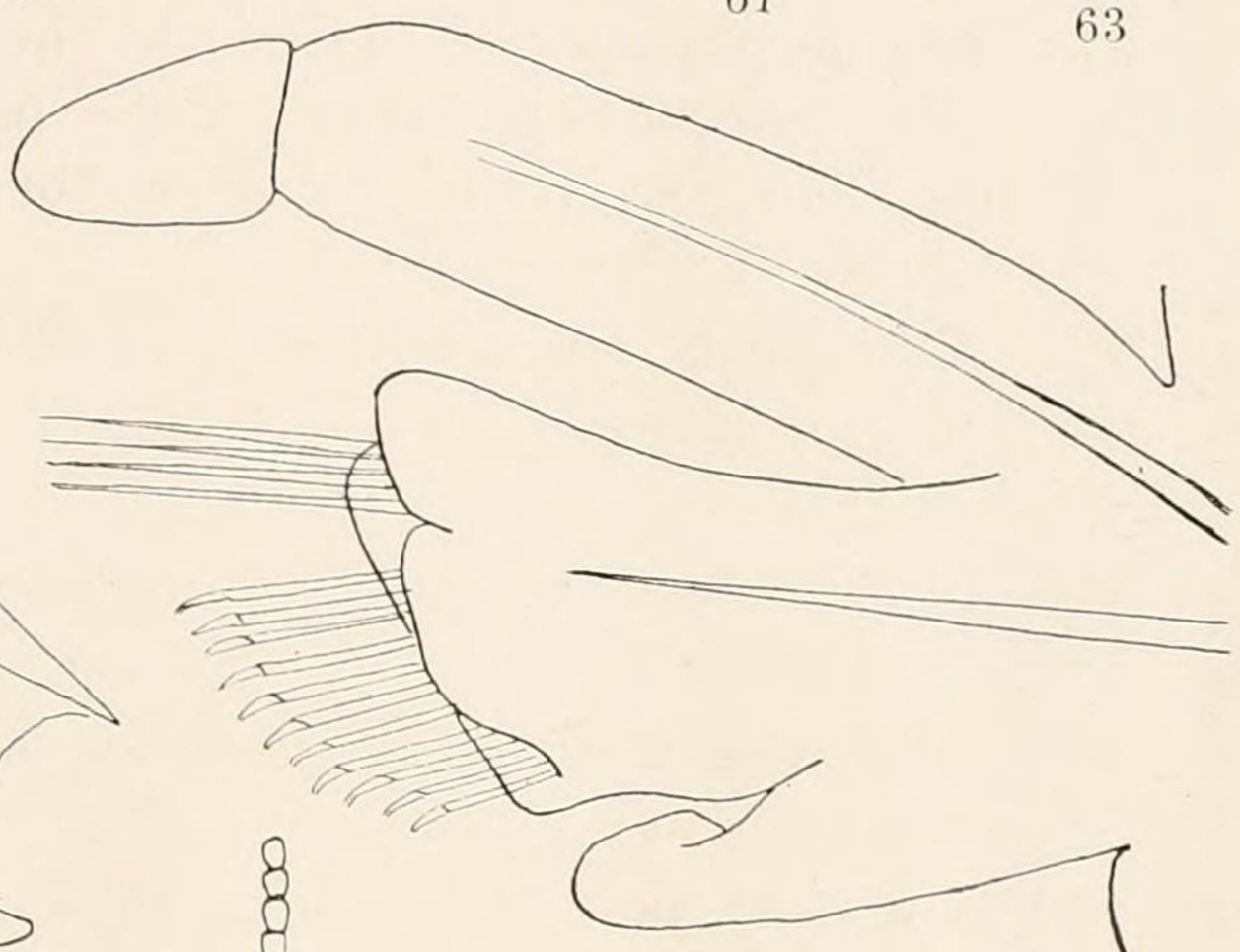

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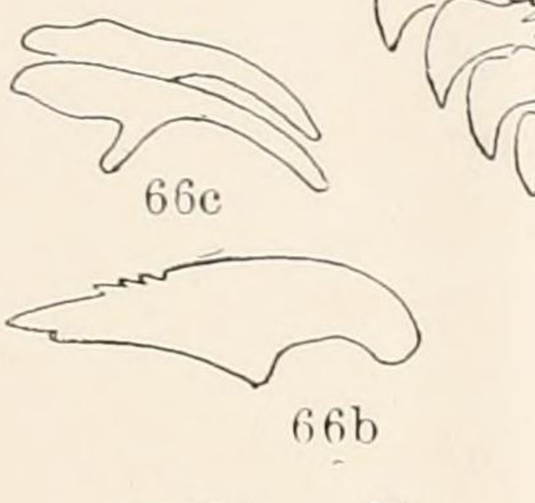

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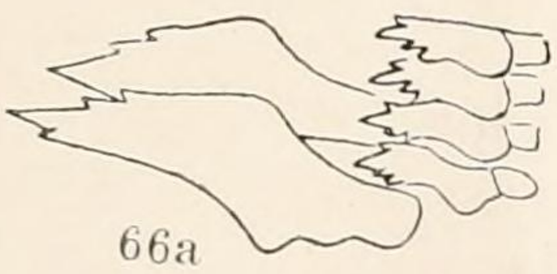

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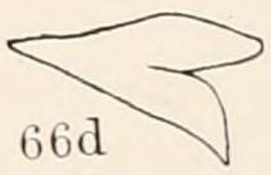

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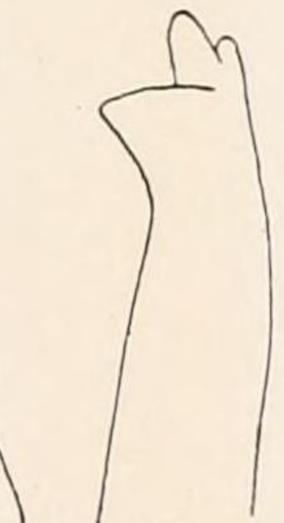

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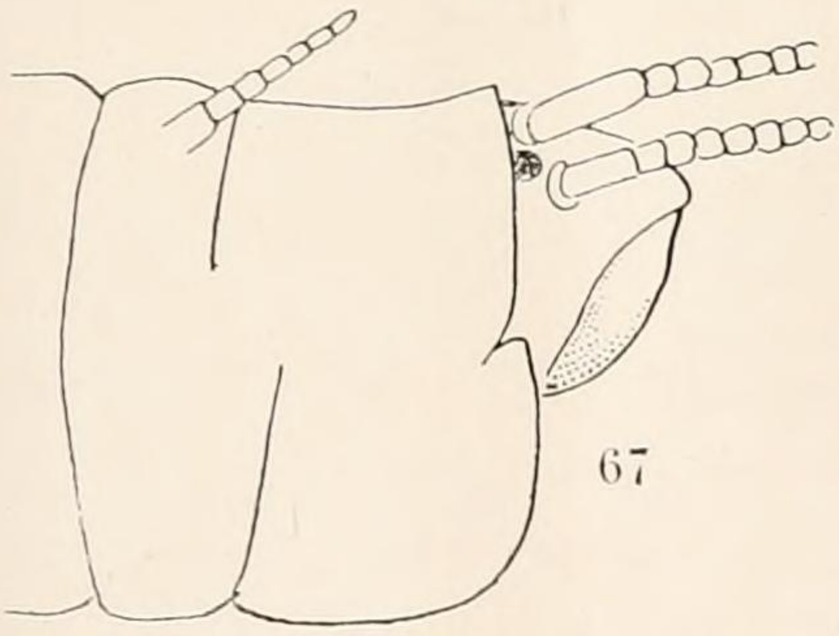

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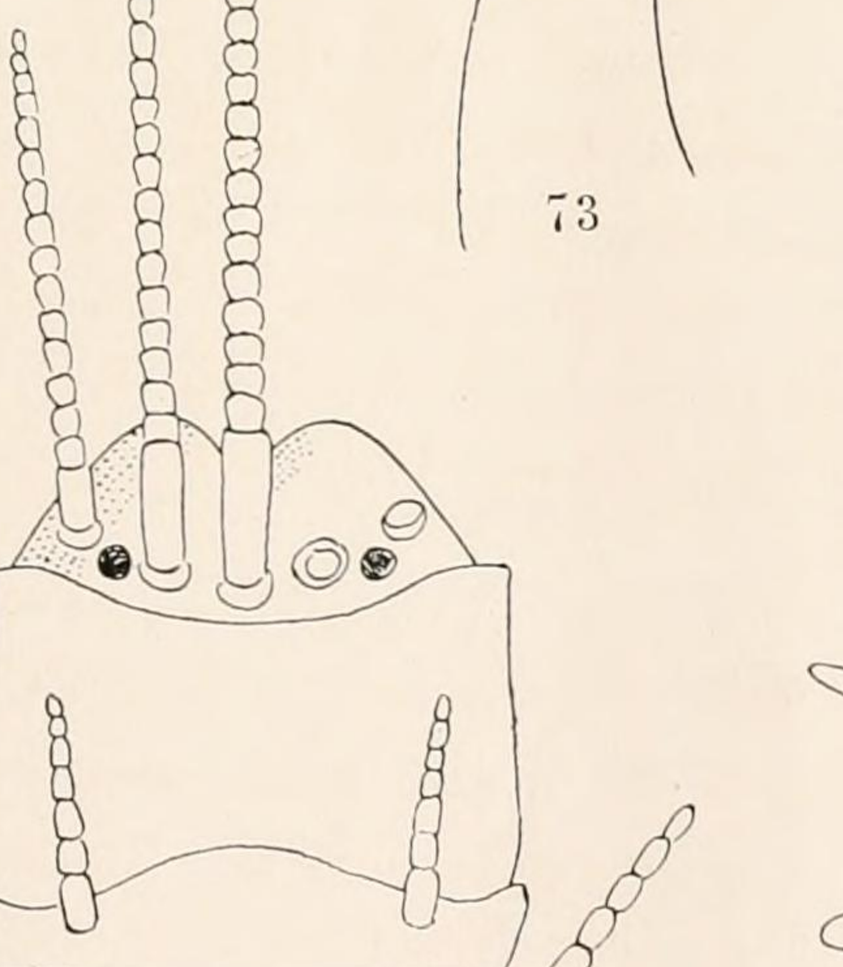

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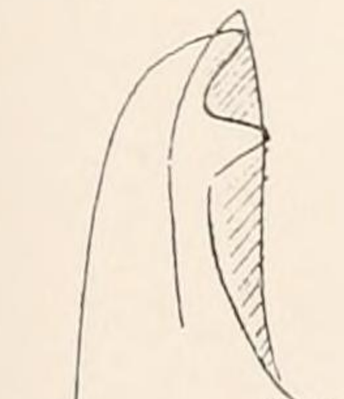

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EXPLANATION OF PLATE XLII.

Eunice bassensis, M'Intosh.

Fig. 75.—The upper jawlets disarticulated (× 20).

Fig. 76.—The "fangs" or basal members of the upper series of jawlets (× 20).

Fig. 77.—The left lower jaw, upper surface (× 20).

Fig. 78.—The twelfth parapodium from a much contracted specimen, showing the stouter form of the dorsal cirrus and the shortened gill filaments, as compared with Fig. 70.

Eunice pycnobranchiata, M'Intosh.

Fig. 79.—The eleventh parapodium (×20); the gill shows the characteristically thickened filaments; the chætæ are diagrammatically indicated.

Fig. 80.—Side view of the head (× 4), to show the deep incision between the lower and the lateral lips; the upper edge of the former is somewhat everted, so as to be visible from above.

Lumbriconereis gulielmi, sp. nov.

Fig. 81.—The head, dorsal view (× 4).

Fig. 82.—The head, ventral view (× 4).

Fig. 83.—The head, side view (× 4).

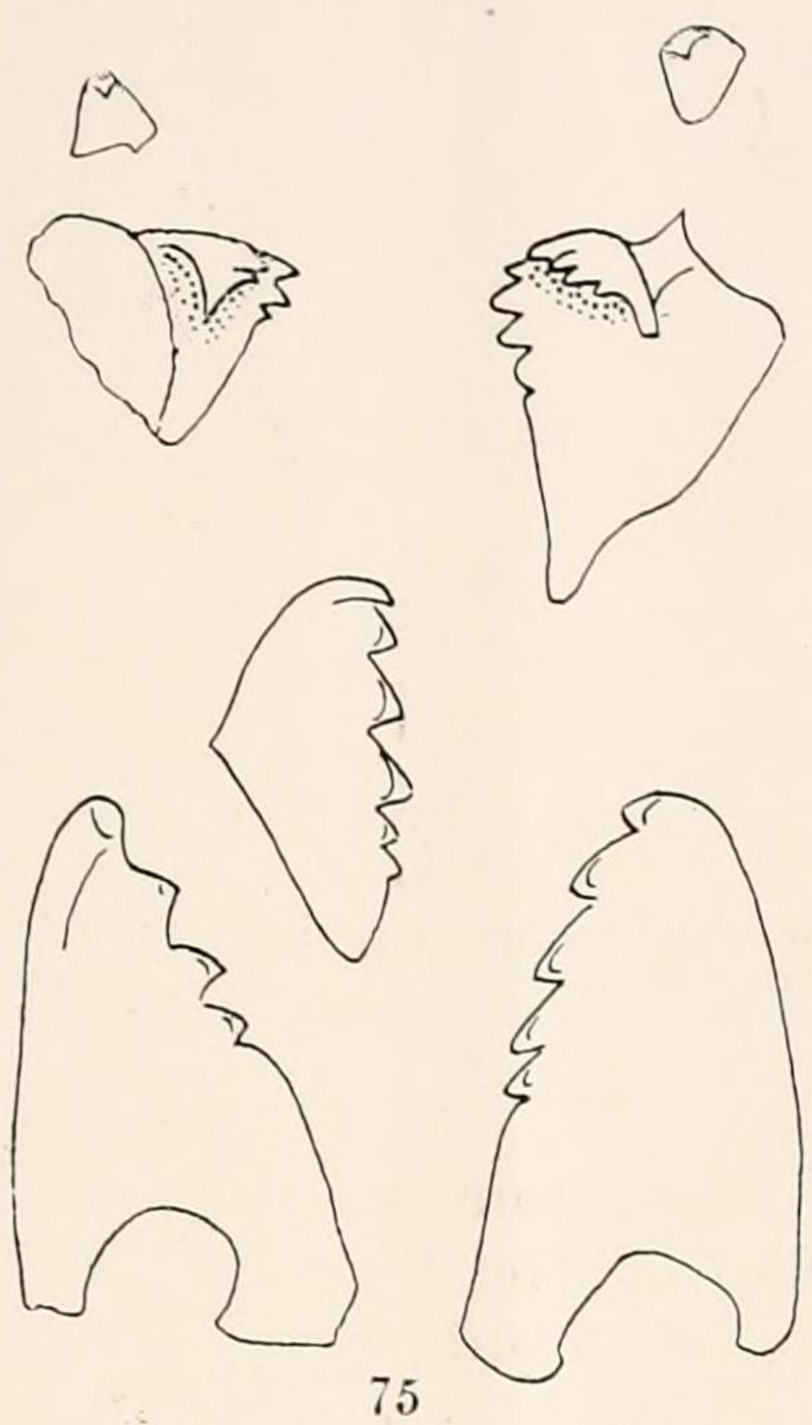
Fig. 84.—The 55th parapodium (× 20).

Fig. 85.—The 125th parapodium (× 20).

Fig. 86.—The 29th parapodium (× 20); blood vessels are indicated in the anterior lip.

Fig. 87.—The 29th parapodium of another individual (× 20), in which the large posterior lip has been pressed upwards by contact with the tube in which it had been preserved. Chætæ omitted.

Fig. 88.—The upper jawlets (enlarged), drawn *in situ* from above. The left "fang" is omitted.



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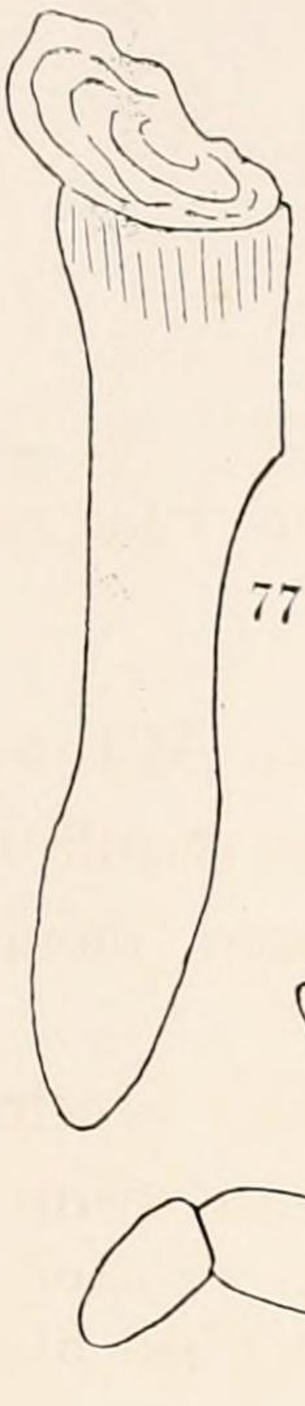

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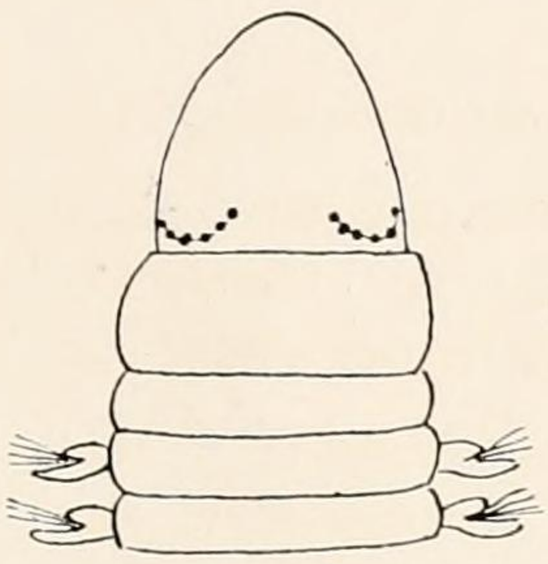

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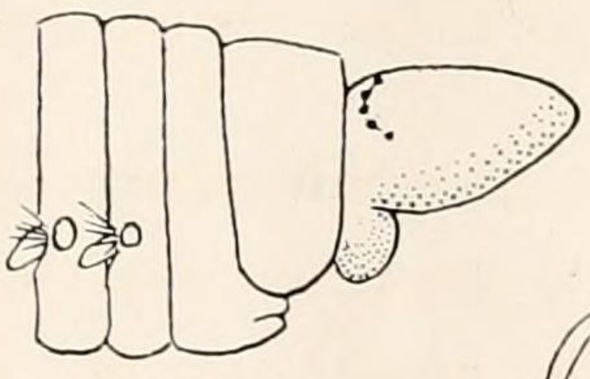

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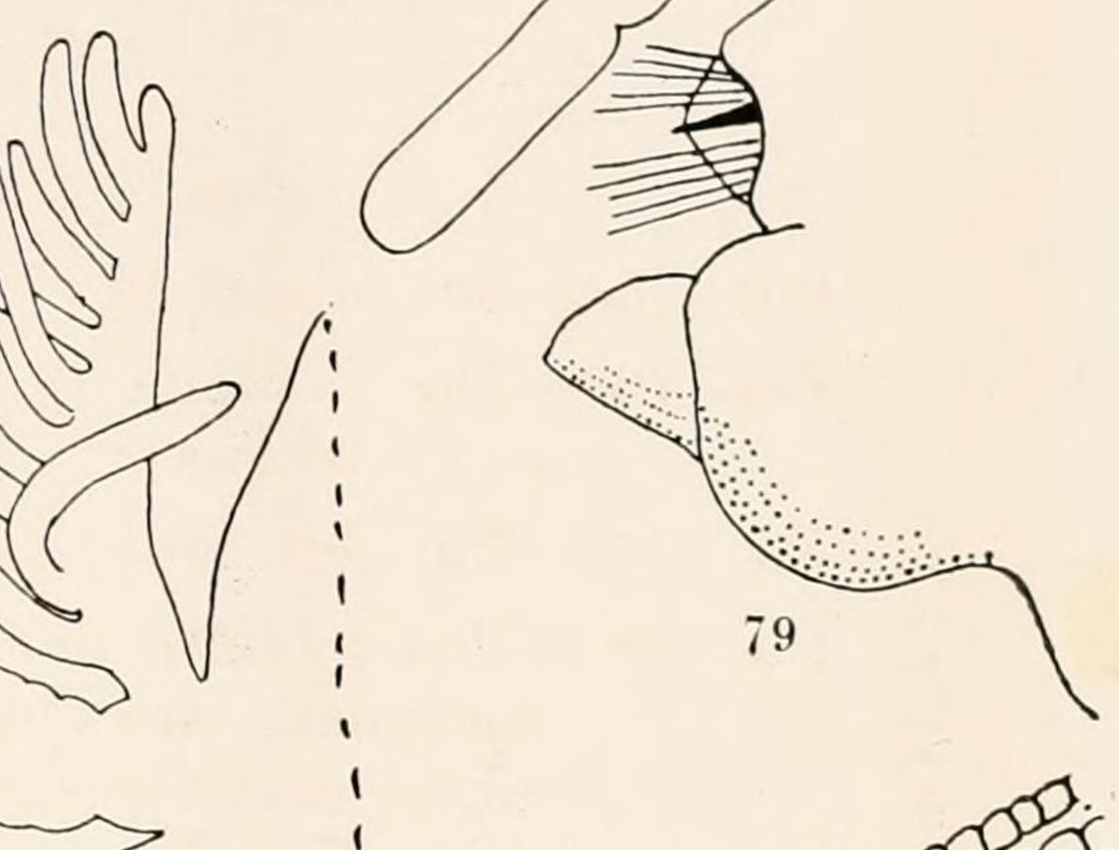

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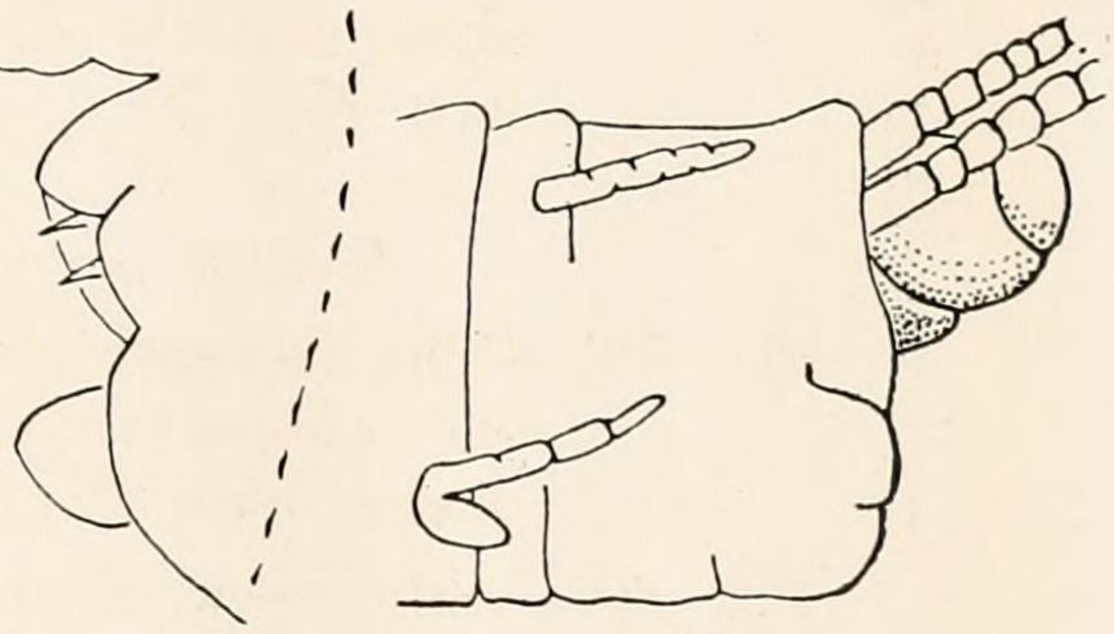

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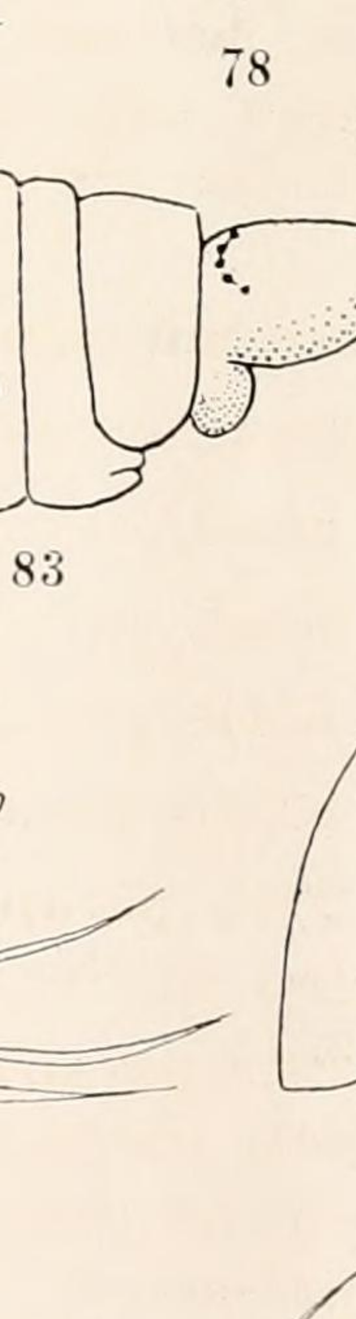

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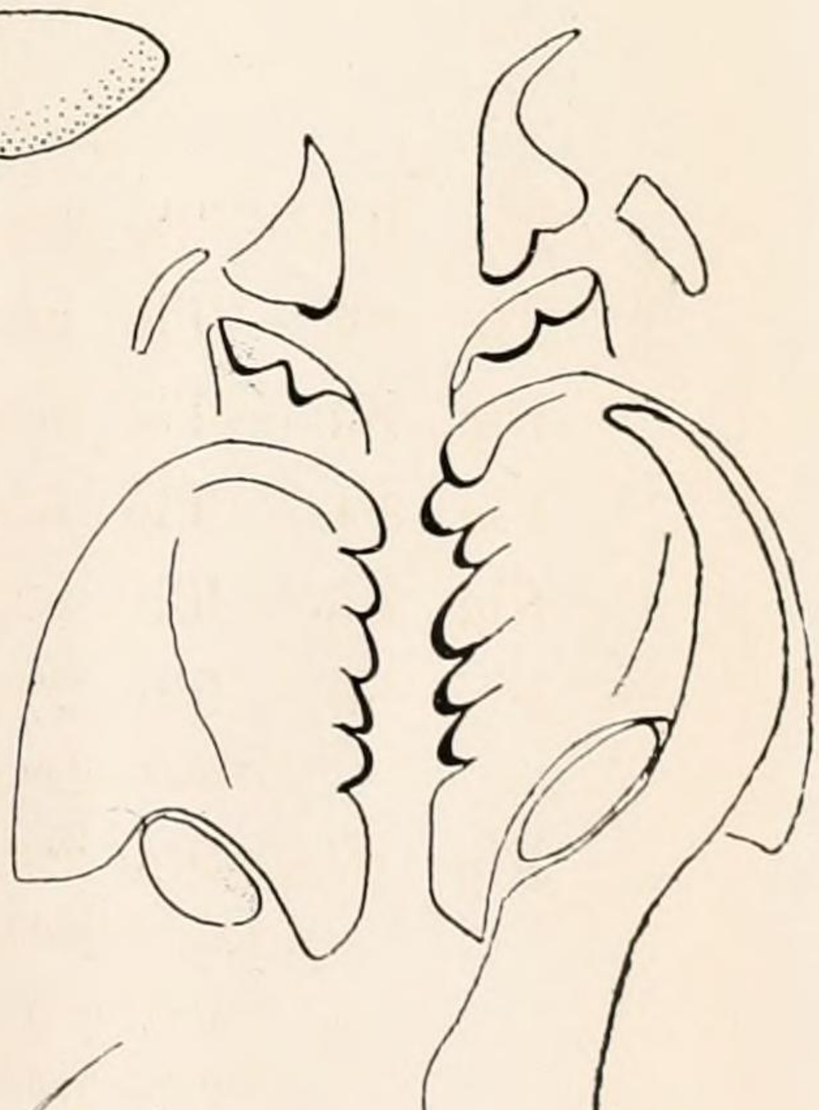

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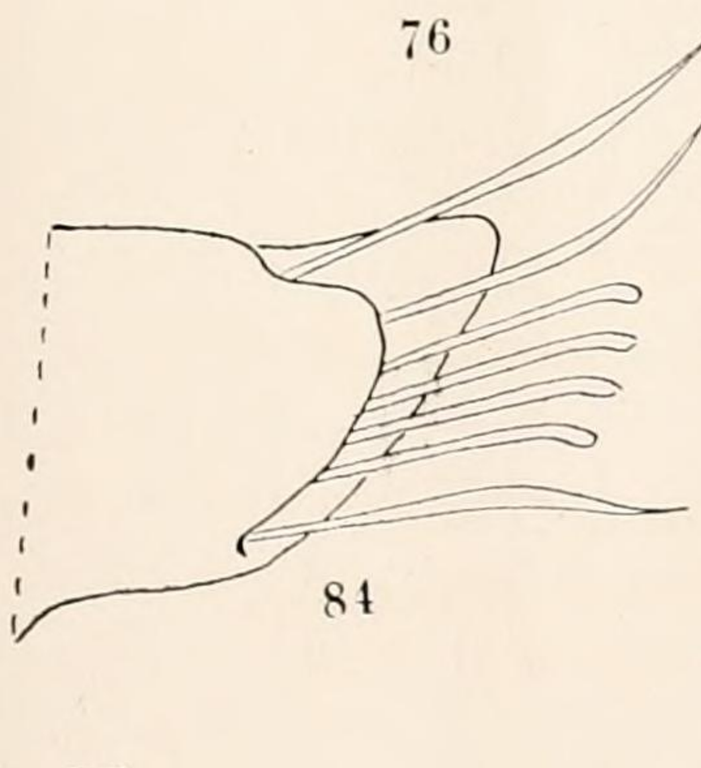

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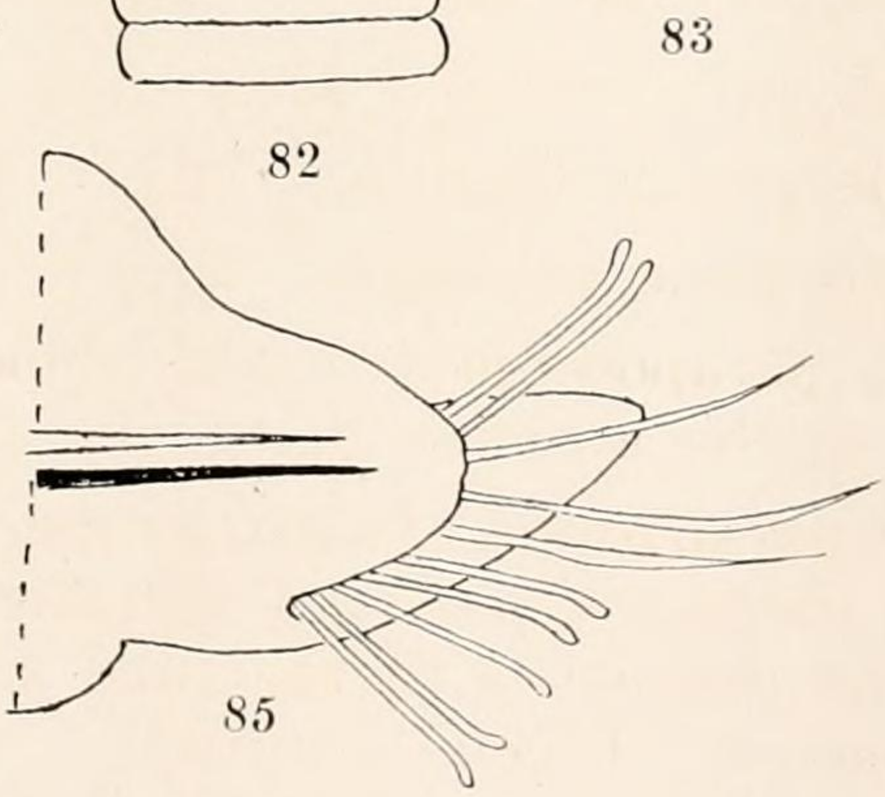

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EXPLANATION OF PLATE XLIII.

Lumbriconereis gulielmi, sp. nov.

Fig. 89.—A series of left parapodia from above (× 7), from the 10th, 25th, 45th, and a posterior segment, in order to show the changes in form and development of the lips and the arrangement of the chætæ.

Fig. 90.—One of the middle chætæ from the 125th parapodium (× 70).

Fig. 91.—The lowermost chæta from the 29th foot (× 70).

Fig. 92.—An upper hook from the 125th parapodium (× 250).

Fig. 93.—One of the lower hooks from the 125th foot (× 250).

Fig. 94.—The uppermost chæta from the 10th parapodium (× 70).

Oenone haswelli, sp. nov.

Fig. 95.—The head from above (× 4).

Fig. 96.—The head from above after the peristomial flap has been slit up and turned aside to show the three small tentacles which lie below it (× 4).

Fig. 97.—The head from below (× 4).

Fig. 98.—The anterior end of another specimen in which the prostomium is retracted below the peristomial flap (× 4).

Fig. 99.—The 55th parapodium (× 20).

Fig. 100.—A sub-acicular chæta from a posterior parapodium (× 250).

Fig. 101.—An upper hook or acicular chæta from a posterior foot with the notch separating the two teeth terminal in position (× 360).

Fig. 102.—A lower acicular chæta from the same foot (× 360). The proximal tooth is here laterally situated; the wing is broken.

Lysarete australiensis, sp. nov.

Fig. 103.—The head from above (× $2\frac{1}{2}$). The three tentacles lie backwardly, directed in a groove.

Fig. 104.—The median region of the first three segments and part of the prostomium (× 5). The tentacles are cut away to show the posterior pair of eyes, and the excavation in the three segments in which the tentacles lie.

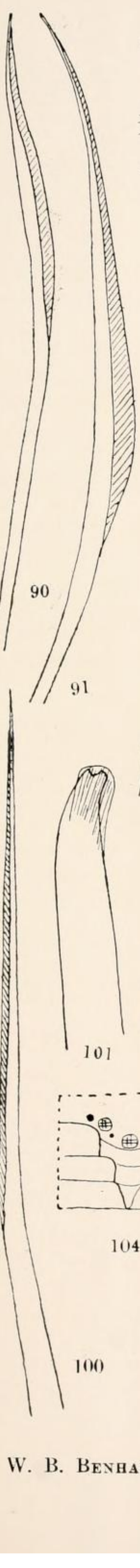
Fig. 105.—The head from below (× $2\frac{1}{2}$).

Fig. 106.—A transverse section through the body (× 2). The parapodium of the left side has been omitted.

Fig. 107.—The parapodia from segments 4, 16 and 37 (× 4) from above.

Fig. 108.—A supra-acicular chæta from the 10th parapodium (× 5).

Fig. 109.—The lower jaw and upper series of jawlets of the right side as seen *in situ* (× 5).



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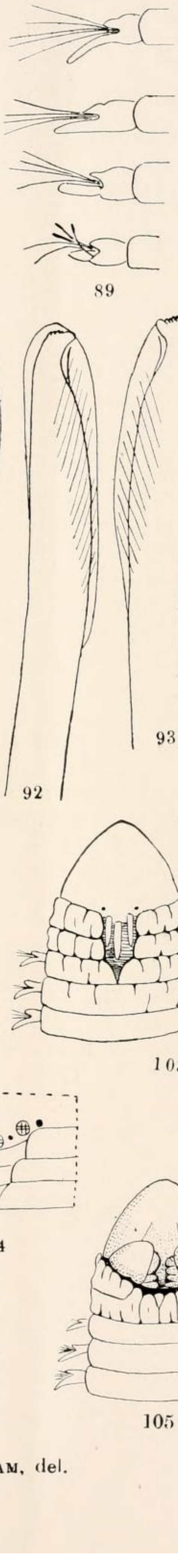

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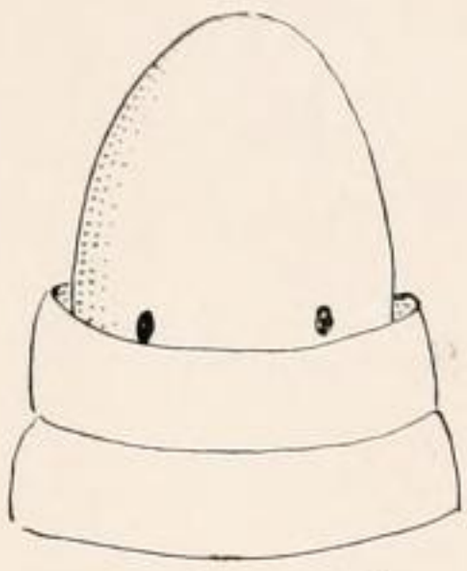

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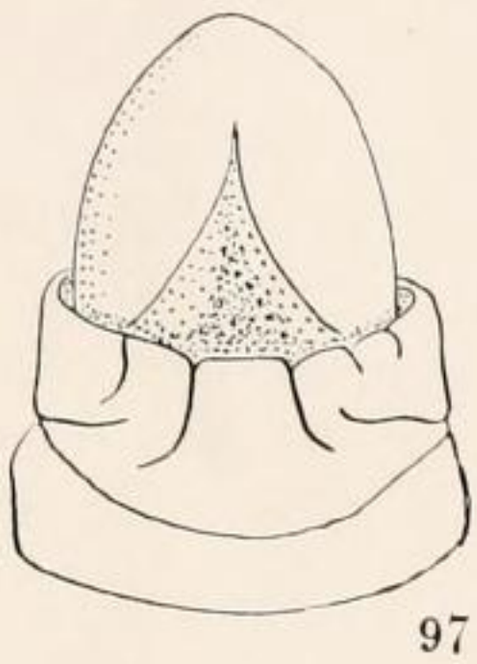

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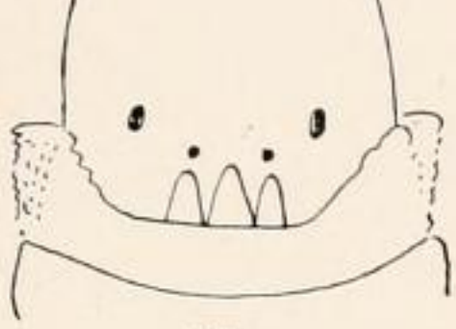

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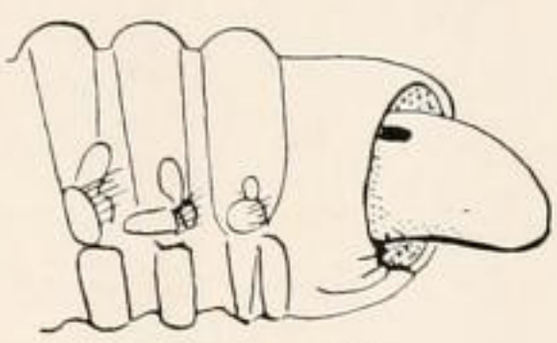

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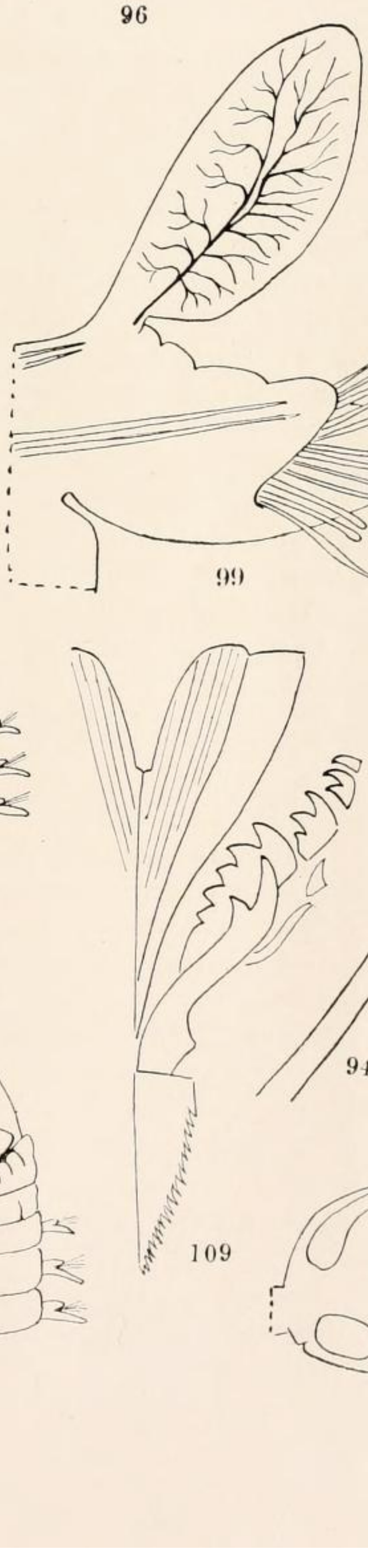

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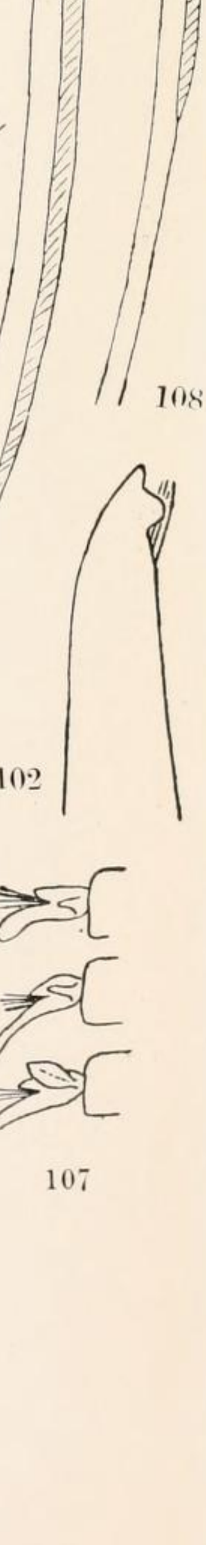

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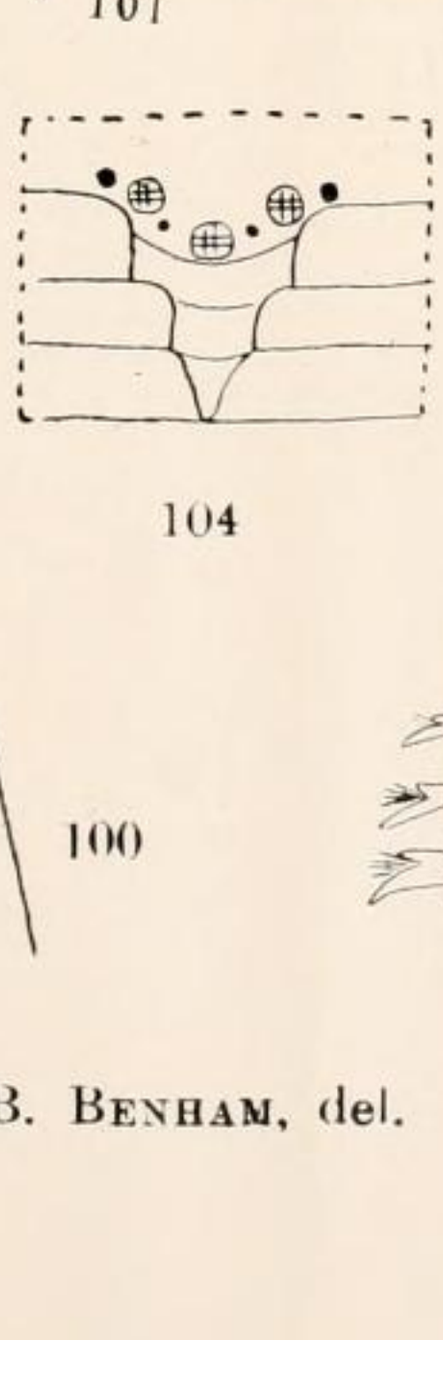

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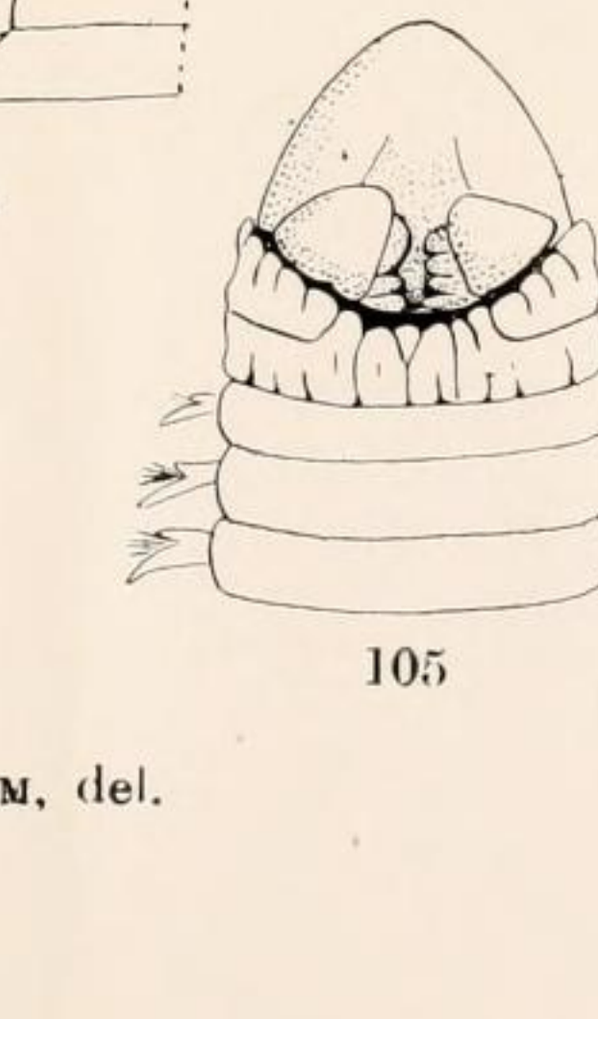

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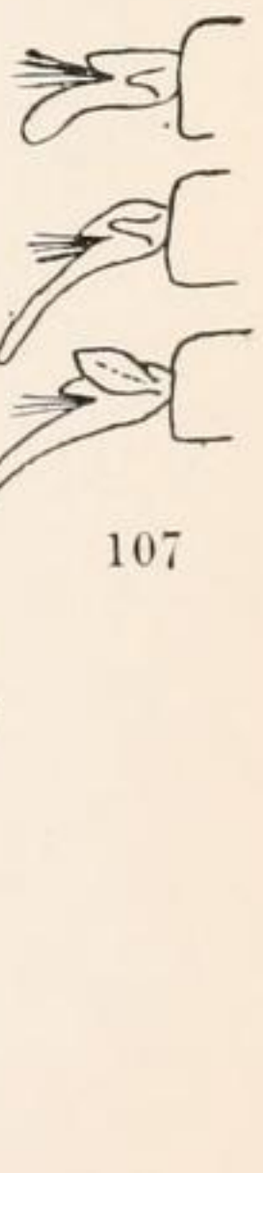

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EXPLANATION OF PLATE XLIV.

Lysarete australiensis, sp. nov.

Fig. 110.—The 10th parapodium (× 13).

Fig. 111.—The 21st parapodium (× 13).

Fig. 112.—The 66th parapodium (× 13), the fully developed condition; the chætæ are cut short; blood vessels are indicated in the dorsal cirrus.

Oenone haswelli, sp. nov.

Fig. 113.—The series of upper jawlets, disarticulated (× 17).

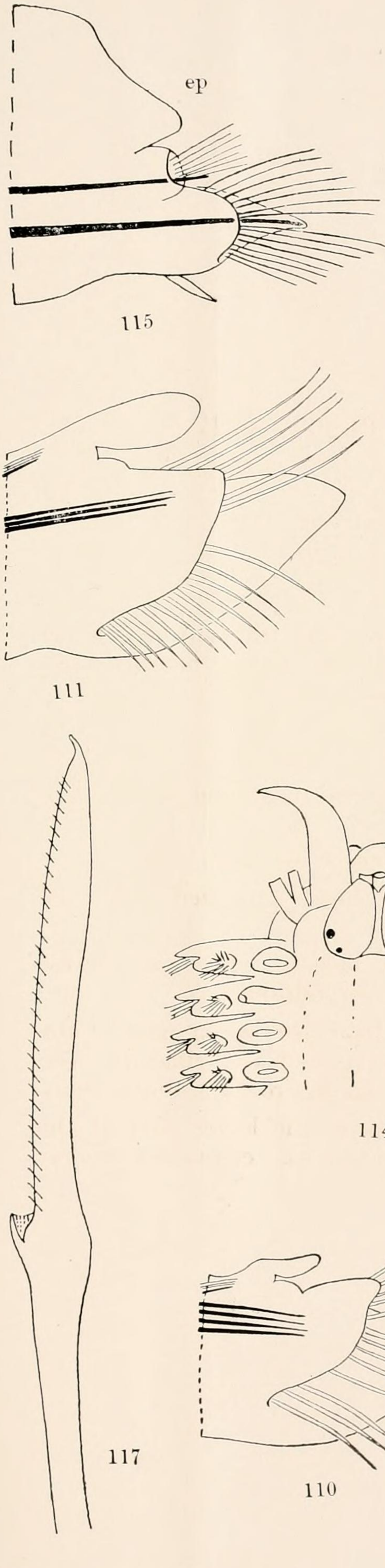
Scalisetosus australiensis, sp. nov.

Fig. 114.—View of the imperfect head (enlarged), *ph.*, the partially everted pharynx.

Fig. 115.—Parapodium, posterior face (× 20), *ep.*, elytrophore overhanging the notopodium.

Fig. 116.—A neuropodial chæta, from the upper part of the bundle (× 250). The very delicate frills are indicated in this and following figure by oblique lines.

Fig. 117.—A neuropodial chæta from the lower part of the bundle (× 250). The notopodial chæta are similar to this.



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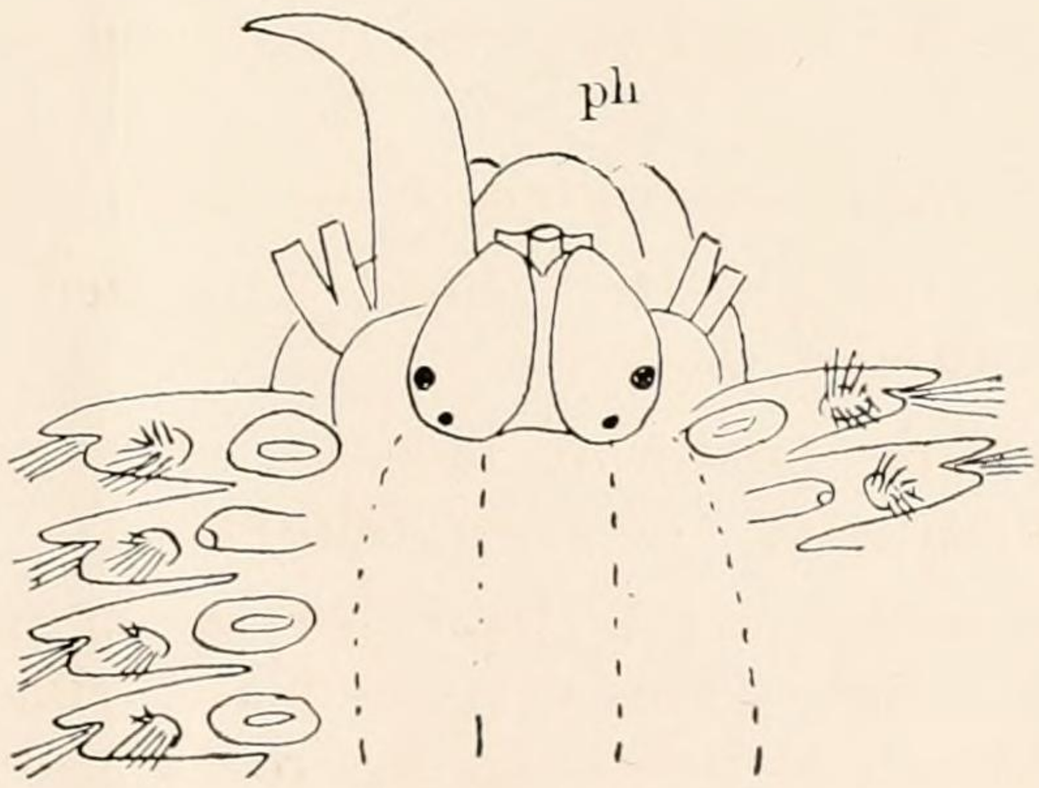

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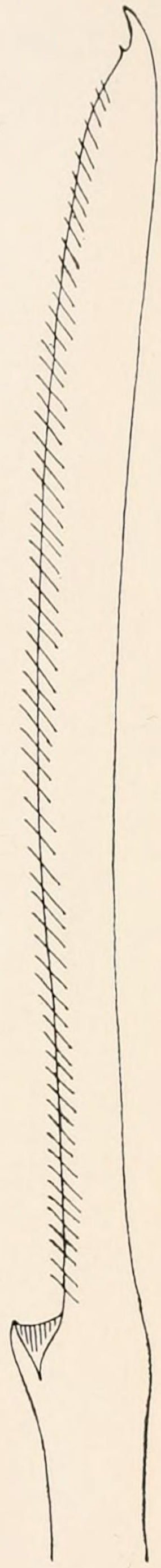

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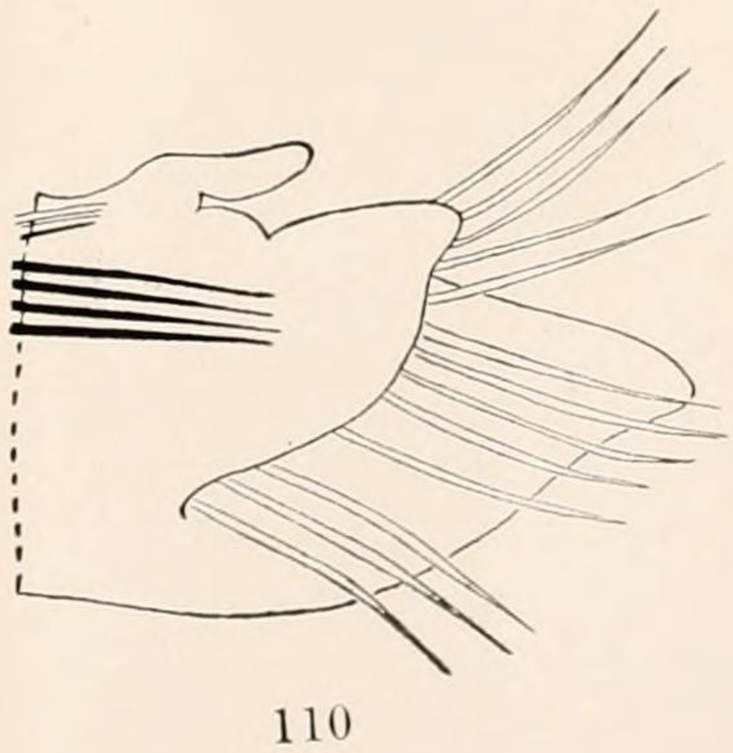

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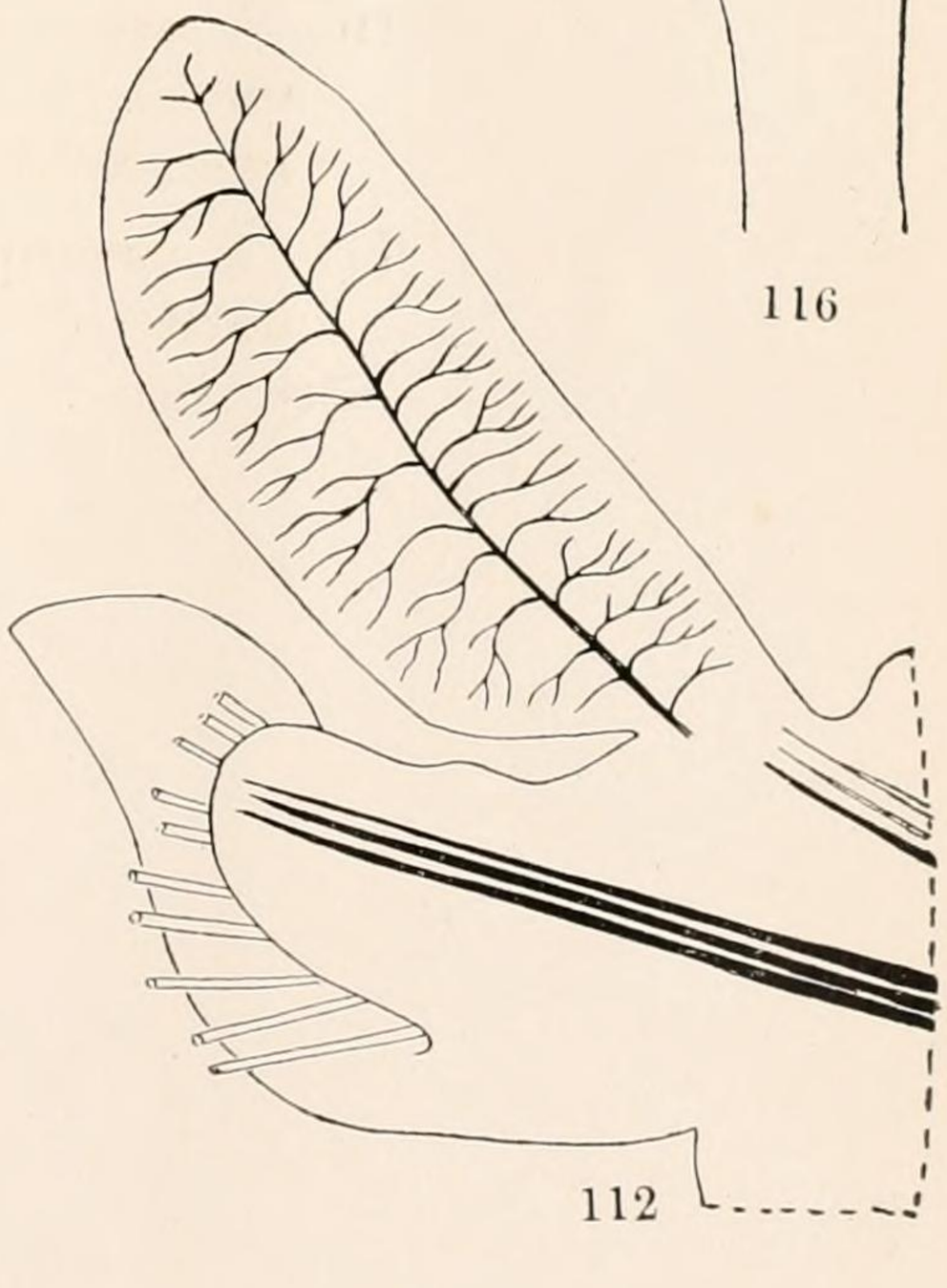

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EXPLANATION OF PLATE XLV.

Thalanessa oculata, M'Intosh.

Fig. 118.—View of an elytron from about the middle of the body, *in situ* (enlarged), showing the typical shape and its relation to the parapodia and segments. *ep.* elytrophore of this elytron. *ep'* elytrophores of the preceding and of the succeeding segments, one of the latter being covered by the elytron.

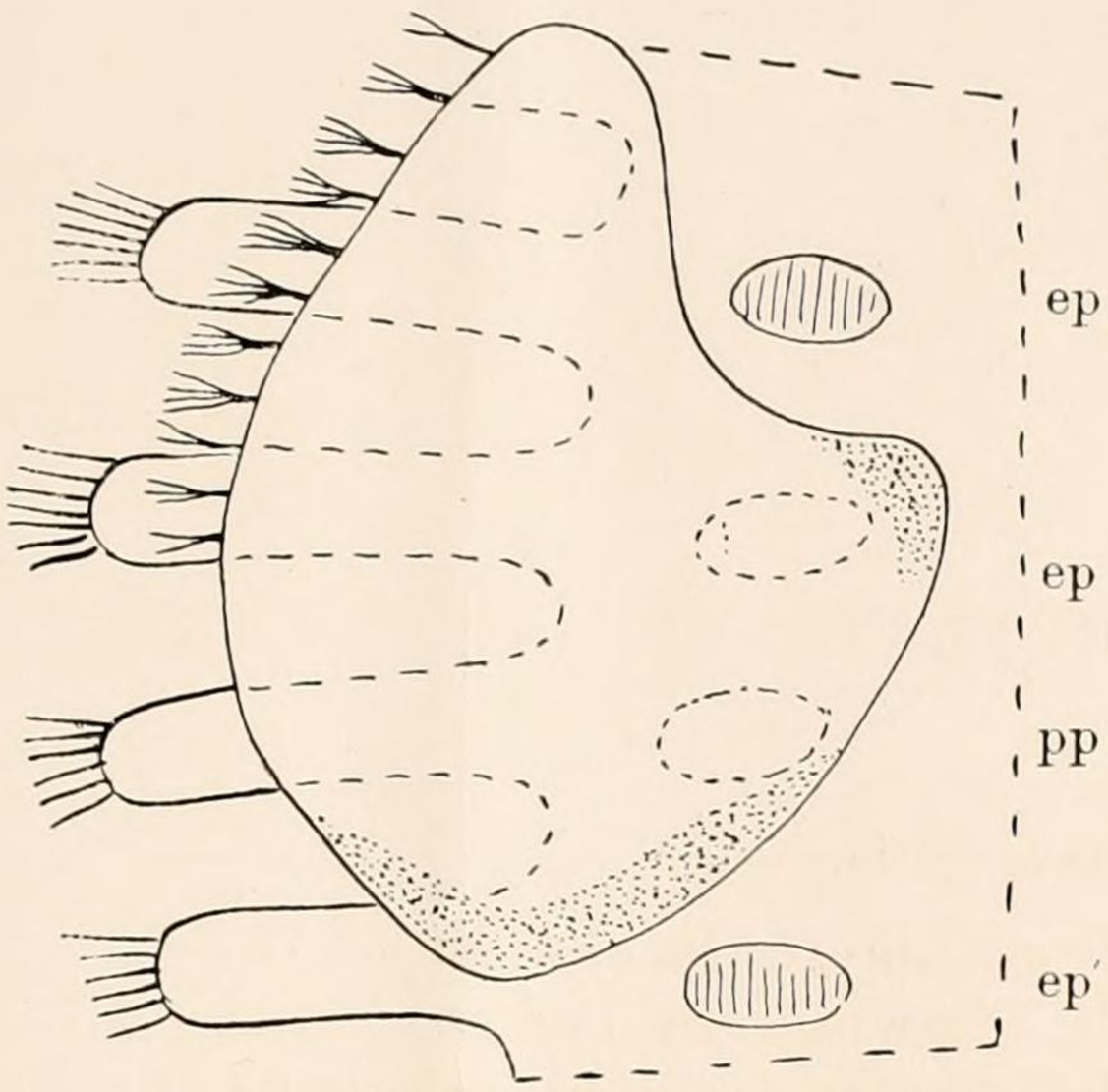
Fig. 119.—A parapodium from the mid-body (× 90). *a*, ciliated pad; *b*, cirriform process of the notopod. The dotted structures are the characteristic membranous lips on the neuropod; the chætæ are diagrammatically represented in that no attempt is made to give their shape.

Fig. 120.—Dorsal view of a normal, mid-body segment of the left side. *nrp.*, neuropod; *ntp.*, notopod. The filamentous lip process of the latter is bent backwards.

Fig. 121.—Dorsal view of the first parapod of the left side (enlarged), showing the great development of the membranous lip. *p*, a horny capsule, many of which are attached to the chætæ along the body. (? egg capsule of mollusc).

Fig. 122.—Dorsal view of the fourth parapod, showing the digitiform processes on the notopod; the two membranous lips of the neuropod are bent backwards.

Fig. 123.—The fourth parapod of the right side (× 90). *a*, ciliated pad; *b*, group of digitiform processes on the notopod. The dotted structures are the membranous lips of the neuropod.



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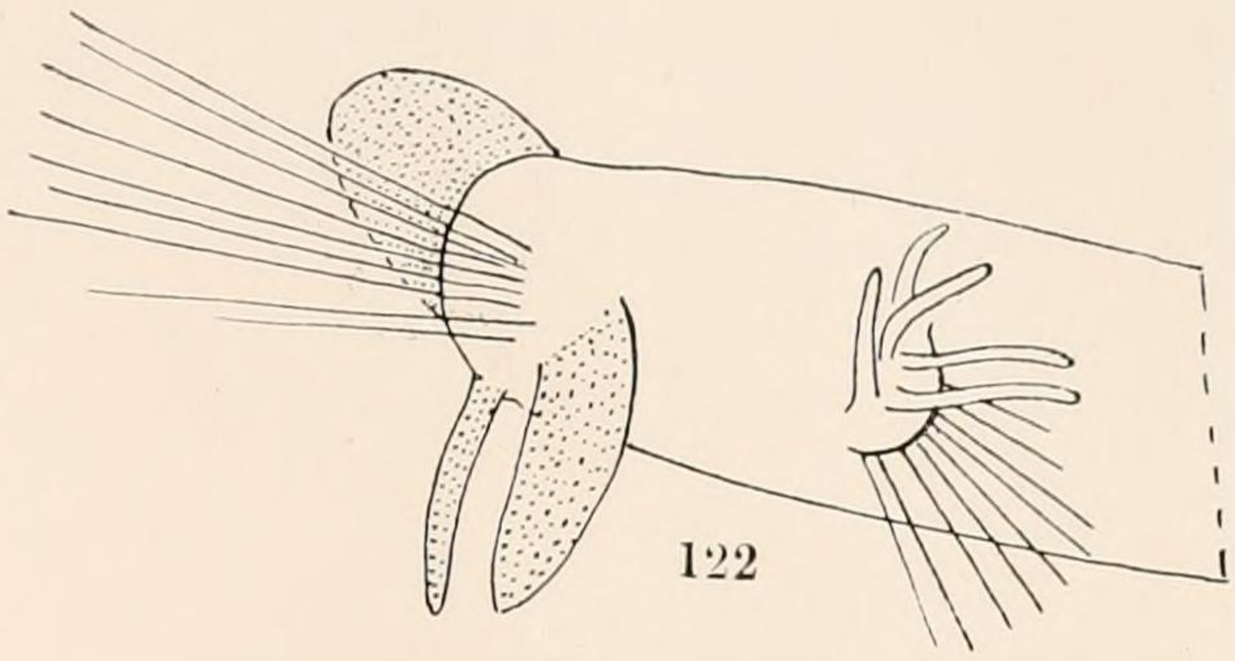

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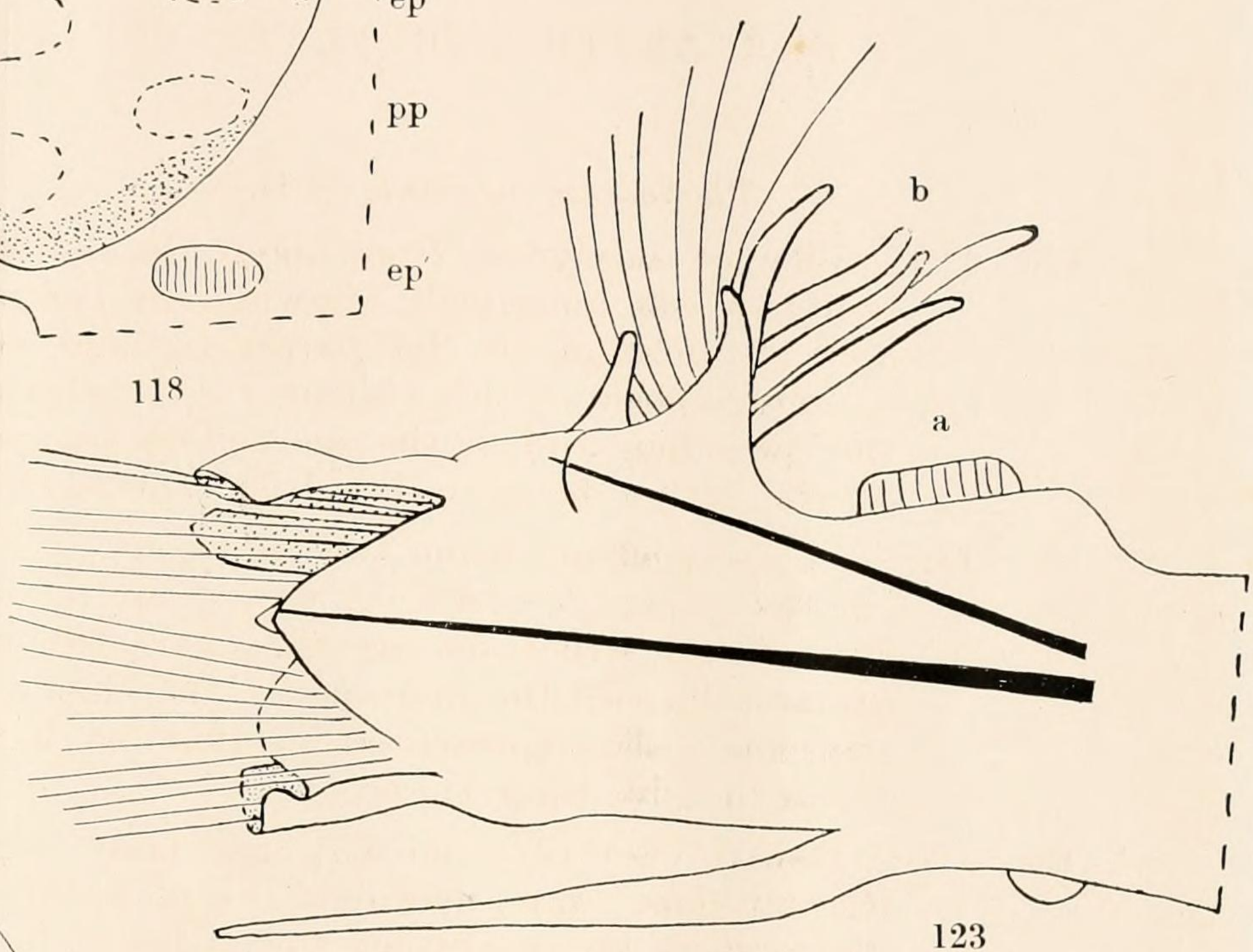

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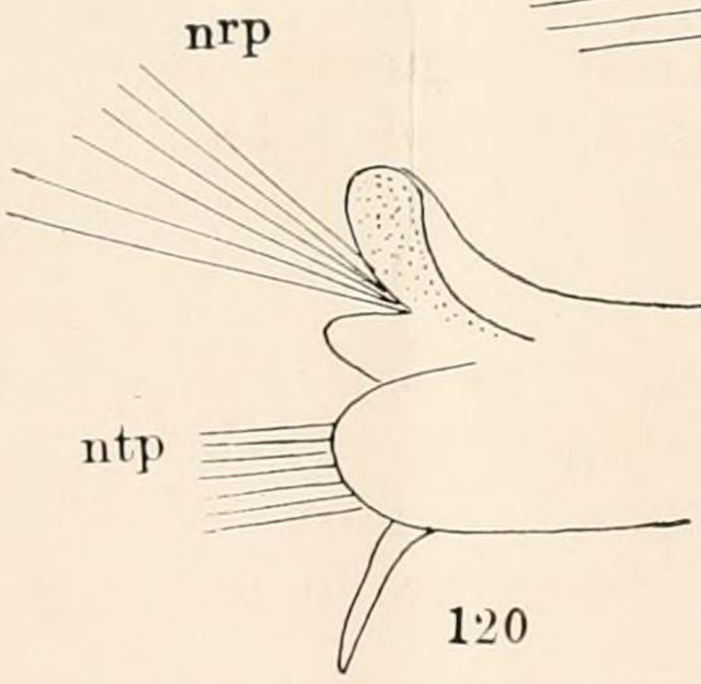

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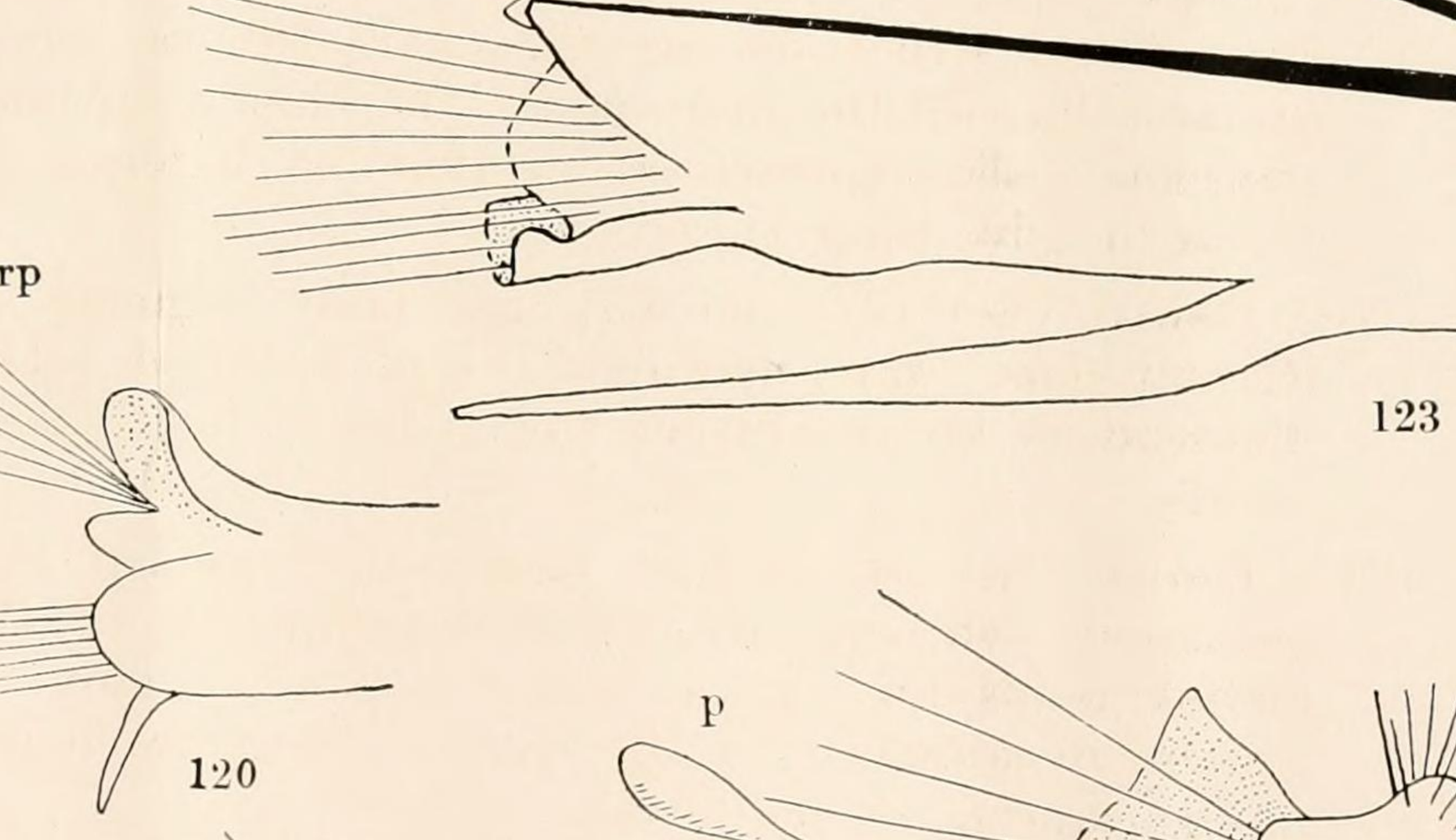

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W. B. BENHAM, del.

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[Begin Page: Text]

V. Report on the Polycheeta obtained by the F.I.S.

" Endeavour " 011 the coasts of New South Wales,

Victoria, Tasmania and South Australia.

PART I.

BY

WILLIAM B. BENHAM, M.A., D.Sc., F.R.S.,

Professor of Biology at the University of Otago, New Zealand ; Mutton

Medallist. New Zealand Institute.

Plates XXXVIII.-XLV.

[Begin Page: Text]

[Begin Page: Page 173]

REPORT ON THE POLYCH^TA.

PART I.

I. INTRODUCTION.

AT the request of the Curator of the Australian Museum, Mr. R. Etheridge (acting for the Hon. the Minister for Trade and Customs), I undertook the examination of the series of Polychseta which were dredged by the Federal Investigation Ship " Endeavour," chiefly off the east coast of Tasmania and the southern and eastern coasts of Australia. Owing to my University duties, I have only a few months in the summer available for research work of a continuous character, so that it has only been possible to work through about two-thirds of the material. Hence any general summary of the results must stand over till the publication of the second part.

Our knowledge of the Polychseta of the Australian seas is very meagre. We know something of those occurring in Port Jackson from the work of Professor W. A. Has well, 1 published a good many years ago in a series of papers in the " Proceedings of the Liimean Society of New South Wales." He includes an account of several of the species which had been previously described by Schmarda 2 , who collected in this region and elsewhere, and by other early zoologists as Baird. Kinberg and de Quatrefages, each of whom had described one or more species which had been incidentally and occasionally collected by early voyagers or collectors.

As to the worms from deeper water, our knowledge is confined to what is recorded in that monumental volume in

the series of " Challenger ' Reports by Professor W. C.

M'Intosh. 3

It may be well to give this list of worms obtained during

that voyage.

Station 158, considerably south of Australia, Lat. 50

1' S., Long. 123 4' E., 1800 fathoms ; Globigerina ooze.

Hyalinoecia bentkaliana, M'Intosh.

Grubianella antarctica, M'Intosh.

1. Haswell Proc. Linn. Soc. N.S. Wales, iii., 1879 ; Id., Ibid., vii., 1883 '

Id., Ibid., ix.. 1885; Id., Ibid., x., 18815; Id., Ibid., (2), vi., 1892.

2. Schmarda Neue Wirbellose Thiere, 1861.

3. M'Intosh Chall. Rep., Zool., xii., 1885.

[Begin Page: Page 174]

Station 160, south of Australia, Lat, 42 42' S., Long. 134

10' E., 2600 fathoms ; red clay.

Eunoa abyssorum, M'Intosh.

Polynoe ascidioides, M'Intosh.

Station 162, Bass Strait, Lat. 39 10' S., Long. 146 37'

E., 38 fathoms ; sand and shells.

Polynoe platycirrus, 1 M'Intosh.

Thala.nessa oculata, M'Intosh.

Staurocephalus australiensis, M'Intosh.

Eunice vittata, D. C'liiaje.

Eunice pycnobranchiata, M'Intosh.

Eunice bassensis, M'lntosh.

Station 163A, Twofold Bay, Australia, 150 fathoms ;

green mud.

Piiyllodoce duplex, M'Intosh.

Sabellaria (Pallasia) giardi, M'Intosh.

Terebella grubei, M'Intosh.

Station 163B, off Port Jackson, 35 fathoms ; hard ground.

Aphrodita ausiralis, Baird.

Thalanessa fimbriata, M'tntosh.

Eunice a/ihroditois, Pallas.

Sabella fusca, Grube.

Station 186, Torres Strait, Lat. 10 30' S., Long. 142 18'

E., 8 fathoms ; coral mud.

Lepidonotits cristatus, Grube.

Eupompe australiensis, M'Intosh.

Eunice torresiensis, M'Intosh.

Eunice tribranc/iiala, M'Intosh.

Hyalinoecia tubiccla, Muller, var. papuensis, M'In-
tosh.

Thelepus, sp.

With the first and the last stations we have here no con-
cern, as they lie outside the limits of the cruise of the
" Endeavour/'

But we may consider the remaining stations, for they
were approximately covered by this vessel.

Out of the fifteen species obtained at these four stations by
the " Challenger " at depths from 35-2600 fathoms, all but
four were new to science.

1. So written in the text, but in this list and in that of bathymetrical
distribution it is written " platydrrata."

[Begin Page: Page 175]

Of the twelve new species then found, so far as the present
material has been examined, the " i^ndeavoxir " collection

contains four, namely, Staurонereis (Staurocephalus) australiensis, Polynoe plalycirnis, Eunice pycnobranchiata, and E. bassensis, the last, having been founded for a small fragment, it is now fully described for the first time.

Two world-wide species, Eunice siciliensis and Hyalinoecia tubicola, are also represented, while Hesione splendida and Nephthys macrura are known from other parts of the world.

Xew species of the interesting and rare Lumbriconereid genera, Oenone and Lysarete are here established. But perhaps the most interesting feature of the collection is the abundance of the polynoid genus Physalidonotus, originally discovered in New Zealand, and later on in Japanese waters. I find it necessary to make four new species, and it will probably be found to be widely distributed through the Pacific Ocean.

From the subjoined list it will be seen that I have found it necessary to establish eleven new species, while two others are possibly new to science.

Under each species here recorded I have added the geographical distribution so far as the literature at rny disposal enables me to do so.

LIST OF SPECIES.

Family HESIONIDJ5.

Hesione splendida, Savigny.

Family APHRODITID^.

Sub-family POLYNOIN^.

Polynoe pJalycirrus, M'Intosh.

Lepidonotas hedleyi, sp. nov.

Lepidonotus willeyi, sp. nov.

Physalidonotus rugosus, sp. nov.

Physalidonotus laevis, sp. nov.

Physalidonotus turritus, sp. nov.

Physalidonotus paucibranchiatus, sp. nov.

Harmothoe etheridgei, sp. nov.

Scalisetosus australiensis, sp. nov.

[Begin Page: Page 176]

Family SIGALIONID.E.

Sub-family SIGALIONIN^.

Thalanessa oculata, M'Intosh.

Sigalion, sp. incert.

Sub-family ACOETIN^.

Eupompe australiensis, M'Intosh.

Family ALCIOPID^.

Halodora, sp. ?

Family NEPHTHYDID^.

Nephthys macrura, Schmarda.

Family AMPHINOMID^.

Chloeia inermis, Qua tref ages.

Notopygos labiatus, M'Intosh.

Family STAURONEREID^.

Stauronereis australiensis, M'Intosh.

Family

Sub-family EUNICIN^E.

Eunice siciliensis, Grube.

Eunice bassensis, M'Intosh.

Eunice pycnobranchiata, M'Intosh.

Sub-family ONUPHIDIN^E.

Hyalinoecia tubicola, Muller.

Family LUMBRICONEREIDiE.

Lumbriconereis sphaerocephala, Schmarda.

Lumbriconereis guliclmi, sp. nov.

Oenone haswelli, sp. nov.

Lajsareie australiensis, sp. nov.

[Begin Page: Page 177]

II. DESCRIPTION OF THE GENERA AND SPECIES.

Family HESIONID.E.

Genus HESIONE, Savigny.

HESIONE SPLENDIDA, Savigny.

Hesione splendida, Savigny, System, des Annelides, 1820,

p. 40, pi. iii., fig. 3.

Hesione ceylonica, Grube, Proc. Zool. Soc., 1874, p. 327.

Hesione pacifica, M'Intosh, Chall. Rep., Zool., xii., 1885,

p. 184.

Hesione ehlersi, Gravier, Nouvelles Archives de Museum

Paris, 1900, p. 175.

A comparison of the descriptions of the above species

inclines me very strongly to the opinion that they are synonymous. I can find no definite characters that serve to distinguish the one from the other. True, one author gives some detail that is not mentioned by another. In the case of Savigny's account, for example, an inspection of the figures alone has led some authors to regard that species as blind and as being without prostomial tentacles ; but, as Grube has pointed out, these organs are mentioned in the diagnosis of the genus Hesione on the previous page of the work, and as this species is the type, eyes and tentacles must have been present, though overlooked by the artist. Grube has also, on more than one occasion, made it clear from a careful perusal of the diagnosis and of the figures, that the species has four pairs of peristomial cirri. I note that in the drawing, too, the preanal cirri are not included, though reference is made in the text to them.

M'Intosh notes that his species is nearly allied to Savigny's, though the ' ' body is more elongate and the shape of the head is different."

Grube 1 writes of H. ceylonica'.--" Species cum Hesione splendida, Sav., maxime congruens, sed dorso fuscius lineato, haud transverse sulcatc, cirrisque tentacularibus longioribus differens/'and Willey 2 has that it "is probably a geographical form of H. splendida."

1. Grube Proc. Zool. Soc., 1874, p. 327.

2. Willey Ceylon Pearl Oyster Fisheries, pt. iv., Suppl. Rep., xxx., Polychseta, 1905, p. 266.

[Begin Page: Page 178]

It is curious that Gravier in referring to Savigny's species on p. 179, repeats the error about the. tentacles which had been pointed out previously by Ehlers and Grube.

So far as I can see the only differences are in reference to these errors and the dimensions of the various forms. They all agree in being uniformly coloured without pattern, such as occurs in most of the other species typified by H. pantherina, Risso.

A re-examination of the species is desirable.

The following is a description of the single specimen obtained by the " Endeavour " :

Length, 47 mm. ; widest at mid-body, 8 mm., or including the parapodia 19mm. From this point it tapers towards each end, the first segment measuring 4 mm. and the last 3 mm.

The anus is situated at the end of a funnel turned dorsally, and this funnel is preceded by a preanal segment, which is dark brown, the rest of the body being a pale yellowish tint. The worm is, perhaps, like Savigny's type, " margaritaceous 5; or " pearly " in life.

The usual division -lines are noticeable, separating a median dorsal area from lateral areas, and the sides are swollen at the points to which the parapodia are attached.

On the under surface the median area is dotted with brown pigment. This is not mentioned by other authors, but it does not seem to me a specific character ; this dotted area is interrupted by pale circular spots at each intersegmental line (possibly over the ganglia).

The head is a good deal compressed owing to pressure against the bottom of the tube ; the prostomium is broader than its length, and its width is about one-third that of the peristomium, which is intimately fused with its anterior end. It is bilobed, with two pairs of eyes, and anteriorly a pair of minute tentacles which are easily overlooked, but can be detected 011 using a Leitz dissecting microscope, No. 16. Each is a transparent somewhat elongated conical organ. The peristomium, composed of four segments fused, is as wide as the first chsetigerous segment. It carries eight couples of long peristomial cirri on each side, the dorsal cirri being about twice as long as the ventral, and the longest reaching as far back as the fourth chsetigerous. The first

ventral cirrus is shorter than the others.

[Begin Page: Page 179]

Thc.se cirri have enlarged cirn>pln>res, and the tiagelluin is minutely annulated.

The 16 parapodia have the usual form, and each carrie,; a long dorsal cirrus, springing from an enlarged cirrophore ; the filament being about three times the length of the parapodium, that is, as long as the width of the body. The four anterior parapodia are smaller, the first much shorter, than the rest.

The chsetophoral sac has at its antero -dorsal margin a short filamentous " ligule " into which the black aciculum projects. This is easily overlooked unle.-s the foot is mounted with the anterior surface upwards. It is not shown in M'Intosh's figure of the foot.

The cha'tiv are pale yellow, and of the usual form.

The ventral cirrus reaches beyond the end of the parapodium almost to the tips of the chaetse.

The preanal segment carries dorsal and ventral cirri but

no distinct parapodium. The subanal cirri, borne by the anal funnel, are as long as the dorsal cirri anteriorly.

LOG. Off Babel Island, Bass Strait. 50-80 fathoms.

Distribution. Red Sea, Indian Ocean, Pacific Ocean (Tongatabu).

Family APHRODITID^E.

Sub-Family POLYNOIN.E.

Genus POLYNOE (sensu latu), 1 Savign//.

POLYNOE PLATYCIRRUS, M'lntOS,!.

Polynoc platycirrus, M'lntosh, ('hall. Rep., Zool., xii., 1885,. p. Ill, pi. iii., fig. 4, pi. xvi., tig. "2, pi. xix., fig. 3, pi. viii.v., figs. 14, 15, pi. ixA., fig. 1. Id.. Potts, Trans. Linn. Soc., Zool. xiii., 1010. p. 336.

The material consists of two entire individuals and the greater part (anterior end included) of a third.

A complete specimen measures 7"> mm. in length by 1) mm. across the elytra and 12 mm. over the ventral cha-t;r.

1. The whole subject of the delimitation of the genera of the Polyn<>in.>' seems almost in as much confusion as at the time Grube wrote his classic paper " Bermerkungen Fam. Aphr >'liten I'.ilyn'iina," in 1875.

These differ from the type in the colour of the elytra, which are uniform pale pinkish brown. They lack the " four darker longitudinal belts " which, being continuous with those of the other elytra, give the striping which M'Intosh regarded as characteristic of the species.

I find also that there are 24 pairs of elytra in both the entire individuals, instead of " about 23 pairs " recorded by M'Intosh. They are on the parapodial segments 1, 3, 4, 6, 8, etc., up to 42, 44 and on 45. This last scale, then, is in an unusual position, being on a consecutive instead of on an alternate segment.

There are seven postelytral cirriferous segments, giving in all 52. M'Intosh's largest specimen measured only 45 mm. in length by 10 mm. " total breadth," and his drawing shows 48 parapodia on each side.

It is possible, then, that they were not fully grown. It is not unlikely, it seems to me, that in these species with longish bodies the number of segments and even of the elytra may increase with age. Thus Potts records that specimens measuring 30 and 33 mm. had 19 or 22 pairs of elytra

respectively.

In all other respects my specimens agree with M'Intosh's, especially in the unique structure of the dorsal cirrus, which is flattened from side to side, so as to be band-like. This is of more weight than any trifling difference in size or colour.

I may add one or two notes in extension of the former accounts. The parapodium is practically uniramous, for the notopodium is represented by a very small lobe on the anterior of the upper surface containing an aciculum and some two or three very small chaetse such as M'Intosh figures and which recall those of L. simplicipes, Haswell.

The neuropodial lobe carries a large number of stout chsetiB in two groups a supra- and a sub-acicular group which are distinctly separate when seen from the side of the animal. But all are alike in structure, the supra-acicular group consists of 4-5 horizontal rows, with 2-3 in a row, giving a total of about 14-15 chsetse in a middle foot.

The sub-acicular group are in 8-9 tiers, of three in the upper and lower tiers and five in the middle ones, a total of 38-40. These chaetae are bifid, with 20 pectinated frills, and agree precisely with M'Intosh's figure.

Iocs. Off Babel hland, Bass Strait, 50-80 fathoms.
Off Gabo Island, Victoria, 200 fathoms.

[Begin Page: Page 181]

Distribution. The " Challenger " specimens came from off East Moncceur Island, Bass Strait, 38 fathoms, and off Twofold Bay, New South Wales, in 120-150 fathoms. Another is recorded from 2,200 fathoms from Station 163, quite close to this latter locality.

These three " Challenger " stations, then, are practically the same as the two stations from which the " Endeavour " obtained the above material.

Indian Ocean (Potts).

Genus LEriDONOTU.s, Leach (sensu stricto), Kinbery.

LEPIDOSOTUS HEDLEYI, Sp. HOV.

(Plate xxxviii., figs. 1-7.)

It is with some little hesitation that I make a new species for the single individual, which bears some resemblances to L. lissolepis, Haswell, and to L. purpureus, Potts, to which I refer below.

The specimen is ill preserved, and superficially resembles

Harmothoe etheridgei in its grey colour.

It measures 20mm. by 9nim. over the chsetse, as measured on the ventral surface, for the animal is flattened, somewhat distorted, and the elytra displaced so that dorsal measurement.:; are uncertain. The elytra are uniformly pale gray, translucent, oval, thin and a good deal crumpled ; they overlap but slightly fore and aft, and do not entirely cover the back. The dorsal surface of the body is marked by transverse bands of dark pigment ; each band is composed of a series of very narrow lines close together, crossing the body in the alternate annuli (for as in other Polynoids each segment is biannulate as in many Earthworms) ; and each band is of the same width as the intervening imcoloured band.

The elytra (PI. xxxviii., fig. 1) appear to be smooth under a lens, but are really sparsely covered with uniformly arranged low conical tubercles which have an oval base, so that they present under a low magnification a characteristic appearance of elongated refringent dots with a slit along its middle (PI. xxxviii., fig. 3\

Each elytron (PI. xxxviii., fig. 1) is oval with a slight anterior emargination, and is rather broader externally ; the circular white areola is nearly central. The anterior regie 11

of each is pigmentless and transparent, the pigment is rather darker round the areola especially in the posterior region. The pigment occurs as minute black granules in certain round cells rather widely scattered amongst clear empty cells (PL xxxviii., fig. 2). There is no fringe.

The notopodium (PL xxxviii., fig. 4) is small, and contains about 12 pale almost colourless chsetaj, all alike, with incomplete spiral frills : for in some aspects the serrulations appear to be limited to one side.

The neuropodium is bluntly pointed, with yellow-golden chsetse, thicker than the notopodials, about 24 or 25 in number ; these have a subapical tooth, and from 1) to 15 pectinated frills, according to their position in the bundle ; the most distal frill having large teeth (PL xxxviii., figs. G, 7).

The dorsal cirrus is pale brown for about half way along its length, then white, with a dark band a little below the tip, giving the appearance of a subterminal swelling.

The prostomium is typically lepidonotan ; it is as long as its breadth. The anterior eyes are at its widest point ; the posterior pair are far back, close to the nuchal fold.

The tentacles are smooth ; the median is lacking. The laterals are long slender, and colourless, except for a pale . grey ring below the subterminal swelling.

Remarks. In L. lissohpis, Haswell, from Port Stephens, the elytra are described as '" smooth, rather delicate, dark slatey-brown. the pigment being arranged in minute dense lobed corpuscles instead of in separate granules." This appears to be quite different from the arrangement above described, and his figure of the chaetae is too poor to be sure that it agrees, except in a rough way, with those of the present species.

L. purpureus, Potts, 1 is also only briefly described. Its colour, however, is said to be " purple brown," and the pigment is " concentrated in little masses " between clear cells, giving a honeycomb appearance.

The surface of the elytron is " strewn with little chitinous tubercles showing a slight median depression."

His figure is not very clear, though if the dark circular things are meant for the tubercles they do not agree with those before me.

But both these seem from other features to be nearly allied to one another and to the present.

1 . Potts Loc. cit., p. 33k

[Begin Page: Page 183]

Loc. Forty miles west of Kingston, South Australia, 30 fathoms.

LEPIDONOTUS WILLEYI, sp. nov.

(Plate xxxviii., figs. 8-15.)

? Lepidonotus carinulatus, Willey, Ceylon Pearl Oyster Fisheries, part iv., Suppl. Rep., xxx., Polychteta, 1905, p. 248. Id., Potts, Trans. Linn. 8oc., Zool., (2), xiii., 1910, p. 331.

A single imperfect specimen which measures 9mm. by 4mm. over the chsetse, and only '2-5 across the body veiitrally. It is imperfect posteriorly, as it contains only 19 pah's of parapodia, and 10 elytrophores. The elytra are, with the exception of 3 or 4 pairs, lacking.

The specimen is a poorly preserved male.

Under a lens the colourless elytra are covered in their exposed regions by pale brown roundish tubercles of relatively large size on the lateral area, and 011 the areola,

which is somewhat raised. A patch of pale reddish brown pigment occurs above the scar.

The anterior concealed region is covered with much smaller hemispherical tubercles (PI. xxxviii., fig. 8). The large tubercles, which appear to be round under a lens, are on focussing seen to be polygonal at the base, and to be produced into a variable number, and variably arranged short blunt processes.

Perhaps these correspond to Willey 's " echinulate ' tubercles, though the spines shown by him are sharper at the point.

Towards the external margin there occur a few rows of " spinulate " tubercles, short columns of various sizes, terminating in a variable number of sharp spines (PI. xxxviii., figs. 9, 11).

The elytra are fringed only on the external margin with coarse, relatively long cylindrical processes.

All these outgrowths of the elytra are covered by abundance of very fine particles, which masks their details to a great extent.

The prostomium is relatively long, narrowed posteriorly, with the anterior eye laterally at the greatest width, which is about midway along the side ; the posterior eye is about

midway between this and the hinder end of the prostomiium

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The median tentacle is broken, the laterals are relatively short, and, excluding the base, each is equal to the length of the prostomium ; there is apparently no sub-terminal swelling, though as the animal is soft, it may be present in life ; they are smooth and colourless. The palps are pale brown with a white tip.

The dorsal cirri have a subterminal swelling, though feebly developed, and the pigmented ring below it no doubt adds to the effect. The parapodium (PI. xxxviii., fig. 12) consists of a small notopodium only slightly prominent, and a large neuropodium whose lower margin slopes upwards to meet the upper at a blunt point, at which is the short acicular ligule. The notopodial chsetse are of two kinds, which differ only slightly from one another. The upper (a) are about 12 in number, shorter than the second kind, but of unequal lengths ; they are arranged in a semicircle above the bases of these. Each terminates in a blunt smooth apex, at a little distance from which the usual frills commence (PI. xxxviii., fig. 13). The second kind (b) are about 7 in number, longer, but of the same diameter ; the tip, however, is extremely fine, and appears to be flexible ; the frills are

continued to the apex (PL xxxviii., fig. 14).

The neuropodial chsetae are 24 in number, with a sub-apical tooth, and about five frills, of which the uppermost has stouter denticulations than the rest (PI. xxxviii., figs. 15, 15a)

Remarks. Willey described a species from Ceylon under the name L. carinulatus, Grube, and Potts identifies one from the Indian Ocean under the same name. And at first I supposed that I had a specimen of Grube's species before me, as it agrees very closely with the account given by these two zoologists.

The chief reason for disagreeing with Willey s determination of his species is the presence of a sub-apical tooth on the chsetse, for Grube makes no mention of it, either in his original diagnosis of the species, to which neither of the above authors refer, nor in his second account of specimens from the Philippines.

Indeed, the original account 1 contains the following description of the chsetse " inferiores fere 24-nae, apice graciliori simplici sub eo vix dilatatse, dentibus 4 serratse, extreme majore."

1. Grube -Annelid en des rothen Meeres (Ehrenberg gesammelt). Monatsber. Kgl. Akad. Wiss. Berlin, 1869, p. 7.

He here speaks of a " simple apex." Had he meant to imply that there was a tooth below the apex, he would surely have used the words " apice bidente " as in his diagnosis of P. (Harmothoe) grisea, on p. 9.

Grube's account of the elytron in his second memoir 1 , however, seems certainly to apply to that of the specimen before me, and to those which Willey and Potts describe. He says that they appear, under a feeble magnification (" schwach bewaffnet Augen "), as presenting a network of closely arranged tubercles, which appear rounded, but are in reality polygonal, and each is crossed by a small low "keel" or light stripe. But are we justified in identifying a worm as L. carinulatus, because it has elytra of apparently the same pattern, when the more important chaetse are so different ?

I think, therefore, that Willey and Potts had before them specimens of this new species, L. wilhyi, and not Grube's species. It is true that Willey describes on the elytra of his worm some large rounded tubercles as " echinulate," but Potts does not find any such marked echinulations, nor are they present in this individual. Probably the short rounded

outgrowths above described represent these spines. Potts' account agrees precisely with what I have seen.

Loc. Off Maria Island, Tasmania, 78 fathoms (with Eunice pycnobranchiata, Physalidonotus rugosus, and Glycera, sp.).

Genus PHYSALIDONOTUS, Ehlers.

The genus was established by Ehlers2 for the reception of a worm described in detail by W. M. Thomson 3 in 1900 under the name of ' Lepidonotus giganteus, Kirk," which had been previously named by Quatrefages " Aphrodita sqwimosa." The leading peculiarity to which the Ehlers' term refers is the possession of branchial " papulse " on the sides of the parapodia, such as occur in the Acoetan genus, Eupolyodontes, and the existence of a definite dorsal channel below the elytra for the pass-age of the respi-ratory current backwards to its exit between the last pair of elytra ; the mesial portion of the elytra being supported by certain low tubercles or pads of (? mu.-cular) tissue along the back.

1. Grube- Annulata Semperiana, 1878, p. l!(i.

2. Ehlers -Neuseeland. Annelid., 1904, p. 9.

3. Thomson Proc. Zool. Soc., 1900. p. 974.

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A translation of Ehlers' diagnosis is: "Polynoinae with 20 pairs of leathery, rugged elytra covering the back; three tentacles with large basal joints at the anterior margin of the prostomium ; a niu-hal caruncle ; chaetae between the peri-stomial cirri ; finely denticulated dorsal capillary chaete on a short dorsal foot-lobe, and stout chaste with serrate frills in the ventral lobe ; with bladder-like evaginations around the base of the cirro- and elytro-phores."

Previous to Ehlers' memoir, Moore 1 , in 1903, had described two species of Lcpidonotus from the coastal slope of Japan, viz., L. cititonijormis (p. 405) and L. branchiferus (p. 409), which clearly belong to this same genus. He pointed out their " evident relationship to L. giganteus, Kirk, from New Zealand," and suggested that the three species " might very properly be segregated as a distinct generic group." 2

Amongst the material from the " Endeavour " dredgings I find four new species of this remarkable branchiate genus, and am therefore able to add one or two characters to the diagnosis of Ehlers and to delete two.

In the first place he includes the presence of chaete on the peristomium ; but these Bourne 3 long ago showed to occur

in the genus Le-pidonotus, and other early authors have recorded them.

The " Nackencarunkel " is also attributed to the genus ; but in this I fancy Ehlers was misled by Thomson's figure of the head (PI. 51, fig. 4) where he shows the first of the series of dorsal tubercles or elytron supports, labelled "d.t.l," and which he explains as " the first dorsal tubercle in the respiratory channel/' It overlaps the base of the prostomium, but is not analogous with the " caruncle " of Amphinomids.

Additional characters are as follows :

(1.) All the species agree in having the elytra attached by a long, narrow oval cartilagiiioid tissue in the elytrophore, which is set transversely to the body axis in line with the foot, and leaves a very distinct, long oval scar on the elytron ; whereas in all other species of Polynomae and Aphroditinae, so far as the figures inform me, the elytrophore and its scar is a more or less circular thing ; but in I-phiojie muricata, Savigny shows (PI. iii., fig. 1) them as oval.

1. lLouiv 1'roc. Aciid. .Nat. iSci. Philadelphia,, 19U3, p. 401.

2. He notes, too, that " L. branchiata, Tread well (Bull. U.S. Fish. Comm., xx., 1903, p. 18(i), from Porto Rico, possesses similar branchiae, but the seta> and elytra are different."

3. Bourne- Trans. Linn. Soc., Zool., ii., 1883, p. 347.

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(2.) In all the species so far examined the elytron is fringed with long filamentous processes, usually termed " cilia," over the posterior, the lateral and part of the anterior margin.

(3.) The ventral chaetae are not as figured by Thomson, but are bearded, as correctly shown by Moore for his species ; and a re-examination of several individuals of P. squamosus shows that the short " frills," so characteristic of the Polynoids, are in reality formed by the bases of these long hairs. It may be mentioned that Thomson, in his description of the chaetae (p. 981), writes : " Rows of minute filiform spines, but bearing no comb-like plates," and his figure shows short hair-like processes. All the specimens at my disposal are of rather large size, and these hairs have been worn away, leaving short frills composed of very minute and very thin and numerous processes, of unequal lengths. It is clear that Thomson had this in view, and recognised that the chaetae differed from the usual type.

Such bearded chaetse occur also in Iphione spinosa as figured by M'Intosh in the " Challenger " Report.

(4.) It appears to be characteristic to possess on the upper surface of the cirriferous segments and encroaching on the feet large transversely oval cushions (the dorsal " tubercles ' of Grube), similar to, but smaller than, the elytrophoral cushions. In the figures of Polynoids, of which the naked dorsal surface is carefully drawn, these, though present, are much less conspicuous. Their great development here seems to be related to the improved respiratory system, evidently serving to direct the incurrent water between the feet on its way to the respiratory channel on the back, and so ensuring that it passes over the gills which are set along the faces and upper surfaces of the feet.

(5.) In all the species the elytra are supported mesially by a series of small " pads " along the back 1 two pairs or two single ones in each segment, which, as in other Polynoids, are biannulate.

The first two pads are median and belong to the first para-podial segment ; then follows a double series, median in position and close together, which extends till the tenth, thirteenth, or even, in one species, to the fifteenth segment, after which comes a median series, which ceases in the nine-teenth segment. The channel thus formed along each side of this row of pads continues till the last elytron on the

1. Similiar pads are shown in a few other Polynoids, e.g., Harmclhoe tubtrosa, Ehler*.

twenty -second segment, above which is the " excurrent aperture " noted by Thomson as being formed by excavations on the mesial margins of the last pair of elytra, which margins are slightly upturned to limit a definite aperture.

(6.) The large tufts of very fine dorsal chsetse are so arranged as to meet the neighbouring tufts, before and behind, and these chaetae are covered with numerous fine hairs or long denticulations in which the fine particles become entangled as they are being carried inwards by the current. They serve, in fact, as a filtering apparatus.

(7.) Again, around the base of the dorsal cirrus, in all the species, is a large gland from which the cylindrical cirrophore arises, and thus divides the gland into two portions. 1 This gland is separated from the dorsal cushion by a distinct space on which in some species are the dorsal gill*. May it be that this gland secretes a mucous material which also entangles fine particles which have escaped the filtering action of the cheetse? One finds delicate strands of stuff, with entangled particles, in between the feet and between the cushions.

The genus is in one respect at least more nearly related to the Aphroditinse than to the Polynoinse, namely in the form

of the intestinal caeca, which are long and branched, and the ends reflexed, and lying below the " cushion " and elytrophores, whereas in the Polynoinse these organs are shorter, simpler, and apparently not bent backwards.

The genus is, then, a specialised Polynoid in which certain modifications have occurred in the feet as well as in other parts of the body in the direction of perfecting the respiratory functions ; and it presents an interesting instance of adaptation to its mode of life.

All the species come from some depth. The New Zealand forms are usually found in from 20-40 fathoms of water, with a bottom of ooze or fine sand. Lt is true that we sometimes find the animal on shore, but it may be that it has been carried there aiter a storm, for they are only occasionally found when shore-collecting. f have found them inside fishes.

The two Japanese species were obtained from 30-63 fathoms ; and the new species occur in deep water, down to 200 fathoms.

1 . A similar gland occurs in other Polynoid genera.

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PHYSALIDONOTUS RUGOSUS, sp. nov.

(Plate xxxviii., figs. 16-22 ; Plate xxxix., figs. 23-25.)

A stout oval Polynoid, measuring 48 mm. in length by 22 mm. across the elytra, and 27 mm. over the ventral chaetae. The diameter of the body alone measured over the ventral surface is 10 mm. The height at about the middle is 9 mm.

The 12 pairs of elytra completely cover the back and overlap considerably in the fore and aft direction. They are attached firmly, are of a cartilagiiioid consistency, shiny white below. The region of each which is covered by its predecessor is smooth and nearly white ; the rest of the exposed surface is extremely rough, with smaller and larger tubercles and papillae of various shades of brown ; but a small area just in front of the 1L areola" is rather conspicuous, owing to the pale ground colour, with small, pale tubercles. The external or lateral region is thinner than the rest, and where it covers the parapodium may be folded upwards owing apparently to the contraction of the body wall and elytrophore.

The wt areola," or scar as it is sometimes called that is, the area by which it is attached to the elytrophore, is an elongated oval, transverse to the long axis of the body. At the

mesial or upper end of this areola is a small group of 4-6 long sub-cylindrical spinose papillse, terminating in an enlargement covered with conical spines (PL xxxviii., fig. 19). These " areolar papillae' measure from 1.0 to 1.5mm. in length.

In addition, there may be one or two isolated similar papilla 1 near the external end of the areola.

The entire free edge, i.e., the lateral and posterior margins, is fringed with similar papilla?, shorter on the posterior but longer on the lateral edge, where they measure from 1 .5 to 1.75 mm. Moreover, they are not confined to the latter edge, but some 2-3 rows of rather smaller papilla? occur on the surface of this region close to the edge (PI. xxxviii fi^ 18).

These long laterally placed papillse form a very conspicuous fringe overlying the notopodial chaetae. They are pale, transparent, and probably colourless in life.

The shape of the elytron in the mid-body is roughly a rectangle with rounded corners, and with a slight excavation on the anterior margin ; its long axis is transverse to that of the body.

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The first elytron is sub-circular and bears the long papillae on its anterior edge as well as in the usual position.

The second is reniform, having a very deep concave excavation of its anterior margin, which fits round the first elytrophore.

So much can be observed with the naked eye ; microscopic examination reveals the fact that amongst the large tubercles and long papillae are smaller tubercles, stellate in form, of various sizes and of various shades of brown and stages of development. Many have a radiate base, or with spines close to the base, from which springs a column, terminating in radiating spines 3-5 in number (PI. xxxviii., figs. 20, 21).

The long marginal papillae are in reality long inverted cones with a narrow base of attachment and slightly expanded end, which is produced into two or three or more long spines, and the sides also bear spines. In the type they are more numerous and blunt, and resemble the pictures in children's books of an ogre's club.

The actual margin of the elytron is fringed with delicate hair-like " cilia " around the lateral, posterior, and the outer portion of the anterior margin.

The gills. The branchial organs are thin- walled, finger-shaped hollow outgrowths of the body-wall, and may be termed " papulae " (a word in common use for similar organs in the Asteroidea). These papulae commence on the third parapodium, where there is a single one on the anterior and on the posterior face, but they soon become more numerous ; then for a few segments before ceasing they decrease in number, and die out after the 23rd segment, which carries the last pair of elytra.

The arrangement, which may be regarded as normal for this species, as seen at about the middle of the body (PI. xxxix., fig. 25), is as follows :

On the anterior face of the parapodium there is a row of four papulae, commencing at the "cushion" and sloping downwards along the anterior limit of the upper surface of the foot, the most distal of the row lying close to the base of the notopodium. There is a second row at a lower level, consisting of two (or occasionally three) papulae, of which the distal is the larger and lies below the upper distal papula ; the proximal is removed by some little space from the axilla.

On the posterior face the arrangement is somewhat different ; there is a row of three commencing at the cushion, and the distal papula is close to the base of the cirrus (in the

cirriferous segments). There may also be a couple of small papulae springing from the posterior face of the cushion. A lower row of two, the proximal near the axilla, the distal about half-way down the side of the foot. This row is nearly vertical, running down the axillary angle between the two feet (PI. xxxviii., fig. 22).

The arrangement on the elytriferous segments is nearly the same, though there are usually three papulae in the lower row on the posterior face, the proximal or uppermost being close to the axilla.

The parapodium has the form represented by Thomson's figure and illustrated here on PI. xxxix., fig. 38 it possesses two bundles of chaetse ; the notopodial bundle consists of a very large number of closely set, very fine, almost silky and very flexible bristles, which project as a pencil or brush, spreading outwards in all directions, and touching those of the neighbouring feet (PL xxxix., fig. 25). Under the micro-scope they are seen to bear a double series of very fine and rather long " cilia " or short hairs, which are covered with fine particles of mud, and evidently act as a sieve.

The neuropoclial chaetae are stout and brown, about 30 in number, arranged in 10-12 tiers of 2-3 in a tier. They differ

remarkably from the normal Polynoid chaetae, and resemble those figured by Moore for P. chitoniformis.

The usual " pectinated frills " (of A. G. Bourne) are replaced by transverse rows of very long, very fine hairs, which spread out on each side. It is impossible, I find, to count the rows, as they successively overlap, but there are at least 12-15 or perhaps more (PI. xxxix., figs. 23, 24).

The aciculum of the neuropodium pierces the foot near its upper margin, and there is here above it a short tongue-shaped lip. There are only about five or six chaetae abcve the aciculum.

The dorsal cirrus arises from a swollen base, which appears to be a gland ; it is more largely developed behind than in front of the base. The usual cirrophore and style are distinguishable in the cirrus, which presents no structural characteristic.

The cirrus is slender in proportion to the size of the animal. The head agrees in general with that figured by Thomson for P. squamosus.

The prostomium (PI. xxxviii., fig. 16) is about as broad as its length, widest behind the middle, and limited anteriorly

by a slightly impressed line across the bases of the lateral tentacles ; it is notched for the insertion of the median tentacle.

Both pairs of eyes are far back ; the anterior eye on each side is at the widest part of the prostomium, and forms a distinct protuberance ; the posterior is just behind it.

The tentacles are pale brown, for about half their length from the base, followed by a colourless region, with a narrow band of darker pigment below the swelling. The palp is ciliated in seven rows, as figured by Thomson. The relative proportions of the parts are shown in the figure.

The "elytra! pads" on the dorsum are double over the 2nd to 13th parapodial segments.

Other specimens measured have the following dimensions :

(1) 20mm. by llmm. over the elytra, and 15mm over the chsetse.

(2) 25mm. by 14mm. over the elytra, and 17mm. over the cha?ta>.

(3) 40 mm. by 16 mm., with a height of 8 mm.

Remarks. The species resembles P. squamosus in size and general appearance of the elytra, but that species lacks the supra-areolar papilla?, for in all my material of different sizes and from various localities around the New Zealand coasts, this region of the elytron is comparatively smooth, though there are a few rather large papilla? just posterior to this areola. But in the present species they form a very conspicuous tuft.

At the same time there is a fair range of variability as to the rugositv of the elytra, seen in the material from Tasmania.

In a specimen measuring 40 mm. by 16 mm., with a height of 8 mm., they are less strongly marked than in the type, as they are smaller, and to the naked eye not so distinctly marked off from the more posterior papillae. One can easily trace a gradation in this individual between the posterior stellate tubercles and the longer papilla? which carry the spines.

The long papilla? which in the type cover the external portion of the surface of the lateral region, are here fewer and even absent on some elytra. But 1 find no feature that marks this individual off definitely from the type, such as any difference in the arrangement of the branchial papula?.

In the smaller individuals the spines 011 the marginal papillae are sharper and fewer than in the larger type.

The colour varies somewhat in tone ; some are paler, others darker ; in some the smaller tubercles are almost black, in others brown. But colour is not a thing of importance in these worms, and in an individual, the successive elytra present differences in these respects.

Locs. Off Maria Island, Tasmania. 78 fathoms. A single specimen, which has been selected as the type.

East of Maria Island, Tasmania, 78 fathoms.
East of Babel Island, Bass Strait, about 70 fathoms.
South of Mt. Cann, Victoria, 75 fathoms.
East coast of Flinders Island, Bass Strait.

PHYSALIDONOTUS LAEVIS, sp. nov.
(Plate xxxix., figs. 26-32.)

Two specimens were obtained, the larger of which has the following dimensions: Length, 32mm. by 13mm. across the elytra and 15 mm. over the chaetae, with a height near the

middle of the body of 6 mm.

The second individua.1 is darker in colour, and measures only 20 mm. by 10 mm. across the elytra.

The elytra are pale brown, and appear to the naked eye relatively smooth as compared with P. rugosus and others. The exposed surface is covered with small colourless stellate tubercles, which are quite minute anteriorly (PI. xxxix., fig. 28) ; they increase in size towards the areola and the posterior border, but none attain the same large proportions found in P. squamosus or P. rugosus. Even those on the external margin are short.

Over the upper end of the areola these stellate tubercles are more densely aggregated, are slightly larger and taller than those in the posterior region, but not greatly so (PI. xxxix., fig. 31).

The marginal papillae are somewhat different from those in P. rugosus ; they are cylindrical rather than obconical, with a few large spines at the free end (PL xxxix., fig. 29) ; the largest of the spines is usually a continuation of the axis of the papilla, the others radiating more or less at right angles from it. But on the posterior margin many of the papillae have five nearly equal spines radiating horizontally, one of which is larger than the rest.

As in other species, the ground colour of the elytron is white, and the sxirface covered with variously coloured stellate tubercles of a regular form, some of which may contain black pigment ; these stars may be carried by short cylindrical bases. Near the external, anterior margin are a few soft, uncoloured, simple conical papillae (PI. xxxix., fig^SO).

Tn the larger individual the elytra are a good deal paler than in the shorter one, owing, of course, to the less amount of the black pigment in the tubercles, or rather to the fewer black stars.

The gills. On the anterior face of the parapodia, there is a row of 3 or 4 papulae in a line, starting from one at the outward corner of the cushion, the distal one of the row being near the notopod. There may also be, on the cirriferous segments, an additional papula at a lower level on the face of the foot about half way along. On the posterior face there is a large papula close to the cushion, larger than any of the others, which in cirriferous segments is clavate rather than finger-shaped (PI. xxxix., fig. 32).

At a lower level is a row of smaller papulae, commencing

at the axilla, and inclined downwards ; in the cirriferous there are two, and the elytriferous three, in this row.

The prostomium is as broad as its length, broadest almost at its hinder border. The two parrs of eyes are even further back than in P. rugosus, very close together, the anterior at rather a higher level than the posterior ; they are oval in outline, with the longer axis vertical, and is best seen in side view (PI. xxxix., figs. 26, 27).

The tentacles are broken off in the larger specimen (the type), and in the smaller only one lateral tentacle remains. This is reddish brown right up to the swelling, which is white ; the tentaculophore is vandyke-brown.

The tentacle is proportionately as long as that of P. rugosus.

As in other species, the hinder margin of the prostomium is overlapped by the first " pad " for the elytra.

The double " pads " occur on segments 2-13 inclusive.

Locs. Twenty-five miles south-west of Cape Everard, Victoria. This specimen has been selected as the type.

Off Gabo Island, Victoria, 200 fathoms, with P. pauci-branchiatus.

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PHYSALIDONOTUS TURRITUS X , sp. nov.

(Plate xxxix., figs. 33-35.)

Four specimens of this small species, one of which measures 12 mm. in length by 6 mm. across the elytra.

The characteristic marginal obconical papillae are relatively large for the size of the worm ; they are shorter and wider than those in the preceding species.

There is a row of 3-4 large cylindrical papillae over the areola ; each springs from a distinctly stellate base, and terminates in a crown of rounded lobes, rather than spines. The width of these papillae is less than half the height (Pl. xxxix., fig. 33).

Along the posterior margin there is a row of very irregular spinose papillae, and at the external margin a few large papillae, some of which, towards the anterior edge, are nearly cylindrical, others towards the posterior side are inverted cones, with a very narrow base of attachment, widening out terminally. All these bear blunt spines.

The general surface of the elytron is covered by closely

arranged low stellate tubercles, small in the anterior region, larger towards the areola, and still larger on the posterior region, where they are also of more irregular form and size. In colour they are varied, some being nearly black.

On the covered portion the tubercles are very small and rounded.

The margin, as usual in the genus, is fringed with relatively long " cilia," longer on the external than on the posterior margin.

The gills. On the anterior face there are two papulae close together, about midway along the foot, and one shorter one on the cushion. On the posterior face there is only one papula, that a long one springing from the base of the cushion, but in a cirriferous segment there is, in addition, a second one close to the base of the cirrus (PI. xxxix., fig. 35).

The prostomium is broader than long, widest at its middle, where the anterior pair of eyes is situated, the other pair lies immediately behind them (PI. xxxix., fig. 34).

The tentacles are uniformly pale brown, the median more than twice the length of the laterals. (In these measurements the basal " tentaculophore " is not included).

1. "Furnished with towers," so named from the castle-like form of

the large papillae on the elytra.

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The elytral " pads " on the dorsum are double in segments, 2-13.

Loc. Twenty miles east of Babel Island, Bass Strait, 65 fathoms.

PHYSALIDONOTUS PAUCiBRANCHiATUS 1 , sp. nov.

(Plate xxxix., figs. 36-38 ; Plate xl., figs. 39-42.)

A single individual measuring 23 mm. in length by 9 mm. over the elytra, and 11 mm. over the chaetae.

The shape is similar to that of the other species, a broad oval. The elytra are pale, almost white, with a pinkish tint, or even a faint purplish tint in some of the anterior elytra.

In the pre-areolar region the tubercles are small and dark, many nearly black, stellate, and very sparsely distributed, as, indeed, they are all over the elytron.

There are no special areolar papillae, but just behind this region is a row of 5-6 much larger multiradiate papillae, most

of which are dark greenish, nearly black to the naked eye, which show up conspicuously on the pale background.

These large papilla? are close together in a line running along the length of the elytron, reaching nearly from the mesial and to the external border.

The posterior region is almost free from tubercles, as they are few and scattered, stellate in form, much smaller than those in the post-areolar row ; but close to the posterior margin is a single row of large papillae about half the size of the post-areolar row, the number and distribution of which naturally varies. In some of the elytra this posterior series extends nearly to the mesial border, but usually ceases at the upper end of the level of the areola.

The mesial surface above the areola is sparsely covered with small dark spiny tubercles.

Further, the lateral region, especially towards the anterior border, has very few tubercles, but is sparsely covered by long filamentous processes similar to those constituting the marginal fringe, but of greater length (PI. xl., fig. 42) ; a few of shorter length are found also in the external portion of the posterior region.

The papillae are much shorter than in the previous species, even the largest are short, low cylindrical columns of considerable width, terminating in a nearly flat top, wider than

the base, the margin of which is produced into a variable number of short rays. In those of slightly less size, these

1. In reference to the fewness of the branchial papulae.

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rays are more sharply pointed, suggesting that those of the larger are worn down. The low tubercles behind the areola have a rounded attachment, and are terminally dilated and produced into three or more, rarely four, sharp spines.

The impression conveyed by a close study of the series is that the larger are derived from the smaller by increase in number of rays or spines.

The branchial papulae are much less developed than in the other species (PI. xxxix., fig. 37). On all the feet, within the branchial region of the body, there is a couple of short papulae close together on the anterior face, the distal being somewhat the larger.

On the posterior face of the cirriferous feet there is a single short papula springing from the cushion, but this is absent in the elytriferous feet.

The chaeta has a construction just below the " frilled ' region, Avhich does not occur in the other species (PI. xxxix., fig. 36).

The head. The prostomium is as broad as its length, perhaps rather broader ; the tentacles are broken.

But a characteristic feature about the eyes is their approximation (PI. xl., figs. 39, 40). The two on each side are in contact, near the hinder part of the side. When seen from above only one pair appears to exist, but from the side an anterior eye is seen lower down the side, and rather smaller than the posterior. It may be that it is the anterior eye that has travelled backwards, if one may judge from the relative size of the eyes.

The double elytral " pads " extend on to the 15th segment.

Loc. Off Gabo Island, Victoria, 200 fathoms, with Polynoe l>la,tycirrus and Physalidonotus laevis.

Genus HARMOTHOE (senxu latu), Kinberg. 1

HARMOTHOE (EUNOA) ETHERIDGEI, sp. nov.

(Plate xl., figs. 43-51.)

A single individual whose body is of the usual shape, the sides almost parallel, and nearly equally tapering at each

1. Malmgren's genera, as has been pointed out by others, are founded on such points as the relative size of the notopodium, the presence or absence of a tooth on the neuropodial chaeta, and the presence or absence of a fringe to the elytra. It is well known that these features all occur in various species of Lepidonotus, yet no one, 1 think, has attempted to sub-divide that genus on these minute differences. Hence I follow Willey ("Southern Cross" Polychseta, 1902, p. 263) among others, in using Harmothoe, rather in Kinberg's sense, though it is not easy to distinguish that from his Antinoe.

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end, though the posterior is slightly narrower than the anterior.

The worm measures 25 mm. by 8 mm. over the elytra, and 9 mm. over the neuropodial chaetae.

It has 38 parapodial segments, and 15 pairs of elytra.

The elytra are on the usual segments 1, 3, 4, 6 20, 22, 25,

28, 30, the last elytron is followed by 5 parapodial segments.

Most of the dorsal cirri, as well as the subanal cirri are

absent.

The body wall is unpigmented ; the chaetae are pale yellow.

The elytra are grey, overlap fore and aft, as well as right and left, covering the back, and hiding even the bases of the notopodial chaetae.

They are rather soft to the touch, and are fringed. The first one is grey all over, rather darker near the dorsal region.

The rest have the anterior region white, the exposed region pale grey, becoming darker towards the dorsal region, and posteriorly, but paler again in the lateral region.

This exposed portion is covered sparsely with small dark rounded conical tubercles (PI. xl., fig. 47). Near the posterior margin there is a row of widely separated white. i.e., unpigmented, and probably transparent in life, long, finger-shaped papillae. These are absent on the first elytron. On the anterior elytra there may be as many as eight of these soft papillae ; on the majority I note some 4-6, while on the posterior ones only three are present. When viewed under a microscope the tip of each is seen to be formed by a short conical cap of highly refringent chitin ; at the base, too, is a ring of chitin, the greater part of which is thin and evidently pliable, for many of them are bent (PI. xl., fig. 48). There are also now seen a number of short filamentous processes, on the surface near the

posterior margin, similar to the fringe, but of less length. The fringe extends on to the hinder margin, but the filaments are shorter and less crowded than on the external margin.

The areola is white, circular and subcentral. The elytra are subcircular, with the usual anterior emargination.

The parapodia. The neuropodiurn is produced into a long rounded point, which bears at its apex a small digitiform supra-acicular " ligule ' (PI. xl., fig. 51). On its upper surface the neuropoclium carries the sessile no to podium. The chaetse in both lobes are very numerous.

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The iiotopodial chaeta?., about 50 in number, are stouter than the neuropodial, and are radiately arranged ; the upper and anterior are shorter than the rest, but of the same form ; they have a blunt point below which is a large number of rows of minutely pectinated frills (PI. xl., fig. 49).

The neuropodial chaeta?, about 70 in number, are in 7 or 8 tiers, with 3-6 (or even 7) in each tier (PI. xl., fig. 50) ; the smaller number in the upper and lower, the larger number in the middle tiers. There are some 23-25 frills in the longer upper chaetae. The lower chaetae have, as is usual, fewer

frills than the upper, and are altogether shorter.

There is no evidence of a subapical tooth (therefore it would be placed in Malmgren's genus, Eunoa). Nor are there any stout pectinations in the distal frill.

The dorsal cirri are covered with short cylindrical papillae.

The head is typically Harmothoid, but the peaks are rather widely separated (PI. xl., fig. 46). The prostomium is longer than broad, the anterior eyes are lateral at about the middle of the side, and the posterior are far back, close to the hinder margin.

The tentacles are finely ciliated, the subterminal swelling feebly marked. The median tentacle is much stouter than the laterals, and about twice their length.

The palps are longer than the median, as also are the peristomial cirri. The tentacles, like the cirri, are transparent.

Yellow chaeta?. are visible on the upper side of the base of the peristomial cirri.

Remarks. JVTIntosh described in the " Challenger " Report a species, Eunoa abyssorutn, from the south of Australia, in 2000 fathoms, which in some respects seems to resemble the

present species. But as that individual had no elytra, and as the chaeta? differ in some details, and the form was eyeless, it seemed desirable to establish a new species for it.

In Eunoa opalina, from the Strait of Magellan, M'Intosh describes and figures " soft papillae " on the elytra, but they are short and broad. He refers also to the ' pellucid " tentacles, and the widely separated peaks of the prostomium.

But his figures of the chaeta? show differences in that the apex of the neuropodial is much more hooked and sharper at the tip, and that of the notopodial is longer and sharper than in the present.

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Loc. Off Gabo Island, Victoria, 200 fathoms, with Polynoe platycirrus, Physalidonotus laevis, and P. paucibranckiatus.

Genus SCALISETOSUS, M'Intosh.

SCALISETOSUS AUSTRALIENSIS, Sp.)WV.

(Plate xliv., figs. 114-117.)

A very poorly preserved fragment, deprived of its elytra,

most of the prostomial outgrowths, all its dorsal cirri, while many of the parapodia are injured. It is pale in colour, without any pigment. The 28 segments measure 10 mm. in length, with a diameter of 2 mm. across the body, and 3-25 mm. over the parapodia.

The prostomium (PI. xliv., fig. 114) consists of a pair of oval lobes separated by a wide deep groove ; the anterior margin is well marked, and the tentacles spring from below it. Only the bases of these remain, the median rises at a rather higher level than the laterals, and the tentaculophores appear to be very short. The two pairs of eyes have a pale brown colour.

The elytrophores occur on the chsetigerous segments 1, 3, 4, 6, 8, etc. I cannot say where the change, if any, occurs, owing to the damage in the hinder segments of the fragment.

Both the elytrophores and cirrophores overhang the parapodia much more than is usual in the family, indeed, they overhang the notopodia, which is a small lobe (PI. xliv., fig. 115). The neuropodium has a long anterior pointed lip. The ventral cirri are narrow filaments.

The chgetae are colourless ; they are alike in form in both lobes, but those in the dorsal lobe are much shorter. These chsetse are quite characteristic of the genus (PL xliv., fig. 116) ; at the point where the shaft commences to bear the pectinated

frills, it is distinctly enlarged, and bears a conspicuous single large frill, which under a low power looks like a tooth, but fine grains of mud are present in the cup formed by it. The remaining frills have the appearance of a series of small teeth. The apex is free, and in the dorsals simple, but in many of the ventral chsetse there is a minute subapical tooth.

The frills (PI. xliv., fig. 117) are very short and delicate, and each has but little height, is very indistinct, and slopes downwards more abruptly than is usual in the family.

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The genus was formed by M'Intosh for a single specimen, S. ceramensis, 1 and Moore has found it off the coast of Japan, his species, S. formosus* is, like mine and the type species, very imperfect, and we know nothing of the elytra in the genus. But the chsetae are so characteristic that there is no mistaking it.

Loc, Southern coast of Australia.

Family SIGALIONHhE.

Genus THALANESSA, Baird.

THALANESSA OCULATA, M'Intosh.

(Plate xlv., figs. 118-123.)

Thalanessa oculata, M'Intosh, Chall. Rep., Zool., xii., 1885, p. 142. Id., Treaclwell, Bull. U.S. Pish. Comm., xxiii., 3, 1906, p. 1157.

A single individual was obtained which is smaller than the type. It measures 30 mm. in length by 1 mm. across the body, and 3 mm. over the parapodia. It is a good deal shrunken, as if it had been placed in very strong spirit. There are 61 segments, but it is apparently imperfect.

The account in the " Challenger " is so full that I need not add any further data, but I have given figures in addition to those already published, namely of a typical foot (PI. xlv., figs. 119, 120), and of the peculiar anterior feet, in which the membranous expansion of the neuropod and digitate notopodial processes are so well developed. The parapodia are remarkably long ; their appearance will be gathered from the figures herewith (PL xlv., figs. 121-123).

M'Intosh's figure of the elytron is not quite typical ; it represents an anterior one, while those in the greater part of the body are not exactly " reniform," as he describes them. Each has a deep excavation on the anterior margin, but the outer or ventral boundary is much .longer than the upper, and the scale covers almost four segments as shown (PI. xlv., fig. 118). It is attached to the elytrophore near its anterior dorsal margin.

I find that the body-wall is splashed with pale nut-brown markings on each side of the anterior segments, which are visible through the transparent elytra, which themselves

1. M'Intosh Chall. Rep., Zool., xii., 1885, p. 103.

2. Moore Proc. Acad. Nat. Sci. Philadelphia, 1903, p. 403.

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have a patch of paler brown at the anterior lobe and along the posterior margin ; otherwise they are colourless and transparent.

M'Intosh states that the number of processes to the elytral papillae are five or six ; I find that in the mid-body elytra there may be as many as eight or nine in those papillae in the middle of the series.

Remarks. Haswell's T. microceras differs in a number of features.

Loc. South of St. Francis Island, South Australia, 35 fathoms.

Distribution. Off East Moncceur Island, Bass Strait, 38 fathoms ; Tongatabu, 18 fathoms ; off Hawaii, 20-142 fathoms.

Genus SIGALION, Milne -Eduxirds.

SIG ALIGN, sp. incert.

A fragment without head or tail, consisting of about 50 segments of a diameter of 1.5 mm. across the body and 3 mm. over the parapodia. Its length it is difficult to estimate, as it is much curved. I am unwilling to name the present fragment, but it does not agree precisely with any hitherto recorded.

Loc. Forty miles south of Cape Wiles, South Australia, 100 fathoms."

Sub-Family ACOETIX.E.

Genus EUPOMPE, Kinberg.

EUPOMPE AUSTRALIENSIS, M'lntosli.

Eupompe australiensis, M'Intosh, Chall. Rep.. Zool., xii., 1885, p. 135.

A single specimen, imperfect posteriorly, was in an extra-ordinary condition. It consists of the anterior end with 30 segments, but only the last five were visible, as the worm was completely turned inside out, with the head forwards

and inwards. It was only on slitting open the mass of apparent muscle, which I supposed to be the partly digested body-wall, that I discovered the head and all its outgrowths well preserved inside.

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The pharynx was attached to this mass by a long ligamentous cord, formed apparently by the buccal cuticle drawn out into a filament.

Loc. Twenty miles east of Babel Island, Bass Strait, 65 fathoms.

Distribution. JVTIntosh records it from " Station 168 (apparently off Cape York, Australia, and probably in Endeavour Strait)."

Family NEPHTHYDID^E.i

Genus NEPHTHYS, Cuvier.

NEPHTHYS MACRURA, tichmarda.

(Plate xl., fig. 57.)

Nephthys macrura, Schmarda, Neue Wirbellose Thiere, i. 2, 1861, p. 1)1. Id., Ehlers, Neuseeland. Annelid., 1904, p. 14.

Nephthys virigini, Kinberg, Annulata nova, 1865, p. 239.

Nephthys trissophyllus, Grube, Monatsber. Akad. Wiss. Berlin, 1877, p. 533. Id., M'Intosh, Chall. Rep., Zool., xii., 1885, p. 159.

Ehlers has been able by comparison with the types of the three authors to establish the synonymy as above.

In spite of certain differences between the fragment described below and the accounts of the authors above cited, I identify it with this species, with which it agrees, hi the characters of the foot especially, more closely than it does with any other species in the literature available to me.

A cephalic fragment containing 30 chaetigerous segments measures 15 mm. in length by 2.75 mm. across the body and 3.5 mm. over the parapodia.

The colour is a uniform pale pinkish brown.

The prostomium, which is without eyes, is shield shaped, truncated in front, pointed behind ; its length is to its breadth rather more than as 3 : 2 (PL xl., fig. 57). On

each side near the hinder end is a rounded " nuchal organ."
The anterior angles are produced into a pair of short tri-
angular tentacles, and from the under surface two others
arise of slightly greater size, directed outwards.

1. As the word " Nephthyidae," sometimes used for this family, is em-
ployed for a family of Alcyonarians, the above form seems desirable.

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The first segment carries a parapodium as usual, and the
ventral cirrus is rather larger than that on the following.

The anterior eight feet differ from the rest in lacking the
gill, which makes its appearance on the ninth.

The base of the foot is not quite so high as that of the body.

The pharynx was wholly withdrawn. On opening the body
it is seen to reach to the eighteenth segment. The organ was
slit open and mounted. The entrance to the pharynx is sur-
rounded by a circle of 20 rather long, closely set, bifurcated,
filamentous papillae, with a single shorter one in the dorsal
and ventral mid-line.

The buccal region presents 20-22 longitudinal rows of

similar but shorter papillae, which decrease in size towards the mouth. These rows commence at alternating levels (cf. M'Intosh, PI. xxvi., fig. 4), and those on the dorsal surface commence immediately behind the pharyngeal papillae ; those on the ventral a good deal further back. These rows diminish in number towards the mouth, where only 14 can be counted.

I cannot detect in the mounted preparation any evidence of the bifurcation of these rows of papillae, as the mouth is approached, such as are figured by M'liitosh and by Ehlers ; though otherwise there is a considerable degree of agreement. May it be that as the animal grows the length of the buccal rows increase and then bifurcate ? It is difficult in this retracted state to compare their arrangement with that figured by M'Intosh of the everted organ.

About midway along the pharynx is the usual dorsal and ventral brown conical denticle.

I have stated that there are differences between this form and the accounts of the species. Not only so, but the figures given by M'Intosh are not altogether in accord with those of Ehlers.

In the first place the shape of the prostomium is longer in the fragment before me than in most of the figures. In M'Intosh's figures the proportion of length to breadth differs according to the state of eversioii of the pharynx explicable

perhaps by the fact that when fully averted the prostomium is stretched laterally (cf. PI. xxvi., figs. 1, 3, 5).

In fig. 3 the length to breadth is about as 3 : 2 ; but in others the two approximate, and in Ehlers' (PI. 1., fig. 10) the breadth is the greater. Moreover, he does not show an angle at the posterior end, which is distinct enough in MMntosh's

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drawings ; and Grube in his diagnosis of A T . trissophyllus writes : " Lobus cephalicus. parvus, quadratus, segmento buccali penitus impressus," which I read to mean that it impinges " deeply " into the buccal segment.

Again, there are details about the lobes of the notopodium in which exact agreement is lacking ; for instance, Ehlers shows two smaller lobes below the large one ; only one is figured in M'Intosh ; nor did I find a second in this individual. At the same time Ehlers notes that in the abundant material that he had the variations in details are so great that if they had been found separately different species might have been established.

The colour of the larger individuals is, according to Ehlers and Grube, somewhat variegated, darker brown, either in

lines or spots or over the dorsum generally, on a paler ground. But M'Intosh notes that amongst his material " the smaller examples are pale," and presumably of uniform tint.

Ehlers was able to compare his specimens with Kinberg's type, and to assure himself of the identification of Grube's with Kinberg's species (1897) and later with Schmarda's (1904).

If I am correct in this identification, the species is an interesting example of an Australio-subantarctic distribution, analogous with what Ehlers noted amongst the Polychaetes of New Zealand and as I found amongst the Auckland Islands worms. 1

Loc. Forty miles east-north-east of Babel Island, Bass Strait, 1200 fathoms.

Distribution. Kerguelen ; Fiiegia ; Magellan Strait ; New Zealand.

Family AMPHINOMID^E.

Genus NOTOPYGOS, Grube.

NOTOPYGOS LABIATUS, M'Intosh.

Notopygos labiatus, M'Intosh, Chall. Rep., Zool., xii., 1885, p. 19. Id., Treadwell, Bull. U.S. Fish. Comm.,

xxiii., 3, 1906, p. 1164.

Of two individuals of a worm which I refer to this species, one, well preserved, measures 39 mm. in length, so that it is larger than the type ; it is widest about the middle, where

1. Benham Report on Polychseta, Subantarctic Islands of New Zealand, 1909, p. 236.

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it is 9 mm. across the ventral surface, whence it tapers fore and aft. The width of the 4th chaetigerous is 4 mm., and at the hinder end is 3 mm. It is pale in colour, with little sign of pigmentation ; the caruncle is yellowish, and along the line of union of the crest with the basal lamella is a line of dark purple ; the same colour is present on the cirrophores of the dorsal cirri and at the base of the branchial cirri.

The cha?ta% which are said to be pale green in the type, are here colourless, glassy, though in a less well preserved specimen they are pale yellow.

This suggested that perhaps I had Haswell's N. flavus 1 before me, and the almost total absence of serrations on the

chaetse inclined me to that view, but he states that amongst the dorsal bristles some are simple, while in the genus typically all are forked. I find no simple ones.

Potts 2 has recently tabulated the species according to the presence or absence of serrations. In the present case I can only find serrations on the ventral chsetse of the anterior segments, and then they are so ill-defined that under a low power (Leitz, Oc. 3, Obj. 3) they are not recognisable. Under a higher combination, however, there are seen, as M'Intosh figures them, as minute step-like interruptions in the margin of the larger prong.

Except for this small difference, my specimens agree with M'Intosh's so closely that I do not feel justified in making a new one.

Locs. Southern coast of South Australia.

North of Cape Borda, Kangaroo Island, 40 fathoms.

Distribution. South of the Philippine Islands ; Hawaii.

Genus CHLOEIA, Savigny.

CHLOEIA INERMIS, Quatrefages.

Chloeia inermis, Quatrefages, Hist. Nat. des Annelides, i., 1865, p. 389.

This worm I have taken on several occasions on the coasts of New Zealand, though I do not think that it has been recorded since Quatrefages wrote his brief account of it. Its leading feature is the absence of bifurcation and of serrations on the chaeta?.

1. Haswell Proc. Linn. Soc. N. S. Wales, III., 1879.]. 343.

2. Potts Trans. Linn. Soc.. Zool.. xii.. 1909. p. 358.

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The present specimen measures 42 mm., with a diameter of 10 mm. at its broadest, which extends from about the 15th to 20th segments. It contains 29 segments.

The dorsal and ventral chaetae are alike, though the ventrals are much finer, straight, thick-walled, hollow, with a simple point. A few of the ventrals have a minute subapical tooth ; or this may be represented by a "' step " where the tooth has been woni away.

Loc. Off South Cape, Tasmania, 75 fathoms.

Distribution. New Zealand.

Family ALCIOPID.E.

Genus HALODORA, Greeff.

HALODORA, SP. ?

(Plate xl., figs. 52-55 ; Plate xli., fig. 56.)

I have no recent literature on this group, so that I am unable to compare the present worm with those previously described. I attribute them to the genus Halodora, Greeff, as the head does not project beyond the eyes ; the introvert is without denticles, and there is no " cirriform lip " to the parapodia, while the chaetae are compound. It differs from H. reynaudii, Audouin & Milne-Edwards, in various respects.

The material consists of two cephalic fragments, two tails and an intermediate region of the body, belonging to one of the two individuals ; the portions are much coiled, and measurements are difficult to make with accuracy. 1 But the worm seems to be about 40 mm. in length, with a diameter of 1 mm. or 2 mm. over the parapodia. It is widest anteriorly where the width is 2 mm. over the eyes, and tapers slowly posteriorly.

The worm then is long and narrow, with large brown spots on each segment laterally, just behind the base of the parapodia ; the cephalic eye is of enormous size, and rich brown in colour, the pupil faces downwards and outwards.

Each of the anterior segments is crossed by a narrow band of brown pigment, of a width about equal to the antero-posterior width of a parapodium, and on the first seven or eight segments it is continued from side to side, linking the lateral spots; but in the following segments it is broken in

1. One cephalic fragment has twenty-three segments and measures 12 mm. in length ; one head-less fragment has fifty segments followed by twenty -four very small regenerated segments.

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the middle, and further back the length of each moiety of the band gets less and less, though they persist till nearly the hinder end, and at the same time the depth of the brown diminishes.

Neither caudal portion shows any anal cirri.

The whole worm shows evidence of much shrinkage due to the strong alcohol in which it is preserved.

The head. The prostomium is depressed between the eyes, and is traversed by a convex ridge at its anterior end, which appears to represent a median tentacle, for I can see no definite appendage in the middle line (Pl. xl., fig. 55).

The paired tentacles lie on the underside of the sloping prostomium ; the upper pair is almost in line with the upper surface of it ; each is very short, rounded, and nearly as broad as it is long. The lower pair are directed downwards ; each is cylindrical and about 3-4 times as long as the upper one.

The peristomium. The lower lip is a thin transverse fold notched in its middle, and somewhat produced on either side.

There are three pairs of " peristomial " (or better, " meta-stomial ") cirri. Behind the peristomium is a segment, which bears on e'ach side an oval thickened whitish pad, whence arise two cylindrical processes, one external and ventral, lying against the under surface of the eye ; the other is much smaller, and directed outwards. Behind these again is a faintly marked segment, which bears a pair of larger and stouter cirri, directed backwards.

The next segment bears the first distinct parapodium, but I can detect no chaeta?. The dorsal lobe is produced into a foliaceous process or dorsal cirrus, resting against the hind wall of the eye ; the small ventral cirrus resembles the following. This segment is banded with brown dorsally, and has but a small lateral brown spot on each side.

The parapodium of the following segments is uniramous, with pointed lips (PI. xl., figs. 52, 53) ; it bears dorsally and ventrally a large foliaceous cirrus, the former the larger.

The aciculum is colourless, with a slightly curved tip ; the chsetae are likewise colourless, of the usual delicacy : they are jointed, with a long simple appendix (PI. xli., fig. 56).

Loc. East coast of Flinders Island, Bass Strait.

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Family STAURONEREID^.

Genus STAURONEREIS,! Verrill.

STAURONEREIS AUSTRALIEKSIS, M'Intosh.

(Plate xli., figs. 58-66.)

Staurocephalus australiensis, M'lntosh, Chall. Rep., Zool., xii., 1885, p. 232. Id., Treadwell, Bull. U.S. Fish. Comm., xxiii., 3, 1906, p. 1173.

A single entire individual, which 1 believe belongs to this species, which M'Intosh founded on a posterior fragment.

The worm is nearly white, and is probably pink in life. It measures 75 mm. in length, with a diameter of 5 mm. over the bocty, and 10 mm. over the parapodia. It consists of a head with 145 chsetigerous segments, whose length is about one-eighth the width of the body in the anterior hah*, and one-fifth posteriorly. The body is slightly wider anter-

iorly, tapering slowly backwards. The dorsal surface is convex ; the ventral flat with a median furrow.

The semicircular prostomium is of small size, its base being about a quarter the width of the peristomium (PI. xli., fig. 58).

The tentacles are moniliform, with 9 rings, terminally rounded, the last ring being longer than the others. They are relatively thick and short, scarcely reaching beyond the lateral margin of the body ; or when pressed back, to the posterior margin of the first chaetigerous.

There is a pair of downwardly directed palps, not moniliform, but the apex is constricted from the rest ; the rest is smooth, but a good deal contracted so that irregular furrows cross it. It is only a little longer than the tentacle, but a good deal stouter (PI. xli., fig. 60).

There are two pairs of eyes, the anterior pair, the larger, lie at the side of the prostomium, in front of the base of the tentacles ; the hinder pair behind the tentacles, nearer to the midline. They lie below the edge of the peristomial margin, which overlaps the prostomium (PI. xli., fig. 59). When this hood is lifted backwards the transverse slit-like openings to the nuchal organs are displayed, and in the middle line is seen the small rounded connection between the prostomium and peristomium.

1. Ehlers points out why this name must take the place of Grube'a Staurocephalus and Anisoceras (Die Polychseten d. magellan u. chilen. Strandes, 1901, p. 146).

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The mouth is partially blocked up by a pair of large oral convex oral pads, separated by a deep groove in the middle line, as is figured by Ehlers in S. cerasina.

The peristomium is longer than the nuchal segment, dorsally and laterally, but on the ventral surface it is shorter, where it forms the lower lip, which, like the lateral lip, is longitudinally furrowed.

The parapodia are long, nearly half the width of the body, the dorsal cirri are longer, and as wide at the base as the length of the segment (PI. xli., fig. 61) ; each is semi-cylindrical, being flattened on the under and convex on the upper surface, so as to appear " flattened " ; it is con-stricted near its end into a knob-like appendix, which in posterior segments is wider than the main stem, so that the cirrus has the appearance of a penis.

The first parapodium is small, and is borne, of course, by

the segment following the nuchal. It has no dorsal cirrus ; the second foot has a relatively short cirrus, but on following segments the cirri are of practically uniform length, are directed nearly horizontally outwards, lying alongside the body like a fringe. The ventral cirrus is short, stumpy, and as wide as the segment is long.

The body carries at its hinder end two pairs of subanal cirri ; the upper is annulated with 9 rings, and is as long as the dorsal cirrus of the penultimate segment ; the lower cirri are short, smooth, and rather longer than the neighbouring ventral cirri.

The parapodia, seen under a lens, present three rounded lips, a larger posterior and two rather shorter anterior lips (PI. xli. ; fig. 62).

A figure is given of the tenth foot. Studied under a microscope, the posterior lip is seen to be slightly notched. The parapodium is supported by a single golden aciculum, and a couple of very slender bristles enter the dorsal cirrus, and reach almost to the subterminal constriction.

The chaetse are in two bundles ; the supra-acicular bundle contains about 6 long curved capilliform bristles, with fine serrations along its upper convex margin.

In the sub-acicular bundle there are about 30 chaetaa, which are jointed, i.e., " gomphotrichs " ; the long appendix

has a subapical tooth of nearly the same size as the terminal hook ; the wing is finely denticulated along the greater part of its length (PI. xli., fig. 64).

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In the second foot the appendix of the gomphotrich is narrower and nearly twice as long as that on the tenth foot.

The jaws. The lower jaws have a curved anterior edge, which is without denticulations. The pair are only feebly connected together. The upper series consists of the usual small black paragnaths, which are in three rows on each side (PI. xli., fig. 65) :(a) The dorsal-most or internal row consists of about 30 relatively stout, prominent, curved denticles, the anterior few of which have lateral serrations on each side (PI. xli., figs. 66a, 66b) ; the shape of these will be understood from the figures, (b) The outer row contains about twice as many denticles of much smaller size ; they are straight, denticulated along both edges, and overlie the bases of the internal row ; each is supported by a minute rectangular plate, the series of which are set close together, and form the ventral or innermost limit of the series (PI. xli., fig. 66a). (c) A third row is made up of about 30 two-rooted pieces, with the divergent roots directed outwards, which seem to lie over the second row (PI. xli.,

fig. 66d).

Remarks. M'Intosh describes the species from a posterior fragment measuring 11 mm. in length by 5mm. across its anterior truncated end. He figures the foot (PI. xxxvi., fig. 6), which differs from the hinder foot of the present specimen, only in the apparently smaller size of the terminal knob of the dorsal cirrus. But he says that the cirri are " flattened," and as the chaetae agree, and the worm was obtained in the neighbourhood of East Moncoeur Island, the probability is that we have the same worm before us.

It may be noted that Haswell 1 described a species under the name Staurocephalus australis, from Port Jackson, which, amongst other features, differs from 8. australiensis in the proportions of the head, for the prostomium has a base nearly as wide as the peristomium, and narrowing forwards between the tentacles. But, as no doubt the drawing is made from a freshly killed specimen, while mine is from a much contracted one, the difference may be discounted to some extent. However, the neuropodial chaetae are stated to have an appendix which is only " obscurely notched " at its apex. As the species is littoral, I hesitate to identify it with M'Intosh's.

Haswell notes that S. loveni, Kinberg, was also obtained at Port Jackson in 12 fathoms, but it differs from S. australis in that the palps are twice the length of the tentacles.

1. Haswell Proc. Linn. Soc. N. S. Wales, x., 1886, p. 747.

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How far such proportions are useful systematic features apart from other more permanent characters is doubtful.

Ehlers 1 gives a fully illustrated account of S. cerasina, which in regard to the head, at any rate, resembles this species from Tasmania.

Loc. -Storm Bay, Tasmania.
Distribution. Hawaii (Treadwell) .

Family
Sub-Family EUNICIN^E.

Genus EUNICE, Cuvier.
EUNICE SICILIENSIS, Grube.

Eunice siciliensis, Grube, Actinien, Echinodermen, u. Wurmer, 1840, p. 83. Id., Ehlers, Die Borsten-wiirmer, 1864-68, p. 353.

Eunice adriatica, Schmarda, Neue Wirbellose Thiere, i., 2,

1861, p. 124.

Eunice tcenia, Claparede, Glan. Zool. parmi les Annelides, 1864, p. 120.

Eunice valida, Gravier, Nouv. Arch. Museum Paris, 1900, p. 264 (fide Grassland, Proc. Zool. Soc., i., 1904, p. 323).

This widely distributed species is represented by three fragments, one of which bears a head with 173 chsetigerous segments, measuring 120 mm. by 8 mm. ; the segments are very short, being about one-ninth of the diameter of the body.

The second fragment has neither head nor anus ; consists of 180 segments measuring 90 mm. ; the segments are still shorter, only about l-18th of the diameter.

The third fragment contains 57 segments wifeh a length of 50 mm.

In all details these agree with the accounts of the species, though it is larger than those that I have studied from the Kermadec Islands.

1. Ehlers Die Polychseten d. magellan. u. chilen. Strandes, 1901, p. 147.

From a second locality comes a dark green, ill-preserved female worm in eight fragments, the total length of which amounts to 1160 mm. without a head or tail, and the breadth is from 3.5 to 5 mm.

Locs. Off Gabo Island, 200 fathoms.
South-west of Gabo Island, 75 fathoms.

Distribution. Mediterranean ; Red Sea ; Indian Ocean ; Pacific Ocean.

EUNICE PYCNOBRANCHIATA, M'Intosh.
(Plate xlii., figs. 79, 80.)

Eunice pycnobranchiata, M'Intosh, Chall. Rep., Zool., xii., 1885, p. 294.

The twelve specimens obtained from various stations show, as M'Intosh indicated, a certain amount of variation in those features which are used for specific characterisation, and it may be as well to give a general account of the species, filling up a few of the lacunae in the original description.

The colour of the preserved specimens is either a rich

reddish or coppery brown with iridescence, or a paler flesh tint or even grey. In three individuals the pale ground colour is marked by irregular and irregularly distributed splotches of red, usually transversely disposed anteriorly, but becoming smaller and more numerous and more scattered in the mid-body and posterior segments.

In some cases the fourth chaetigerous and in others the second is quite pale, probably white in life ; while in the majority this pale segment is not present.

The size varies from 200 mm. by 8 mm. in a very soft specimen to 110mm. by 5.5mm. in hardened specimens for the same approximate number of segments, 146-150 ; while, of course, smaller specimens occur with fewer segments.

Taking for description a deep coppery brown individual, rather soft, measuring 190 mm. by 8 mm. across the body, the peristomium is 6 mm. and the breadth over the parapodia is 10 mm. There are 147 segments. The widest region is a short distance behind the peristoraium, thence it tapers very slowly to the hinder end.

The fourth chaetigerous is pale.

The tentacles are moniliform, rather deeply notched, and the furrows indicated by a pale brown line; even in those specimens in which, owing to preservation, the moniliform

character is not evident, the brown rings exist. The median tentacle has, in this case, 18 swellings, the admedian 16, and the lateral 8, and the length of the three has the same proportion ; but in one other I noted 13, 10, and 8 respectively. It is likely that the tips are fragile, so that this detail and the relative lengths in regard to the number of segments, such as it is sometimes the custom to give for species of Eunice, has little importance, as Grassland has already remarked.

The palp is divided horizontally into a smaller upper lobe and a larger lower lobe.

The peristomium is as long as the nuchal and the first two chsetigerous segments together ; its diameter is 6 mm. and is much more than its length. The upper lateral edge of the lower lip is, as M'Intosh stated and figured, prominent and visible from above as it is separated from the side of the peristomium by a deeper notch than is visual in the genus (PI. xlii., fig. 80).

The nuchal cirri are indistinctly moniliform, having about eight rings ; generally they do not quite reach the anterior

margin of the peristomium.

There is a pair of smooth subanal cirri equalling in length the last 10 segments.

The dorsal cirri are not annulated, but are irregularly constricted, especially in the anterior feet, in which they are of larger size than further back. Under a lens they have the appearance of annulation, but microscopic study shows that this is merely a result of muscular constriction ; while it may be noted, by a comparison of successive cirri or of cirri on opposite sides of the body in the same segment, that these constrictions are quite irregular in their spacing and in their number. In the figure illustrating M'Intosh's account (PI. xxxix., fig. 13) the cirri are shown annulated, but in that of the foot (figs. 14, 15) these annuli are not represented.

The gills in this individual commence on the fifth chsDtigerous segment. 1

In the fifth there is but one filament, that is the axis of the future gill ; on the seventh, there are four filaments ; the maximum number is reached on the 10th, with six filaments ; the lowest being here longer than the dorsal cirrus. This

1. I use the word "segment" always as meaning a "chsetigerous segment," and exclude from the enumeration of segments the two first segments, the peritftomial and nuchal.

niaxiinuin is retained till the 26th segment ; for the next 12 segments present five filaments ; the number then sinks to 4 (segments 39-70), to 3 (in segments 71-95), after which the number decreases rapidly, and only the last three or four segments are without gills.

The gill as a whole has a very characteristic appearance, indicated by the specific name " thick-gilled " (PI. xlii., fig. 79) ; the gill filaments, whether few or many, are coarse, arise from the axis close together, and even in some cases touching one another, and under a low-powered dissecting lens the gill has some resemblance to a folded or wrinkled membrane.

There is a considerable range of variation in detail, to which I refer later, but the above is generally typical, though the maximum number of filaments may reach 8 or even 10 in some individuals.

The gill may be described as " small," whether the number of filaments be few or many ; they only reach a short distance up the much arched side of the body even when placed upright against it. Usually they are not so directed

in these specimens ; they are ranged alongside the body, usually with the free ends forwards.

The parapodia do not present any special features ; they are supported by two, or sometimes three, black acicula, and on the 30th segment or thereabouts (for this point varies) an inferior black bidentate acicular chaeta appears, which is of course continued to the end of the body. Under the microscope this is seen to be a dark brown with golden margins, though under a dissecting lens it is black and very conspicuous. The chaetse are illustrated by M'Intosh, and need no further description.

The jaws are white below, the lower always, the upper jawlets sometimes, but the denticulations are always white tipped. On the right side the large dental plate (II) has six teeth, of which the proximal and the distal are smaller than their neighbours. Plate IV is hoodlike, with nine or ten rounded denticulations ; plate V has a singled tooth. On the left side, II has five teeth, IV is curved, has five, V has one, and the unpaired plate (III) has seven teeth.

The jaws, as is now well known, vary within limits as to the precise number of denticulations of the plates, and M'Intosh gives instances.

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Remarks. I have specimens from the coast arid seas round New Zealand which belong to this species, though those which I sent to Ehlers for identification were named by him as E. antennata, Savigny. Those, however, which I have as duplicates agree precisely with these Australian forms, and if Grassland's analysis of Savigny's species be accurate, Ehlers' identification must be incorrect. In the first place Crossland 1 states that the acicula and tridentate acicular chsetse are not black but yellow, that the gills are " large," and that they are figured as nearly meeting across the back ; that in the posterior segments, after a decrease in the number of gill filaments, which are quite slender, there is an increase before dying out at or near the hinder end. Ehlers 2 gives an account of a worm under the name E. antennata from Chilian shores (p. 126) which does not agree wholly with Grassland's account, for the acicula are black, and Ehlers says nothing about the increase in the posterior gills. Moreover, in E. antennata, Savigny, not only are the tentacles moniliform, but the dorsal cirr also, anteriorly multiannulate, posteriorly triannulate. At the same time the Australian species has the same lower lip as Crossland figures for E. antennata, and it appears that the two are pretty nearly allied.

Locs. East of Maria Island, Tasmania, 78 fathoms.

Near Storm Bay, Tasmania.

Ten miles north of Circular Head, Tasmania.

East coast of Flinders Island, Bass Strait.

Off Babel Island, Bass Strait, 50-80 fathoms.

North-east of Babel Island, Bass Strait, 100-170 fathoms.

Fifteen miles north-west of Cape Jervis, South Australia,
17 fathoms.

Between Port Stephens and Newcastle, New South Wales.

Distribution. New Zealand (Foveaux Strait ; Massacre
Bay, on west coast) ; Pegasus Bay, on east coast.

Variations. The gills vary (a) as to the point of commencement, and (b) as to the maximum number of filaments. Out of the twelve anterior ends I find that in six they commence on the sixth chaetigerous segment, in four on the fifth, while in two they do not begin till the seventh, and then as quite small stout filaments. The largest number of filaments usually occurs on about the eighth to the thirtieth segments ; and it is only to the last two individuals in the list that this

1. Crossland Proc. Zool. Soc,, i., 1904, p. 316.

2. Ehlers Die Polychceten des Magell. u. Chilen. Strandes, 1901, p. 126.

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area of maximum development is more extensive, reaching to the seventieth. It may be noted that both these individuals are " spotted " with red, and are from the same locality ; but No. 12 occurs with another more normal in colouration, and normal so far as the gills are concerned (No. 6). The maximum number of filaments in the fore body is usually five or six, but in one, otherwise normal (No. 3), it rises to seven, and even here and there to nine, while in another instance (No. 4) it is ten or occasionally eleven. On the other hand, in No. 5 the number of filaments is as low as two.

In all but one specimen, and that one of the " abnormals," the number of filaments decreases slowly and fairly regularly towards the hinder end, and the gill is continued to the extremity or is only absent on the last half-dozen segments, which are, of course, very small. In the abnormal individual (No. 11) the gill after decreasing, increases near the hinder end to seven filaments, and further back to eight before undergoing the usual terminal decrease.

The two " abnormals " differ then not only in the colour-

ation but also in some matters concerning the gill ; yet an examination of one of them (No. 12) the jaws are precisely like that which I studied in detail (No. 1), and in all other respects these two agree with the rest. It appears to be merely a local variation.

The form of the gill in all these twelve is very uniform : the filaments broad, closely set, nearly or quite touching one another, or in some case overlapping. When fully developed the lower filaments are longer than the dorsal cirrus ; one or more of them may bifurcate ; not infrequently the axis projects but slightly beyond the uppermost filament, as if it were capable of budding off additional filaments at this point. In one individual the gill is much smaller than usual (No. 10) and the filaments more delicate and further apart.

Other variations, such as length, depend on the state of preservation. The colour in some is copper. The white " collar," too, is remarkably sporadic ; it might at first sight seem rather a characteristic feature, but such a " collar ' appears as a variation in other species such as E. aphroditois. M'Intosh notes that in his specimens a " collar " exists on segment II in those from Twofold Bay, while it is absent in the Bass Strait specimens.

The segment in which the acicular chseta first occurs is also subject to variation, though usually somewhere about the thirtieth, it may occur either before or after that segment. These variations are tabulated below.

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VARIATION IN GILLS IN E. pycnobranchiata.

Numbers in brackets indicate that in their area of maximum development these numbers occur on occasional segments irregularly : (imp.) indicates that the worm is incomplete posteriorly.

VARIATIONS IN OTHER ORGANS IN E. pycnobranchiata.

h = hard, well preserved. s = soft, ill preserved.

imp. = incomplete posteriorly.

Nos. 1-5, Maria Island ; 6, 12, Babel Island ; 7, Cape Jervis ; 8, Stores Bay; 9, Circular Head; 10, New South Wales coast; 11, north-east Babel Island.

1. The number of gill filaments is occasionally only five.

2. The number of gill filaments rises to seven on segment xc., it is eight at c ; and then decreases to five at cxxx, and gradually dies out.

3. On the two sides.

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EUNICE BASSENSIS, M'lnlosli.

(Plate xli., figs. 67-74 ; Plate xlii., figs. 75-78.)

Eunice bassensis, iVTIntosh, Chall. Rep., Zool, xii., 1885, p. 298.

It is with some hesitation that I attribute the material to this species, for JVTIntosh's account is necessarily brief and imperfect, as he had only a single fragment of the posterior end of a worm upon which to found the characters of the species, which are thus drawn only from the structure of the foot and chsetse. But as that fragment was obtained from near the localities in which the " Endeavour " material was collected, and as these agree well with the few features mentioned by him, it seems probable that we are dealing with his species.

My material consists of one entire individual, eight cephalic fragments of less or greater length, two anal fragments, and three pieces from somewhere near the middle of the worm.

The entire individual was studied.

It is a fairly well preserved, though somewhat contracted, female, filled with eggs ; it measures 140 mm. in length, with a diameter of 5 mm. over the body, and a height of 5 mm. It contains 112 segments in addition to the "head."

Its colour is dark brown, highly iridescent, but the majority of the specimens are quite a pale grey. 1

The prostomium has the usual ventral median furrow, and each lobe is traversed by an obliquely horizontal furrow separating a smaller upper from a larger lower lobe.

The tentacles are very definitely annulated, with deeply pigmented grooves between the swellings (PL xli., fig. 68). The proximal swellings are shorter and less rounded than the distal, due, perhaps, to differences of contraction. The median tentacle has 17+n swellings ; it is iincomplete here, the admedians 21 and the laterals 14, in addition, in each case, to the cylindrical cirrophore.

In another individual the numbers are 27, 21, and 12, and in a third 25, 20, and 15.

1. The dark tint ot this individual may he due to it having been preserved in the same tube as some other organism from which the pigment has been dissolved and stained the worm ; for I have had specimens of pale Echinids, which have been preserved with Comatulas, and have be-

come stained dark brown.

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The peristomium and nuchal segment together are broader than their length, which is about equal to 2^ chsetigerous segments.

The peristomium is slightly excavated on the dorsal surface ; the lower lip is not so deeply notched as it is in E. pycnobranchiata, and its upper margin is not visible from above (PI. xli., fig. 67).

The nuchal cirri present 8 annulations ; they fail to reach the anterior margin of the peristomium by a space about equal to the length of the nuchal segment.

The dorsal cirri are also distinctly moniliform, and relatively stout. Anteriorly, there are four dilations, the terminal being elongated, and under a dissecting lens may appear to be constricted, but in a preparation this is seen to be only a, " bend," not really a constriction.

As in the tentacles, the furrows are pigmented.

After about the 6th segment, and throughout the rest

of the body, only three dilations exist, but there appears to be some variation in this, for in some individuals, the feet of which were mounted, four appear (PI. xli., fig. 70). The anterior dorsal cirri are particularly stout.

The ventral cirri of about the first half dozen feet are short, rounded sub-spherical lobes ; further back this lobe bears a short stout bluntly rounded conical appendage, while over the greater part of the body the latter elongates and the basal lobe decreases.

The anal cirri, also moniliform, have a length equal to the last 10-12 segments.

The gills commence on the 6th chsetigerous segment (in this and all the anterior ends available), and are continuoxis to the posterior end of the animal. In this individual the first gill has 4 filaments the maximum is 10 and this number occurs over the segments 8-9, after which there is a gradual and fairly regular decrease, with here and there an occasional addition of one filament. Thus on segments 40-60 there are 4 filaments ; on 61 only 3 ; on 90 the number is again 4, but on segment 100 the number once more scales to 3, and then to 2, and to 1 at the last few segments.

This cannot be regarded as a " posterior enlargement ' of gills, such as occurs in one or two other species (see below).

As to the relation between the size of the gill, even at its

maximum stage of development, one cannot regard them as

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" large " ; they only reach about half way up the side of the body towards the middle line, even when held vertically up by forceps (PI. xli., fig. 69).

The filaments are rather thick, springing close together in this and other individuals, but in others they are relatively more delicate (cf PI. xli., fig. 70 ; PI. xlii., fig. 78).

The gill seems to be much contracted, and the lower filaments do not reach to the end of the dorsal cirrus, but in other specimens in which they are better preserved, the lower gill filaments are longer than the dorsal cirrus.

The chaetse present no special peculiarities. I find the following numbers, in addition to the 4 or 5 minute "combs" in the uppermost part of the bundle, there are 6 or 7 capiliiforms without a flange, somewhat flattened and sword-shaped ; then two golden acicula, with occasionally a third one, below which are 12 " gomphotrichs "' (i.e., jointed or compound chaetse), which decrease in number in the posterior feet (PI. xli., fig. 71). After about the thirty-sixth foot a subchsetal spine or acicular-chsetae appears.

The subchsetal spine is golden, bidentate in the early segments, but tridentate in most of the feet (PL xli., figs. 72-74).

Owing to the golden colour of the spine it is difficult to detect on the worm under a dissecting lens, and thus difficult to state quite definitely the segment on Avhich it occurs (but as this may vary, see above for E. pycnobrancliiata] . In this specimen it is not present on the thirty-sixth, but is on the fortieth segment ; in another individual I find it in the thirty-sixth ; in a trird in the thirty-eighth.

The jaws. The lower jaws have large thick white plates at the distal end, which are irregularly undulating at the free edge, so as to form three projections of irregular size (PI. xlii., fig. 77).

The upper jaws are dark brown, but in smaller specimens a paler brown ; the tip of the "forceps," and of the various denticulations of the other sclerites, are white and calcified.

The forceps (zange) are slender, with the tip curved upwards (PI. xlii., fig. 76). The artknilatioii between forceps and its carrier is marked by a dark brown band, which is very conspicuous when the jaws are of the paler tint.

The left dental plate (jawlets of the second parr) (II.), has 4 teeth, the distal largets, the others decreasing proximally (PI. xlii., fig. 75).

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The left unpaired (III.) has 6 teeth, the two proximal are quite small and less pointed than the rest. This plate lies alongside the large dental plate, as in some other species.

The fourth left is hoodlike, with 5 teeth ; the base of the hood is dark brown.

The fifth is triangular, with a single recurved white tooth.

On the right side, the dental plate (II.) has 5 teeth, decreasing in size from the most anterior ; the hoodlike fourth has 8 or 9 teeth, of which the one at each end of the series is very little developed; the fifth plate is like that on the left side. All the teeth are tipped with white.

In four individuals examined I find that these numbers are constant.

SOME COMPARATIVE MEASUREMENTS OF E. ba^ensis.

(Cephalic fragments.)

Nos. 1-4, 6, 7. East coast Flinders Island ; 5, Entrance to Oyster Bay.

Remarks. Certain differences exist between my specimens and the fragmentary type. The foot figured by M'Intosh (PI. xxxix., fig. 16), shows no prominent chsetophoral sac. the cheetse seem to spring from the general contour of the body. Surely this must be an error of the artist, as it is totally unlike the general character of an Eunicid parapodium. .But the most noticeable difference is in the size of the gill, which has nine filaments. Unfortunately M'Intosh gives us no idea of the size of the worm, nor does he say whether the foot figured came from the anterior end of the fragment or not. His fragment was two inches in length, and if one examines the present material at this distance from the anus, the gill has but six filaments. We must then presume that his specimen was portion of a larger worm.

At any rate, none of the other species obtained from this neighbourhood or elsewhere agrees so closely with ours.

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In a recent article Grassland (1904) has tentatively sug-

gested that E. bassensis is a synonym of E. antennata, Savigny (1820). But if my identification be correct, E. bassensis differs from that species as described and figured by the authors, Savigny, Gravier (1900), and Grassland, in the following features :

(1) E. antennata appears to be a small species. Savigny 1 gives its length as 3 inches. Grassland states that those from Zanzibar are 100 by 5 mm. (including the feet), those from the Maldives are 80 x 4 mm., and less.

E. jlaccida, Grube, 2 which Grassland identifies with this, was fragmentary ; the 67 segments measure 35 x 2 mm ; while Grube's variety gracilis measured 78 x 2.5 mm. for a worm with 85 segments. Compare this with our first individual, where the 84 segments measure 60 by 5 mm. In other words, this Tasmanian species is evidently a larger worm .

(2) Grassland 3 , in his drawing of the head (PL xxii., fig. 1) from above, shows that the upper edge of the lower lip is prominent, and is visible from above, as in E. pycnobranchiata, while there is no excavation of the anterior margin of the peristomium.

(3) The gills are shown as nearly meeting dorsally, whicn is far from being the case in any of our individuals.

(4) The form of the ventral cirrus, as given by him, is

represented (text fig. 60, p. 317) in the 10th segment as long and narrow, without the swollen base which is so evident in ours, and it projects further beyond the lip of the chsetophoral sac than in ours.

(5) The dorsal cirrus is apparently much more slender.

(6) The nuchal cirrus is shorter.

(7) According to Grassland's figure of the acicular chseta the main tooth forms nearly a right angle with the axis, and it may be noted that Gravier's 4 figure of E. flaccida (p. 256) is less than a right angle, whereas in the present species this angle is much more open.

(8) The jaws of E. antennata show a considerable range of variation ; and if I understand Grassland's formulae on p. 316 "6 7 : 10 + 9 8" to mean "left dental plato (FT.) h;is six

1. Savigny System. Annelides, 1820, p. 50, pi. v., fig. 1.

2. Grube Annel. cl. rothen Meeres, Monatsber. k. preuss. Akacl. Berlin, 1889, p. 491 (separate copy, p. 11).

3. Crossland Proc. Zool. Soc., 1904, I., p. 312.

4. Glravier Nouv. Arch. MUR. Paris, 1900, p. 255.

teeth, the right seven, the unpaired (III) has ten, the left anterior (IV) nine, and the right eight then none of his variations of the dental plate have so few teeth as 4-5, which appears to be constant in the present species, and though the anterior plate (IV) varies, none of them agree with ours, which show no variation amongst themselves.

Some of these differences may be due to age or to the mode of preservation, but others, such as the chaeta and the jaws, seem diagnostic, and the accumulation of the .small differences as well as the geographical distribution justifies one in making a new species. At the same time it is clearly allied closely to Savigny's species from the Red Sea and the Indian Ocean.

E. antennata is a Red Sea and Indian Ocean species, and though Ehlers 1 records a worm under this name from the Chilian coast, he states that it has black acicular chsetse instead of the golden that characterises E. antennata, as Savigny noted in his account ; and it presents one or two other differences, as in the jaws. The same author 2 has also recorded this species from the New Zealand coasts (1907, p. 12), but my material from which I sent him the specimen belongs to E. pycnobranchiata.

Grassland's ground for including Australia in the distribution of E. antennata rests on his examination of the specimen labelled by Grube himself as " E. ^aitcibranchiata," which was obtained from this region. He gives no reference to the paper in which Grube describes a species under this name. Grube 3 himself named a species ' paucibranchis ' : but in a later article 4 identifies this with E. australis, Quatrefages 6 (which belongs to a different group of the genus in which the gills are limited to a few segments in the anterior region of the body).

Now one of the characters of Savigny's species is said by Crossland to be the increase in size of the gill and in the number of its filaments behind the middle of the body immediately previous to the ultimate gradual decrease 6 . As I have stated, I find no evidence in my material for this

1. Ehlers Die Polvchaeten d. Magel!. u. chilen. Strandes, 1901, p. 126.

2. Ehlers Neuseelaml. Annel., 1907, p. 12.

3. Grube Sohless. gesellsch., 1866, p. 64.

4. Grube Mittheil. ub. d. Tarn. d. Euniceen Schless. gesellsch., 1877, p. 20.

5. Quatrefages- Hist. Nat. d. Annel., p. 321.

6. Savigny does not show this phenomenon in his figure, nor mention it in the text, though he says that the gills may l>e absent in 20-30 last segments.

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increase in size. It is true that there may be an increase in number of filaments by one over a variable and inconstant region of the body, but such increase seems to me to be a mere variation, and one knows it to occur in several species in which the gills extend over a long portion of the worm.

Locs East coast of Flinders Island, Bass Strait.

Entrance to Oyster Bay, Tasmania.

Oyster Bay, Tasmania, 20-40 fathoms.

Ten miles north of Circular Head, Tasmania.

Breaksea Island, Port Davy, Tasmania.

North of Cape Borda, Kangaroo Island, 40 fathoms.

Sub-Family ONUPHIDIN.E.

Genus HYALINOECIA, Malmgren.

HYALINOECIA TUBICOLA, Muller.

Nereis tubicola, Muller, Prodromus Zool. Dan., 1766, p. 217.

Onuphis tubicola, Audouin & Milne-Edwards, Ann. Sci. Nat., xxviii., 1833, p. 225. Id., Ehlers, Die Borstenwiirmer, 1864-68, p. 297 (with synonymy).

Northia tubicola, Johnston, Cat. Brit. Mus., 1865, p. 136.

Hyalinoecia tubicola, M'Intosh, Chall. Rep., Zool., xii., 1885, p. 335.

Three individuals in their transparent tubes, two of which measure 108 mm. by 5 mm. at the broader end and 4 mm. at the other : the third is rather shorter.

The worm removed from the tube is 50 mm. in length ; it consists of a head with 64 cheetigerous segments ; another is 75 mm. in length ; the third is 55 mm. In this last the tentacles were stretched to the fullest, so were easily measured.

I suspected that the worm would be H. benthaliana, M'Intosh 1 , and although his account is not very full and is in some respects unsatisfactory for instance, he gives no measurements after comparing the worms with the various accounts of the European species, I have no doubt that it is

1. M'Intosh Chall. Rep., Zool., xii., 1885, p. 339.

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the same. It is already known to be very widely distributed, and the details given for H. beiU/ialiana seem to me scarcely sufficient to distinguish it from Muller's species.

It appears from the various accounts that the relative lengths of the three middle tentacles is subject to variation. By some authors they are described or shown as approximately equal, while others give a greater length for the median, as, for example, Ehlers 1 . Again, the size of the worm, the position of the first gill, the number of denticulations on the jaw plates, show a fair range of variability.

In the present case it may be as well to record the facts. The filamentous gill commences on the 2?nd chsotigemus segment. The jaw plates of the second pair (II) on the right side bear 11, on the left 12 denticulations ; IV have 8 and 9 or 10 respectively ; the unpaired one has 13.

The present worms agree more closely with the typical form as described by M'Intosh and St. Joseph 2 than with any of the " varieties ' described by the former author ; especially in the denticulations of the jaw plates as well as in

the segment on which the gills commence.

Loc. Off Babel Island, Bass Strait, 50-80 fathoms.

Distribution. The typical form and its " varieties " have been obtained in the European seas ; in the Atlantic ; from the Pacific ; on the coast of Japan (Moore) 3 and of California (Moore) 4 ; from New Zealand (Ehlers) 5 ; from Torres Strait (M'Intosh). I have no literature dealing in detail with other regions.

It has already been suggested by \\ illey 6 that H. camiguina, Grube 7 , from the i'hilippines, Ceylon and the Indian Ocean (Crossland) 8 is merely " a local form " of the European species, and it seems not unlikely that H. brevicirris, Grube, 9 from Moreton Bay on the east coast of Australia is al;-o a variety of this species, for the account only differs in one or two features of proportions of parts. If these two be included, then the species may be said to be distributed everywhere outside the Arctic and Antarctic seas.

1. Ehler.-- Die Borstemviirmer. ISfH-Of-', p. 29 T.

2. St. Joseph Am. Sci. Nat., (8), v., 1898, p. 241.

3. Mooru Proc. Acad. Nat. Sci. Philadelphia, 1903, p. 444.

4. Moore Loc. cit., 1911, p. 280.

5. Elilf-rs Neusecland. Annelid., 190,. p. IT).

6. Willey Ceylon Pearl Oyster Fisheries, pt. iv., Suppl. Rep., xxx., Polychseta, 1905', p. 274.

7. Grube Anmilata Seinpeiiana, 1878, p. 42.

8. Crossland Proc. Zool. Soc., 1904, p. 281.

9. Grube Monatsber. Akad. Wiss. IVilin, 1877, p. 528.

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Family LUMBRICONEREID.K.

Genus LUMBRICONEREIS, Blainvillt .

LUMBRICONEREIS SPHAEROCEI'HALA, Sckmarda.

Notocirrus sphaerocephala, Sehmarda, Xeue \Yirbellose Thiere, I., 2, 1861, p. 11(5.

Lumljriconereis sphaerocephala, Ehlers. Abhancll. Gesell. Wiss. Gottingen. Neuseel. Annal.. 1904, p. 33.

A single imperfect specimen of small size and. dark coppery brown in colour, with a high iridescence, appears to belong

to this species. The prostomium is, however, rather longer than broad, and, therefore, less nearly spherical than in Ehler's description ; this may be a matter of preservation. I have preparations of this species, which is common on New Zealand coasts, and it agrees well with them.

Loc. East of Babel Island, Bass Strait, about 70 fathoms.

Distribution. New Zealand ; Chatham Islands.

LUMBRICONEREIS GULiELMi, 1 sp. nov.

(Plate xlii., figs. 81-88; Plate xliii., figs. 89-1)4.)

Two imperfect individuals of laige size, one consisting of the head and 58 chaetigerous segments, measures 70 mm. in length, with a diameter of 7 mm. It is narrower anteriorly where it is only 3 mm. across the peristomium The other specimen consists of 133 :-egments and the head, and has a length of !)9 mm. There is little evidence of a posterior taperivg, for at its truncated end it still measures 6mm. in width.

The worm is nearly cylindrical, its height being 6-7 mm. The segments are short as usual, being about l-6th to l-7th of the diameter of the body.

The colour is coppery brown, with a bright green iridescence and the chaetse are glistening brown.

The prostomium (PI. xlii., figs. 81, 82) is a rounded cone as broad as its length, with no conspicuous eyes, but in their place a curved transverse row of 6-8 small black spots close together on each side of the base, and extending laterally so as to be visible from the side. In the second individual, which is in a better state of preservation, these pigment spots are less distinct ; they form a row right across the base of the prostomium, and are not confined to the sides.

1. 1 have taken the liberty of naming this line speck's alter the veteran zoologist. Professor William C. M'lntosh.

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On the underside the prostomium presents a pair of rounded lobes (? palps) immediately in front of the mouth (PI. xlii., fig. 82).

The p3ristomiumand nuchal segment are separated don-ally and laterally by a furrow, but merge into one another ventrally, as the furrow bends forwards on each side nearly at right angles, and thus delimits a ventral lip which is marked by longitudinal furrows.

The peristomium is about twice the length of the nuchal segment, whose length is equal to that of the first chsetigerous.

The parapodia of a few anterior segments have a representative of a dorsal cirrus in the form of a small rounded lobe into which a small bundle of fine bristles enter. The feet as been from above under a dissecting lens have from the first a long posterior lip, which is antero-posteriorly compressed so as to be lamelliform ; it is quite narrow in a well preserved specimen, but rather thicker in the other (PI. xliii., fig. 8!t). In the latter this lip is bent upwards in many of the feet, but in the other specimen its bluntly rounded apex is directed outwards (PL xlii., figs. 86, 87) ; its upward bend is, I think, due to pressure against the wall of the containing tube. The upper margin is nearly horizontal, though it is slightly concave, while its lower margin slopes upwards from "below. The feet in the first half-dozen segments are smaller than the following. The posterior lip is curved backwards in the greater part of the body. While the lip in the anterior segments is much compressed and very thin, it becomes, somewhere about the fortieth, shorter and thicker, and this proceeds till it is in the posterior segments short and quite thick (PI. xliii., fig. 89). The anterior lip likewise changes somewhat in its form. Both lips are very vascular, but the vessels in the posterior lip are more numerous and more clearly seen owing to its thinness.

The capillary cheetse, many of which are brown and iridescent, project a good way beyond the larger lip, and this especially in the case of the upper cheetse. In the anterior 40-50 feet all the chsetse are flanged capilliforms, bent upwards from a point just below the commencement

of the flange (PL xlii., fig. 86).

But at or about the 50th foot most of the lower capilliforms are replaced by hooks, with a long hood formed by a pair of wings (PL xlii., fig. 84) ; and by about the 60th the uppermost capilliforms are similarly replaced by one or usually bv two hooded hooks (PL xlii., fig. 85).

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Some of the capilliforms in the anterior feet have a flange on both sides, of which one is shorter than the other. in the hinder feet, however, the choeta itself is shorter and the flange less extensive (PI. xliii., figs. 90, 91) The hooks have one large terminal rounded tooth which does not form a marked angle with the shaft ; on its back are some 5-6 very small closely set denticulations separated by parallel linear gaps, so as to resemble a comb (PI xliii., figs. 92, 93). The shaft enlarges for a considerable distance before the end, it is then suddenly narrowed below the hook so as to form a deep bay. The wings are of still more considerable extent, arising below the enlarged region of the shaft, and projecting from the back as well as in front of the hook.

Further details as to the feet show that the 10th foot has about 20 long, upwardly curved flanged bristles terminating

in a fine point beyond the flange. All are alike, but those above the acicula are longer (PI. xliii., fig. 94), projecting beyond the tip of the posterior lip, while the lower ones do little more than reach this tip. The upper ones are golden brown, glistening in reflected light ; the lower are golden yellow. Between the two groups are 4-5 golden acicula whose points do not project beyond the skin.

In the 55th foot the uppermost chsetae are six in number, not so long as those in the anterior i'eet ; in the sub-acicular bundle are five hooks and one flanged capilliform (PL xlii., fig. 84).

The acicula now have brown tips.

In the 125th foot the supra-acicular part of the bundle contains only two large upwardly directed winged hooks (PI. xlii., fig. 85), below which are three flanged capilliforms. differing somewhat from those anteriorly. In the sub-acicular bundle are 5-6 winged hooks, of the same structure as the upper ones, but slenderer. The acicula are now reduced to two, which are stouter than in the anterior feet ; one is golden, the other black.

The pharynx reaches to the 10th chretigerous segment. The lower jaws are brown, covered anteriorly with the usual thin white transparent plate of lime, which is marked on its upper surface with fine longitudinal lines, and on the under

surface with a number of concentric; lines ; the anterior edge is white, and obliquely curved ; the pair are united for nearly their whole length. The upper jawlets are black, each denticle being tipped with white. The forceps, that is the first pair, are relatively slender (PI. xlii., fig. 88). The right

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dental plate (II) has six teeth, the most distal of which is the smallest, the next is the largest, and, with the exception of the third, which is also small, they decrease regularly in size proximally. All are bluntly rounded. The left plate has five teeth. The third pair has two large rounded teeth ; the fourth pair has one indistinct tooth.

Remarks. The species is considerably larger than the majority, and although both individuals are imperfect the diameter indicates that the species is one of the largest. Jt has some resemblance to L. heteropoda, Mareiizeller, 1 which is a Pacific species, especially in the character of the feet, from which, however, it differs most conspicuously in the fact that the jaws of Marenzeller's species have but four clenticu-lations on each of the large dental plate*. 2 The form, too, of the ventral hooks seems from the rather divergent figures of Marenzeller and of MTntosL 3 to have a less extensive enlargement and less extensive wing ; while the details of

the apex are also unlike. It is also noteworthy that Maren-zeller states that his species is eyeless, while M'Intosh finds a pair of eyes obliquely set but hidden by the anterior margin of the peristomium. The colour, according to the former author, is tk yellowish grey, with a feeble bronze iridescence in the middle of the back," which is in marked contrast to the colouration of this species. But how far is colour im-portant by itself ? From a comparison of the feet I supposed that the present worms belonged to this species, but there is some discrepancy between the accounts and figures given by the two authors referred to, .so that I have given a somewhat detailed account of the species. It may quite probably be synonymous.

Locs. Oyster Bay, Tasmania, 26 fathoms.

Twenty miles east of Babel Island, Bass Strait,

Genus OENONE, tiavigny.

OENONE HASWELLI, sp. nov.

(Plate xliii., figs. 95-102 ; Plate xliv., fig. 113.)

Four individuals, two of them are complete, two are anterior fragments. A complete specimen measures 140 mm.

1. Mareiize.ller Denksch. Math. Naturwiss. Akad. Wien, x!i.. isT'.i,

p. 30.

2. Moore (Proc. Acacl. Nat. Sei. Philadelphia, 1908, p. 340) notes that the jaws vary somewhat in tin- number of denticulations, but gives no details.

3. M'Intosh Chall. Rep.. /<>(>!., xii.. 1SS.1, p. 2.35.

[Begin Page: Page 231]

in length, with a diameter of 6 mm. at its widest ; across the feet it measures 9 mm., and the height is 6mm. The body is convex dorsally and flat ventrally.

The segments are very short, being about one-tenth of the diameter of the body, and separated by deep furrows.

The worm contains 247 segments, tapering forward, from the 25th to a diameter at the peristomium of only 2-5 mm., and posteriorly where the last segment is 1 mm. in diameter. Its colour is brown, without any iridescence.

A second complete specimen measures 120 by 5 mm. ; the jaws are partly protruded, and the appearance of the head from above recalls the drawing given by Savigny of 0. litcida.

A third, fragmentary, is 50 by 5 mm. ; the head is much retracted ; and a fourth consists of head and 70 segments measuring 80 by 5 mm.

The prostomium is a bluntly rounded cone ; its length is equal to its breadth ; it carries three minute conical tentacles, hidden under the overhanging anterior margin of the peristomium (PI. xliii., figs. 95, 96).

There are two pairs of eyes, the anterior larger, rather lateral in position and oval in shape ; the posterior small, admedian and round, lying in front of the bases of the two admedian tentacles, and, like them, hidden.

It was not until 1 had slit open the dorsum, in order to study the jaws, that I detected the tentacles, but having discovered them, I found it possible to see their tips in other specimens, on forcing back the peristomial margin.

The under surface of the prostomium has a very deep median groove, which widens outwards posteriorly. There are no "palps " (PI. xliii., fig. 97).

The peristomium (the only footless segment) is, on its dorsal surface, but little longer than the first cha^tigerous segment, but on the ventral surface it lengthens out posteriorly, so that in the mid-line it is about twice the length

it has laterally. The median region, forming the lower lip, is marked out from the lateral by a pair of longitudinal furrows, starting from the anterior margin, and then curving outwards to die out. There is a. slight median notch, which, however, is better seen in a specimen in which the prostomium is retracted, and therewith the peristomium stretched.

The sides of the peristomium are somewhat grooved, and these also are obliterated when the prostomium is retracted.

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The parapodia are prominent ; the dorsal cirri are relatively large from the first, are vertically extended and flattened antero -posteriorly, leaf-shaped in outline ; constricted at the attachment, with rounded apex ; the cirrus increases in size further back, so that by the 29th it is as long as the posterior lip of the chsetophoral sac, and later comes to exceed this in length (PI. xliii., fig. 99).

Seen under a dissecting lens the dorsal cirrus has the appearance of being folded along its length, as Savigny's drawing suggests ; this appearance is due to the large size of the blood vessel which traverses it, and of the lateral vessels which spring in numbers from it. The internal margin, directed towards the body, rises nearly straight

upwards, but the outer margin has a gentle convex curve, which suddenly turns inwards at the base, where it connects with the foot.

The chsetophore has two fleshy lips, the posterior of which is at least twice as long as the anterior, and much higher ; it is produced outwards as a somewhat conical lobe. There is no ventral cirrus.

The parapodium is supported by (usually) two yellow acicula ; the chsetse are few. In the anterior feet they are all capilliform, but in the posterior feet two or three golden acicular chsetse replace some of the ventral capilliforms.

The capilliforms in the upper part of the bundle are longer than those below, decreasing gradually in length from above downwards. Those in the upper part are almost straight or with a gentle curve (which may be artifact), and have only a feebly developed, obliquely striated flange, but in the sub-acicular bundle the capilliforms are bent upwards near their end, and have a wider flange (PL xliii., fig. 100).

Somewhere about the 50th segment the acicular chsetse appear (most of the chsetse in the lower part of the feet are broken short so that it is difficult to be certain as to the exact segment). These are usually two in number, sometimes three, and the two are not alike ; the upper one has the notch separating the two teeth, nearly in line with the axis, that it is almost terminal ; but in the lower chsetse it is

more lateral, and the teeth larger (PI. xliii., figs. 101, 102).

From the 13th foot to the 25th, all the chsetse are capilliforms, arranged in supra-acicular and sub-acicular bundles ; in the 25th the supra-acicular bundle consists of (a) an upper group of long bristles, 4-5, and (b) a lower of 4 rather shorter ones. The sub-acicular bristles arc still shorter.

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In the 53rd foot, the supra-acicular chsetse are (a) 2 very long, and (b) 4 medium capilliforms. Sub-acicular 5 short capilliforms and 2 acicular chsetse.

53rd supra-acicular (a) 2 very long, and (b) 4 medium capill. Sub-acic. 5 short capill. and two acicular chsetse.

The pharynx is long, narrow, cylindrical, extending to the 19th segment.

The lower jaw pieces are short and broad, with a large biting region, which in its outer h?lf is transverse, and on its inner half obliquely inclined backwards. The area of union of the right and left pieces is about one-third of the total length.

The jaws are dead black, the supports are very slender rods, longer than the whole series of upper jawlets.

The upper series (PI. xliv., fig. 113) consists of five pieces on each side : the basal pair (I.) are unlike ; the left one has an anterior long claw-like fang, the internal margin of the base is straight, and bears 12-13 short sharp denticulations.

The right piece (I.) has no claw ; it is a transversely disposed plate, with its internal margin produced fore and aft. ; o as to be nearly twice the length of the plate itself, and this edge bears 13 denticulations.

The next piece (II.) on the right side, extends alongside the basal piece, and under a dissecting lens might readily be overlooked. It is a broad clawed plate, the internal straight margin is produced into 12-13 teeth, the distal ones, small, commence close to the claw, the proximal larger. This internal toothed margin is bent upward, and thus is not readily seen till the plates are moved about.

The corresponding left plate (II.) has a long stout claw, with 9 denticulations, of which the proximal and the distal are small, and those in the middle stout.

On the left side, the next (III.) has a large claw with six teeth, the largest in the middle.

The fourth (IV.) similar, but rather smaller, with six teeth.
The fifth (V.) has a single terminal claw, and no subsidiary denticulations.

On the right side the plates III., IV., and V. are similar, but the third (III.) has seven teeth.

Remarks. The existence of three tentacles would indicate that the worm belongs to the genus Aglaurides, but the

[Begin Page: Page 234]

asymmetry of the jaws, especially the presence of the clawless plate on the right side, agrees with what occurs in the species of Oenone.

There appear to be only three species of this genus hitherto described, 0. lucida, Savigny 1 . 0. diphyllidia, Schmarda 2 , and 0. pacifica, Fischli 3 . The worm described by Willey* from Ceylon as Aglaurides fulgida, Savigny, is not a a member of that genus according to the view of most zoologist^, for it has the Oenonian arrangement of jaw plates, which in Aglaurides are more nearly symmetrical.

Willey seems to have overlooked the difference in the character of the jaws as diagnostic of Oenone, for he supposes

that the only point of difference between the two genera lies in the presence or absence of the tentacles ; and it is noteworthy that in order to see these, he had to cut the peristomium, as I have had to do. I suggest that it belongs to the genus Oenone.

Savigny, in his diagnosis of the genus Oenone, uses (p. 55), as Ehlers has already noted, the phrase " Anteniies point saillantes et comme nulle." I understand this to mean that Savigny had recognised the existence of tentacles, and wished to emphasise their small size so small are they that *' they do not project ; there appear to be none."

With the four species the present one cannot be confused, owing to the details of the teeth.

Aglaurides, too, has two distinct footless segments. Oenone has but one, which, however, is double ventrally, and the formation of the lower lip appears, from Ehlers' account, to differ.

From 0. diphyllidia, as described by Ehlers 5 , the present species differs in the form of the prostomium, in the shorter and thicker feet (compare his PI. xxxiv., fig. 4), in the wider dorsal cirrus, and in details as to the number of denticulations on the various jaw plates.

Locs. East coast of Flinders Island, Bass Strait.

Between Port Stephens and Newcastle, New South Wales,

20-60 fathoms.

1. !Sa vigii V' System. Annelides, 1820, p. 55.

2. Schmarda Neue Wirbellose Thiere, I., 2, 1861, p. 120.

3. Fischli Abhandl. Senckenberg. Naturforseh. gcsellsch.. xxv.. 1900,

p. 108.

4. Willey. Ceylon Pearl Oyster Fisheries, pt. IV., Suppl. Rep., xxx.,

Polychseta. 1905', p. 284.

5.' Ehlers Mom. Mus. Comp. Zool. Harvard, xxxi., 1887, p. 109.

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Genus LYSARETE, Kinberg.

LYSARETE AUSTRALIENSIS, sp. nov.

(Plate xliii., figs. 103-109 ; Plate xliv., figs. 110-112.)

An anterior fragment, consisting of the head and 70 chseti-

gerous segments of what is evidently a veiy large worm. It

measures 110mm. in length, with a breadth of 10mm. over

the body, and 14 over the parapodia ; the height is !> mm. The peristomium is 6 mm. across, and the diameter thence increases, till at the 10th segment it has attained its full measure, which is retained for the remainder of the fragment. The segments are l-5th the diameter of the body.

The colour of the worm is a rich dark copper brown, with a well marked green iridescence.

The prostomium is a short rounded cone, slightly broader than long ; its length is equal to that of the peristomium, nuchal and first chsetigerous segments (PI. xliii., fig. 103). It bears three short cylindrical tentacles, which arise in a curve ; the median, which is inserted behind the others, is longer than the admedian and is nearly as long as the peristomium and nuchal segment. These tentacles lie backwards in a deep groove excavated in the upper surface of the peristomium, nuchal and first chyetigerous segments. It is broad in front, where the overhanging margin of the peristomium is interrupted, while the posterior region of this segment is excavated, and this excavation is successively narrower in the two following segments (PI. xliii., fig. 104).

There are two pairs of eyes, both of very small size ; the anterior are difficult to see owing to the deep pigmentation of the skin of the prostomium ; they lie outside the bases of the admedian tentacles. The second pair lie between the median and admedian tentacles, anil can only be seen when

these are turned forwards.

The surface of the first three segments is marked by numerous short irregular longitudinal furrows.

The under surface of the prostomium presents no groove, but at the base, on each side, is a large prominent convex lobe, triangular at its origin (PI. xliii., fig. 105). One apex is directed backwards, the opposite side is forwards, a second side faces inwards ; the third, backwards and outwards. Between these palps and behind them are several transverse folds, probably due to the partial eversion of the pharynx.

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The peristomium is slightly longer than the nuchal segment, from which it is separated by a definite furrow dorsally and laterally ; but on the ventral surface the inter-segmental furrow suddenly bends forwards to form the outline of a " processus oralis," so that the median part of the lower lip appears to be formed by the nuchal segment.

The lower lip is traversed by short longitudinal furrows along its ventral and lateral margins.

The body is nearly cylindrical (PI. xliii., fig. 106) ; the

parapodia are prominent and widely separated ; the posterior lip of the chaetophore is large, foliaceous, and pointed.

The dorsal cirrus in the earlier feet is small, being little more than a cylindrical papilla, much shorter than the anterior lip of the chaetophore (PI. xliv., fig. 110) ; it is not till about the 20th segment that it attains the length of this lip (PI. xliv., fig. Ill), and by about the 40th it is as long as the posterior lip and even longer. It has now lost its cylindrical form, has become flattened in the antero-posterior direction, and is highly vascular, and projects outwards almost horizontally (PI. xliv., fig. 112).

A few small chaetae, as usual in the family, enter the base of the dorsal cirrus and are accompanied by a black aciculum. There is no ventral cirrus, unless the rounded side of the body is regarded as such ; it is separated from the ventral region by a definite groove.

The chaetae, which are brown, are all capilliform (PI. xliii., fig. 108), with a very slight flange, but are of two sizes : those in the supra-acicular bundle are much longer than the sub-acicular ones. There are usually four black acicula in the main part of the foot.

In the first and second feet I find the following numbers of chaetae : The supra-acicular chaetae are 10, the sub-acicular 8-10 ; in the twenty-first 7 and 14 respectively ; in the sixty-sixth foot the numbers are 6 and 8 respectively.

The jaws are very dark brown in colour ; the " support "
is quite short, not as long as the proximal upper jaw-
plate ; each half is a right-angled triangle, the vertical
side of which is median, the hypothenuse external, and
frayed out, as it were, into a number of delicate short threads.

The right and left jaw plates are symmetrical, five on each
side. The proximal plate (I) on both sides is long and
narrow, bidentate, or rather has two large claw-like fangs at its

anterior end, the posterior of which is only slightly smaller
than the other. There are no marginal deiiticulations. II.
has the ordinary form of a broad plate with five teeth. III.
is short, with three teeth, the proximal being small. IV. is
bidentate ; and V. has but a single tooth.

The fifth plate is so closely placed against the fourth that
on a first inspection they seemed part of a single plate.

The lower jaws are long and anteriorly broad ; they lie
wholly in front of the support of the upper jawlets, and each
is divisible lengthwise into two approximately equal regions ;
the outer region is brown, the inner white, being calcified

and marked by fine longitudinal lines.

Remarks. This species differs from the only other species, L. brasiliensis, Kinberg 1 in the following features : in the number of teeth on the jaw plates, in the dimensions of the dorsal cirrus and posterior lip, both of which are narrower than in the present species. Ehlers, 2 who figures this species, says that the worm is whitish-grey.

LOG. South by south-west of Mt. Cann, Victoria, 55-70 fathoms.

1. Kin berg Anmilata nova, 18fi4.

2. Ehlers Florida Anneliclen, 1887, p. 107.

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EXPLANATION OF PLATE XXXVIII.

Lcpidonotus hedlcyi, sp. nov.

Fig. 1. An elytron (x 8). a. the anterior margin, e.

external margin.

Fig. 2. A portion of its surface (X 250), showing the round

pigment cells and empty cells ; these lie at a lower

level than the tubercles, two of which are shown.

Fig. 3. Four tubercles from an elytron of different shapes

(x 250).

Fig. 4. A parapodium (x 20), seen from the anterior face ;

gl. Gland at the base of the dorsal cirrus.

Fig. 5. A notopodial chaeta (x 500). The pectinated frills

in this and next figure are merely indicated by

dotted lines.

Fig. 6. A neuropodial chaeta (X 250).

Fig. 7. A neuropodial chteta from another aspect (250).

Lepidonotus willeyi, sp. nov.

Fig. 8. An elytron (x 20), showing the limitation of the

fringe to the external margin; ant. the anterior

border.

Fig. 9. Portion of the external margin of an elytron (x 250)

showing some of the smaller tubercles.

Fig. 10. Portion of the aritero -dorsal area (x 250), with

simple tubercles.

Fig. 11. Some of the larger tubercles (x 250). a. from the

external area ; b. from near the middle ; c. one of

the largest in the posterior area.

Fig. 12. A parapodium (x 35).

Fig. 13. A notopodial chaeta, with blunt apex (x 500).

The pectinated frills where they cross the surface

are omitted from this and the next.

Fig. 14. One of the long notopodial chsetse, with a fila-

mentous apex (x 500).

Figs. 15 and 15A. Two aspects of a neuropodial chaeta

(X 360).

Physalidonotus rugosus, sp. nov.

Fig. 16. The prostomium (x 10), the hinder border of

which is overlapped by the first " pad " or elytra!

support.

Fig. 17. An elytron (x2), the characteristically elongated

areola is indicated by dotted line. Ant., anterior

margin.

Fig. 18. A portion of the external area and margin of an

elytron (x 20).

Fig. UK One of the supra-areolar tubercles (x 20).

Fig. 20. A tubercle from the posterior area (x 35).

Fig. 21. Another tubercle from the posterior area (x 35).

Fig. 22. Base of a cirriferous parapodium from behind to

show the branchial papulae (enlarged).

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B10L. RESULTS " ENDEAVOUR, VOL. 111.

PLATE XXX VI 11.

B. BENHAM, del.

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EXPLANATION OF PLATE XXXIX.

Physalidonotus rugosus, sp. nov.

Figs. 23-24. A neuropodial cha3ta from two aspects (>; 90).

Fig. -5. Two parapodia, seen from above (> 5), showing
the disposition of the branchial papulae, the shape
of the elytrophore, the large dorsal swelling on the
rirriferous foot, and the gland at the base of the
dorsal cirru>.

Physalidonotus laevis, ,sp. nov.

Fig. 2C>. The prostomium from the side (/ 10).
Fig. '21. The prostoniinm from above (> 10), the posterior
border is overhung by the first dorsal pad.

Fig. -8. An elytron (> 4). The lower margin of the figure

is anterior.

Fig. 29. A portion of its external area (x 45).

Fig. 30. A portion of its anterior area (> 45), showing the

soft conical tubercles near the margin.

Fig. 31. A couple of tubercles from the supra-areolar area

(45).

Fig. 32. Two parapodia (5), showing the arrangement

of the papulae.

Physalidonotus liirriltix, ^p. nov.

Fig. 33. An elytron (> 20).

Fig. 34. The prostomium (/ 10), overhung by the first

dorsal pad.

Fig. 35. Two parapodia from above (enlarged), showing

the papula. 1 .

Physalidonotus paucibranchiatus, ,sp. nov.

Fig. 10. A neuropodial chseta (,- 90), showing the con-

striction below the bearded region, characteristic

of this species.

Fig. 37. Two parapodia ('/ 10), showing the papulse.

Fig. 38. A parapodium (20), from its posterior face.

This serves to illustrate the form characteristic for

the genus.

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PLATE XXXIX.

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EXPLANATION OF PLATE XL.

Physalidonotus paucibranchiatiis, sp. nov.

Fig. 39. The prostomium from above (> 10).

Fig. 40. The prostomium from the side (x 10).

Fig. 41. An elytron (x 8). Ant. the anterior margin.

Fig. 42. A portion of the surface near the external margin

(> 20), showing the outer end of the areola (on

the right), and the filamentous tubercles on the

antero-external area.

Harmothoe etheridgei, sp. nov.

Fig. 43. A neuropodial chaeta (x 90).

Fig. 44. A notopodial chseta (> 90).

Fig. 45. One of the uppermost notopodial chaise (> 90).

Fig. 46. The prostomium and anterior segments (x 10).

Fig. 47. The fifth elytron (> 10). Ant. anterior margin.

Fig. 48. Tubercles of various shapes (> 45).

Fig. 49. The tip of a notopodial chaeta (X 360).

Fig. 50. Tip of a neuropodial chseta (X 360).

Fig. 51. A parap odium (x 20).

Halodom, sp. incert.

Fig. 52. The fifth parapodium (> 35).

Fig. 53. The fourteenth parapodium (x 35).

Fig. 54. The head, ventral view (enlarged).

Fig. 55. The head, dorsal view (enlarged).

Nephthys macrura, fechmarda.

Fig. 57. The head (x 8), from a camera drawing.

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EXPLANATION OF PLATE XL1.

Halodora, sp. incert.

Fig. 56. The middle region of a jointed chseta (X 300).

X/uitronereis australiensis, M'lntosh.

Fig. 58. The head, dorsal view (enlarged).

Fig. 5!). Head. doi>al view (more enlarged), with the peristomial nap turned back to show the slit-like entrance to the nuchal organ on each side.

Fig. 00. Head, ventral view (enlarged).

Fig. 01. Six segments (/ 4), with the parapodia of one side ; the dorsal cirrus on the penultimate segment has been cut across to show the characteristic flat-

tening in this species.

Fig. 02. The 30th parapodium (20).

Fig. 03. A sub-acicular chseta from the 30th parapodium (X 250).

Fig. 04. A sub-acicular ehteta from the 10th parapodium

(250).

Fig. 05. The upper series of jawlets of the right side, as seen in situ (> 20).

Fig. 00. Isolated jawlets (> 35), <i. a group of jawlets of the outer and inner series : b, one of the jawlets of the inner series ; c, anterior jawlets of the inner series ; d, a triangular piece which rests on the ba.se of the outer and inner series.

Eunice bassensis, M'Intosh.

Fig. 07. The head from the side (/ 8).

Fig. 08. The anterior end (8) ; the tentacles of the right side and the parapodia of the left have been omitted.

Fig. 0!). A segment from the side (> 8) to show the relatively small size of the gill at its maximum development.

Fig. 70. The twelfth parapodium (/ 20), from a well

preserved specimen. (Cf. fig. 78).

Fig. 71. A cha'ta from the 40th parapodiuin (300).

Fig. 72. The tip of an acicular cha-ta from the 40th foot

(. 250) ; it is bidentate, and the wings are present.

Fig. 73. A tridentate acicular chseta from a posterior foot

(> 250). The wings are omitted.

Fig. 74. A tridentate acicular clueta from the 53rd foot

(X 250), the wings are omitted.

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EXPLANATION OF PLATE XL-IT.

Eunice bassensis, M'Intosh.

Fig. 75. The upper jawlets disarticulated (< 20).

Fig. 76. The " fangs " or basal members of the upper series of jawlets (x 20).

Fig. 77. The left lower jaw, upper surface (x 20).

Fig. 78. The twelfth parapodium from a much contracted specimen, showing the stouter form of the dorsal cirrus and the shortened gill filaments, as compared with Fig. 70.

Eunice pycnobranchiata, M'Intosh.

Fig. 79. The eleventh parapodium (x20) ; the gill shows the characteristically thickened filaments ; the chaetse are diagrammatically indicated.

Fig. 80. Side view of the head (x 4), to show the deep incision between the lower and the lateral lips ;

the upper edge of the former is somewhat everted,

so as to be visible from above.

Lumbriconereis gulielmi, sp. nov.

Fig. 81. The head, dorsal view (x 4).

Fig. 82. The head, ventral view (x 4).

Fig. 83. The head, side view (x 4).

Fig. 84. The 55th parapodium (>< 20).

Fig. 85. The 125th parapodium (> 20).

Fig. 86. The 29th parapodium (> 20) ; blood vessels are

indicated in the anterior lip.

Fig. 87. The 29th parapodium of another individual (X 20),

in which the large posterior lip has been pressed

upwards by contact with the tube in which it had

been preserved. Chsetse omitted.

Fig. 88. The upper jawlets (enlarged), drawn in situ from

above. The left " fang " is omitted,

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EXPLANATION OF PLATE XLIII.

Lumbriconereis gulielmi, sp. nov.

pig 89 A series of left parapodia from above (> 7), from the 10th, 25th, 45th, and a posterior segment, in order to show the changes in form and development of the lips and the arrangement of the chseta?.

Fig. 90. One of the middle chsetse from the 125th parapodium (> 70).

pig 91 .The lowermost chseta from the 29th foot (70).

Fig. 92. An upper hook from the 125th parapodium (250).

Fig. 93. One of the lower hooks from the 125th foot (x 250).

pig 94 The uppermost chseta from the 10th parapodium

(X 70).

Oenone haswelli, sp. nov.

Fig. 95. The head from above (> 4).

pio- 96 The head from above after the peristomial flap

has been slit up and turned aside to show the three

small tentacles which lie below it (> 4).

Fig. 97. The head from below (> 4).

pi L , 98 The anterior end of another specimen in which

the prostomium is retracted below the peristomial

flap (X 4).

Fig. 99. The 55th parapodium (> 20).

Fig. 100. A sub-acicular chseta from a posterior parapodium

(250).

Fig. 101.- An upper hook or acicular chseta from a posterior

foot with the notch separating the two teeth terminal

in position (X 360).

pig 102. A lower acicular chaeta from the same foot (360).

The proximal tooth is here laterally situated ; the

wing is broken.

Lysarete australiensis, sp. nov.

Pig 103. The head from above (> 2|). The three tentacles lie backwardly, directed in a groove.

Fig. 104. The median region of the first three segments and part of the prostomium (5). The tentacles are cut away to show the posterior pair of eyes, and the excavation in the three segments in which the tentacles lie.

Fig. 105. The head from below (> 21).

Fig. J<>6. A transverse section through the body (> 2). The parapodium of the left side has been omitted.

Fig. 107. The parapodia from segments 4, 16 and 37 (> 4) from above.

Fig. 108. A supra-acicular chseta from the 10th parapodium (. 5).

Fig. 109. The lower jaw and upper series of jaxvlHs of the right side as seen in situ (5).

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EXPLANATION OF PLATE XLIV.

Lysarete australiensis, sp. nov.

Fig. 110. The 10th parapocliuni (13).

Fig. 111. The 21st parapodium (x 13).

Fig. 112. The 66th parapodium (13), the fully developed condition ; the cha?ta? are cut short ; blood vessels are indicated in the dorsal cirrus.

Oenone hasivelli, sp. nov.

Fig. 113. The series of upper jawlets, disarticulated (x 17).

Hcalisetosus australiensis, sp. nov.

Fig. 114. View of the imperfect head (enlarged), ph., the partially everted pharynx.

Fig. 115. Parapodium, posterior face (> 20), ep., elytrophore overhanging the notopodium.

Fig. 116. A neuropodial cha?ta, from the upper part of the bundle (x 250). The very delicate frills are indicated in this and following figure by oblique linos.

Fig. 117. A neuropodial clueta from the lower part of the bundle (> 250). The notopodial chaeta are similar to this.

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PLATE XL IV.

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EXPLANATION OF PLATE XLV.

Thalanessa oculata, M'lntosh.

Fig. 118. View of an elytron from about the middle of the
body, in situ (enlarged), showing the typical shape
and its relation to the parapodia and segments.
ep. elytrophore of this elytron, ep' elytrophores of

the preceding and of the succeeding segments, one of the latter being covered by the elytron.

Fig. lit). A parapodium from the mid-body (x 00). a, ciliated pad ; b, cirriform process of the notopod. The dotted structures are the characteristic membranous lips on the neuropod ; the chaetae are diagrammatically represented in that no attempt is made to give their shape.

Fi<i. 120. Dorsal view of a normal, mid-body segment of the left side, nrp., neuropod ; nip., notopod. The filamentous lip process of the latter is bent backwards.

Fig. 121. Dorsal view of the first parapod of the left side (enlarged), showing the great development of the membranous lip. p, a horny capsule, many of which are attached to the cha?tse along the body. (? egg capsule of mollusc).

Fig. 122. Dorsal view of the fourth parapod, showing the digitiform processes on the notopod : the two membranous lips of the neuropod are bent backwards.

Fig. 123. The fourth parapod of the right side (>< 00). a, ciliated pad : b, group of digitiform processes on the notopod. The dotted structures are the membranous lips of the neuropod.

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PLATE XLV.

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