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Biological Results of the Fishing Experiments carried on by the F.I.S. "Endeavour," 1909-14.

H. C. Dannevig,
Commonwealth Director of Fisheries

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

PART II.

BY

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

Professor of Biology at the University of Otago, New Zealand; Hutton Medallist, New Zealand Institute.

Plates XLVI-XLVIII.

Having now completed the examination of the worms obtained during the cruise of the "Endeavour," it will be convenient to summarise the results of my work, which will entail to some extent a repetition of the introductory remarks in Part I. There it was noted that the "Challenger" obtained fifteen species of Polychætes in the area covered by the cruise of the "Endeavour," of which twelve were new to science.

The present collection contains forty-one species, including a fragment of a species of *Sigalion*, an indeterminable fragment of a species of Phyllodocid, and a species of *Halodora*, to which I have been unable to assign a name. Of these forty-one, five were obtained previously in this region; seventeen species hitherto recorded in various other parts of the world are now added to the southern Australian fauna; and I have found it necessary to make sixteen new species, one or two of which may, however, be merely varieties of already known forms; and to erect one new genus for a Nereid, namely *Cheilonereis*.

The "Challenger" obtained the fifteen species from four hauls; the "Endeavour" secured these forty-one species in twenty-six hauls, but it must be borne in mind that in the latter cruise the primary object was an economic one in connection with the Fisheries, and it is highly satisfactory that so many worms, many of them of small size, should have been noted and so carefully preserved by the late Mr. C. T. Harrisson, the Biologist on board. In many instances a single individual of a species was received by me and, therefore, presumably the only one captured. We have a very small but fairly representative sample of the fauna of these deeper waters, for the majority of the families is represented by one or more genera; the Polynoinæ and Eunicidæ being well represented. There are some interesting omissions, however, for instance no member of the sub-family Aphroditinæ were included, which is rather unexpected, as they are deep-water forms of large size.

The families Syllidæ, Ariciidæ, Spionidæ being small worms might easily be overlooked in sorting out the contents of the dredge, and burrowing as they do for the most part in mud or others living amongst the Coralline Algæ near shore are not unnaturally absent.

One would perhaps have expected more Terebellidæ, of which only one individual was obtained, and also members of the allied families.

II.—Local Distribution.

It will be useful to tabulate the localities at which the species were obtained so as to compare the differences between the various stations.

The majority come from off the east coast of Tasmania, and this preponderance is no doubt due to the fact that more hauls were taken here than further north, at any rate to judge from the material submitted to me, though it is quite likely that in many cases no Polychætes were obtained in some of the later hauls.

I have given the depth at which the worms were found where that information was supplied, or have included information derived from other records. It will be noted that the depth varies from 17 to 1200 fathoms; only two came from a greater depth than 1000 fathoms—*Asychis victoriæ* from 1100 fathoms and *Nephthys macrura* from 1200 fathoms. The majority came from between 50 and 100 fathoms.

	"Endeavour" Collection.	Other Records.
TASMANIA.		
Ten miles north of Circular Head.		
Nereis kerguelensis	No depth given	10-100 fathoms (Moore)
Eunice bassensis	,,	
Eunice pycnobranchiata	,,	
Oyster Bay.		
Eunice bassensis	20-40 fathoms	
Lumbriconereis gulielmi	26 fathoms	
Storm Bay.		
Eunice pycnobranchiata	No depth given	
Stauronereis australiensis	,,	38 fathoms (M'Intosh)
South Cape.		
Chloeia inermis	75 fathoms	
Breaksea Island, Port Davey.		
Eunice bassensis	No depth given	
East of Maria Island.		
Eunice pycnobranchiata	78 fathoms	
Glycera tesselata	78 fathoms	
Lepidonotus willeyi	78 fathoms	
Physalidonotus rugosus	78 fathoms	
East-north-east of Maria Island.		
Protulopsis palliata	100 fathoms	

	"Endeavour" Collection.	Other Records.
BASS STRAIT.		
EAST COAST OF FLINDERS ISLAND.		
Eunice bassensis	No depth given	38 fathoms (M'Intosh)
Eunice pycnobranchiata	,,	38 fathoms (M'Intosh)
Oenone haswelli	,,	
Glycera tesselata	,,	31-638 fathoms (Moore)
Nereis arenaceodentata	,,	surface (Moore)
Physalidonotus rugosus	,,	
Halodora, sp	,,	
BABEL ISLAND.		
Eunice pycnobranchiata	50-80 fathoms	
Hyalinoecia tubicola	50-80 fathoms	
Lumbriconereis sphærocephala	70 fathoms	
Hesione splendida	50-80 fathoms	
Polynoe platycirrus	50-80 fathoms	
Physalidonotus rugosus	70 fathoms	
Sabellastarte japonica	60 fathoms	
Spirobranchus latiscapus	50-80 fathoms	
EAST-NORTH-EAST OF BABEL ISLAND.		
Nephthys macrura	1200 fathoms	
NORTH-EAST OF BABEL ISLAND.		
Eunice pycnobranchiata	100-170 fathoms	
TWENTY MILES EAST OF BABEL ISLAND.		
Lumbriconereis gulielmi	65 fathoms	
Eupompe australiensis	65 fathoms	8 fathoms (M'Intosh)
Physalidonotus turritus	65 fathoms	
VICTORIA.		
GABO ISLAND.		
Eunice siciliensis	75-200 fathoms	
Polynoe platycirrus	200 fathoms	
Physalidonotus laevis	200 fathoms	
Physalidonotus paucibranchiatus	200 fathoms	
Harmothoe etheridgei	200 fathoms	
TWENTY-FIVE MILES SOUTH-WEST OF CAPE EVERARD.		
Physalidonotus laevis	No depth given	
SOUTH-SOUTH-WEST OF MOUNT CANN.		
Physalidonotus rugosus	55-70 fathoms	
Lysarete australiensis	55-70 fathoms	
CAPE NELSON.		
Asychis victoriæ	1100 fathoms	
SOUTH AUSTRALIA.		
FORTY MILES WEST OF KINGSTON.		
Lepidonotus hedleyi	30 fathoms	
Ceratonereis falcaria	30 fathoms	
Scione harrissoni	30 fathoms	
ELEVEN MILES SOUTH-EAST OF CAPE MARTIN.		
Owenia fusiformis	21 fathoms	
CAPE JERVIS.		
Eunice pycnobranchiata	17 fathoms	

	"Endeavour" Collection.	Other Records.
KANGAROO ISLAND.		
Eunice bassensis	40 fathoms	
Notopygos labiatus	40 fathoms	
CAPE WILES.		
Sigalion, sp. incert.	100 fathoms	
SOUTH OF ST. FRANCIS ISLAND.		
Thalanessa oculata	35 fathoms	
Ophelia dannevigi	35 fathoms	
Notomastus eisigi	35 fathoms	
ONE HUNDRED AND FORTY-TWO MILES SOUTH-SOUTH-WEST OF ST. FRANCIS ISLAND.		
Sternaspis scutata	No depth given	55-260 fathoms (Moore)
GREAT AUSTRALIAN BIGHT.		
Notopygos labiatus	No depth given	
Scalisetosus australiensis	,,	
Cheilonereis peristomialis		250-450 fathoms
Phyllodocid, gen. et sp. indet.	No depth given	
NEW SOUTH WALES.		
BETWEEN PORT STEPHENS AND NEWCASTLE.		
Eunice pycnobranchiata	22-60 fathoms	
Oenone haswelli	22-60 fathoms	

III.—GEOGRAPHICAL DISTRIBUTION.

I have also tabulated the distribution of the species.

Apart from the five widely distributed species (*Eunice siciliensis*, *Hyalinoecia tubicola*, *Sternaspis scutata*, *Owenia fusiformis*, and *Hesione splendida*) the relation of the Australian fauna is distinctly with that of the Pacific ; a very few are Antarctic or Subantarctic, such as *Nephthys macrura* and *Nereis kerguelensis*, yet both these enter the Pacific area, as they have been recorded from New Zealand.

The most peculiar discontinuous distribution is that presented by *Nereis arenaceodentata*, hitherto found only off the coast of Massachusetts. It is, however, a small form and might readily be overlooked or regarded as an immature individual of some larger species.

Under each species its wider distribution, if any, is dealt with in the text.

It is interesting to note the great difference between the Australian and New Zealand Polychæte fauna. Of the series of species here recorded only six have been hitherto found in the latter seas, apart from the widely distributed species *Owenia fusiformis*, *Hyalinoecia tubicola*, and *Sternaspis scutata*.

The Polychæte fauna of the Pacific is but little known; Ehlers has described that of New Zealand, I have given a preliminary account of the Kermadec fauna, but otherwise it is only from the Northern Pacific that we have much information—that of the Philippines by Grube, of Japan by Marenzeller, Izuka and Moore; and of the west coast of North America by Moore, Johnson and Treadwell, references to whose papers will be found in the text.

	Tas.	Viet.	South Austr.	N. S. Wales	New Zeal.	Elsewhere.
Hesione splendida	×	.	.	.	.	Ind. Oc.; Red Sea; N.
Polynoe platycirrus	×	×	.	×	.	Ind. Oc. [Pacific
Lepidonotus hedleyi	.	.	×	.	.	
L. willeyi	×	.	.	.	.	*affin.* Ind. Oc.
Physalidonotus rugosus	×	×			*affin*	*affin.* Japan
P. laevis		×				
P. turritus	×					
P. paucibranchiatus		×				
Harmothoe etheridgei		×				
Scalisetosus australiensis			×			*affin.* N. Pacific
Thalanessa oculata			×			N. Pacific
Sigalion, sp. incert.			×			*affin.* Pacific
Eupompe australiensis	×					Torres Strait
Halodora, sp. incert.	×					
Nephthys macrura	×				×	Subantarctic
Chloeia inermis	×				×	
Notopygos labiatus			×			
Stauronereis australiensis	×					[O.; Pacific
Eunice siciliensis		×				Med.; Red Sea; Ind.
E. bassensis	×		×			
E. pycnobranchiata	×		×	×	×	
Hyalinoecia tubicola	×				×	Atlantic; Pacific
Lumbriconereis sphærocephala	×				×	
L. gulielmi	×					*affin.* Japan
Oenone haswelli	×			×		
Lysarete australiensis		×				
Nereis kerguelensis	×				×	Subantarctic
N. arenaceodentata	×					East coast N. America [Pacific
Cheilonereis peristomialis			×		×	*affin.* Japan, N.E.
Ceratonereis falcaria			×			Ceylon [Pacific
Glycera tesselata	×					Med.; Atlantic; N.
Owenia fusiformis			×		×	Arctic; Med.; Pacific
Scione harrissoni			×			
Notomastus eisigi			×			
Ophelia dannevigi			×			
Asychis victoriæ		×				
Sabellastarte japonica	×					Japan
Spirobranchus latiscapus	×					Japan
Protulopsis palliata	×					Ceylon [Pacific
Sternaspis scutata			×		×	Med.; North Sea; N.

IV.—Description of the Genera and Species.

Family NEREIDÆ.[1]

Genus Nereis, *Cuvier.*

Nereis kerguelensis, *M'Intosh.*

Nereis kerguelensis, M'Intosh, Chall. Rep., Zool., xii., 1885, p. 225. *Id.*, Ehlers, Polychæten, Hamburger magalhaenische Sammelreise, Hamburg, 1897, p. 65; *Id.*, Ehlers, Neuseeländ. Annelid., 1907, p. 11. *Id.*, Gravier, Deuxieme Antarct. Exped. Francaise,—Annélides Polychètes, 1911, p. 76.

Three complete individuals, one of which is a female filled with eggs though still in the "nereid" stage.

The worms are larger than those recorded by Ehlers from South Georgia. The largest is 80 mm. by 5 mm. and 8 mm. over the parapodia, with 78 segments. A second, 65 mm. by 6 mm. and 8 mm. with 75 segments; the third is 48 mm. by 4 mm. and 6 mm. with 70 segments. There are one or two discrepancies between the figures given by M'Intosh and Ehlers, and certain slight differences between these and my own observations.

The peristomial cirri, which are relatively long in the "Challenger" figure, are in these specimens short as shown by Ehlers.

So, too, there are differences in proportion in the tentacles, which M'Intosh shows as narrow and Ehlers as stout and short; here, too, the present specimens agree with Ehlers'.

I have in a previous paper dealing with *N. australis*[2] pointed out that in one and the same species there is a great range of variation in the relative length of these cirri which appears to be independent of locality or age or of methods of preservation. Other features being in accord, these proportions are of less importance.

Loc.—Ten miles north of Circular Head, Tasmania.

Distribution.—New Zealand; Kerguelen Island; South Georgia; Falkland Islands; South Shetlands; and other localities hereabouts.

1. In accordance with the International Rules of Nomenclature the usual title of this family, Lycoridæ, must be replaced by Nereidæ.

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

NEREIS ARENACEODENTATA, *Moore.*

(Plate xlvi., figs. 1-3.)

Nereis arenaceodentata, Moore, Proc. Acad. Nat. Sci. Philadelphia, 1903, p. 720.

A single complete specimen of this small species is present. Its colour is pale pinkish brown in spirit.

The body is broadest anteriorly, and tapers backwards; the parapodia are long, increasing in length posteriorly; their length is as great as the width of the body.

The worm measures 22 mm. in length by 2.25 mm. across the body, and 3.25 mm. over the parapodia anteriorly; but posteriorly these latter numbers are 1.25 mm. and 3 mm. respectively.

Although the present specimen agrees in all essentials with Moore's species, yet, since that has been recorded only from the Atlantic coast, and the occurrence of the same species in two such widely different and dissimilar areas is so rare, if not unknown amongst Annelids, it is desirable that an account of this individual should be put on record and illustrated, so that any doubts about the identity may be set at rest, or at least the material provided for criticism. These notes and figures were, I need scarcely say, made before I became acquainted with Moore's account.

The prostomium is broader than long, which may be due in part to the protrusion of the pharynx, stretching the base. The eyes are large, the anterior pair larger than the posterior. The anterior pair as usual rather more widely separated than the posterior, to which they are closely placed. Moore shows them to be of the same size and in contact.

The tentacles are short, less than half the length of the prostomium. The palps are very large, and broad.

Of the peristomial cirri the posterodorsal, that is the uppermost, is longest, reaching to the back of the fourth chætigerous segment; the dorsal anterior, nearly as long, reaching to the anterior margin of this segment; the two ventral much shorter, scarcely reaching to the end of the second segment. In this respect there is a difference, for what it may be worth, from Moore's account and figure.

The parapodia are all alike, relatively long; the various lobes pointed, distinctly separated and somewhat divergent.

The notopodial chætophoral lip is unusually long and distinct.

The dorsal cirrus reaches only about half way along the dorsal ligule ; there is no enlargement at its base.

The chætæ are all colourless, as are also the acicula.

In the 13th foot, the dorsal chætæ are about fourteen in number, long homogomph spinigers, arranged in a fan-shaped way. The supra-acicular bundle in the ventral lobe consists of five similar chætæ, with four heterogomph falcigers, which have a long and knife-like appendix, hooked terminally, and densely setose. (Pl. xlvi., fig. 22.) The sub-acicular bundle contains the same two kinds of chætæ.

All the spinigers and all the falcigers are alike throughout the worm.

This specific name was evidently derived from the nature of the denticles on the buccal region, which is covered with small conical paragnaths forming a broad band of approximately equal width all the way round. Amongst them, however, are a few rather larger ones arranged in longitudinal rows at intervals on the sides and under surface, which do not appear to correspond to the areas VI., VII., VIII.

The maxillary region presents groups of small denticles, of about the size of the larger buccal kind, which are arranged as follows :—

I. A rectangular patch formed of four transverse rows of 2, 2, 3, 4.

II. An elongated oval group of numerous densely massed denticles.

III. A patch of five or six transverse rows forming a squarish group.

IV. A broad, oval patch of densely massed points.

It is only in the details as to the number of denticles in the various patches that differences exist between this and Moore's specimens (see his Figs. 5-6, Pl. xl.). It is recognised that slight differences may exist in this matter without affecting the identity of the species ; a few more or a few less denticles in a group is a common variation.

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

Distribution.—Wood's Hole, Massachusetts.

Genus CERATONEREIS, *Kinberg.*

CERATONEREIS FALCARIA, *Willey.*

(Plate xlvi., figs. 4-10.)

Ceratonereis falcaria, Willey, Ceylon Pearl Oyster Fisheries, pt. iv., Suppl. Rep., xxx., — Polychæta, 1905, p. 272.

A single specimen of a small worm seems to be identical with Willey's species.

Its length is 20 mm., its breadth 1.25 mm. Its diameter is nearly uniform for the 60 segments of which it consists.

The parapodia are short, less than half the diameter of the body; the dorsal cirrus is very long.

The prostomium is longer than its basal breadth and the preocular region is narrow and deeply grooved dorsally in the median line, giving the impression of a deep frontal incision, which, however, is scarcely existent in this individual (Fig 4). The tentacles are short, about half the length of the prostomium. The palps are relatively large.

The four eyes are large, nearly equal in size, and the two on each side are placed in nearly a straight fore and aft line, so that the four form a square.

The tentacular cirri appear to be short and stout, the longest reaches only to the back of the first chætigerous segment; the next only touches the hinder margin of the peristomium. They are smooth.

The parapodia have four lobes nearly equal in length, short and rounded. The notopodium and neuropodium are not very distinctly separated. The notopodial ligule is rather smaller than the middle ligule (or lip of dorsal chætophore). The neuropodial ligule is stouter than the upper one. The dorsal cirrus is more than twice the length of the uppermost ligule (Pl. xlvi., fig. 5).

The posterior feet differ a little from the anterior (Pl. xlvi., fig. 6). The upper ligule is much shorter than the middle, which is now the longest of the four lobes.

The chætæ of the notopodium exhibit the remarkable change that Willey describes in his account of the species, that is, the homogomph spinigers of the anterior feet (Pl. xlvi., fig. 7) are, in the posterior feet, replaced by a couple of thick brown homogomph falcigers, of which the appendix

is very short, brown, and bluntly bidentate ; the shaft is transversely striated with a deep articular cup (Pl. xlvi., fig. 8).

In the anterior feet the dorsal bundle contains only a few (2-4) homogomph spinigers, the appendix long, with extremely fine denticulations. The change in the character of these chætæ occurs on or about the 22nd segment.

The ventral supra-acicular bundle contains also four homogomph spinigers, two of which have long and two shorter appendices. Below are four heterogomph falcigers, the shaft of which is thick and striated ; the appendix is moderately long, setose along the edge, and with a feeble terminal hook (Pl. xlvi., fig. 9). The sub-acicular bundle contains four heterogomph spinigers, with a short appendix, and two or three heterogomph falcigers.

In all the spinigers, dorsal and ventral, anterior and posterior, the appendix is the same in form though it may differ in length in the same bundle.

In the first two feet, which as usual have only the neuropodial lobe, all the chætæ are spinigers ; the upper bundle has two homogomphs and two heterogomphs with a short appendix ; those of the lower bundle are heterogomphs.

The jaws.—The maxilla has nine blunt denticulations, and like the rest is pale brown.

The paragnaths are very pale, rounded cones (Pl. xlvi., fig. 10). The formula is :—

I. Absent.

II. 5 or 6, forming an oval group.

III. Absent.

IV. A transverse curved group of about 8 denticles.

Remarks.—At first I supposed that this worm was different from *C. falcaria*, as it differs in three points from the few details given by Willey: firstly, in the segment at which the change of chætæ begins, which is the 17th in the Ceylon worm ; secondly, in the absence of denticles in the area III. ; and, thirdly, in the number of denticulations on the maxilla, which Willey states to be only six. It may very likely prove that some of these features are variable. The denticles, for instance, in my species are very pale, and their absence in III. may be due to their having fallen away ; while

as observations on species of *Eunice* tend to show, the segment at which the change of chætæ occurs may probably be quite inconstant.

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

Distribution.—Ceylon.

Genus CHEILONEREIS, *gen. nov.*

The peristomium is produced laterally and ventrally to form a large, widely extending, collar-like lip (*Cheilos*=lip); the base of the notopodium is raised into a lamelliform expansion exceeding in height the rest of the parapodium throughout the greater part of the body.

The type species is *Nereis cyclurus*, Harrington.[1]

CHEILONEREIS PERISTOMIALIS, *sp. nov.*

(Plate xlvi., figs. 11-18; Plate xlvii., figs. 19-22.)

A single entire specimen of a large species which, like *N. cyclurus*, Harrington, is characterised by the great development of the lower and lateral portions of the peristomium to form a great mobile collar-like lip, which partly covers even the protruded pharynx. It is a broad worm with greatly enlarged lamelliform bases of the notopodia, within the cirri, which with the lamelliform dorsal ligules, give it, at the first glance, a likeness to a Phyllodocid.

It is a female filled with eggs, which enter the parapodial lobes. The length is 130 mm. for 116 segments; the greatest breadth is at about the 25th segment, where it is 10 mm. across the body and 13 mm. over the feet; its height is 8 mm. The diameter increases from 4 mm. at the peristomium to this breadth and then decreases to 8 mm. at about the mid-body, and thence to 2 mm. at the hinder end.

The prostomium is rather broader than long; the two pairs of eyes are nearly in line, close to the margin, but the posterior eye is hidden below the greatly developed anterior margin of the peristomium. The tentacles are slender, about half the length of the prostomium, and scarcely reach beyond the tips of the palps. The palps are large, with a small terminal joint, and spring from the lateral region about midway along the prostomium.

1. Harrington—Trans. New York Acad. Sci., xvi., 1898, p. 219.

The peristomium is nearly twice the length of the next segment, dorsally smooth but ventrally pleated lengthwise; whereas the sides are infolded in this individual, they are, in specimens from New Zealand, much longer than the ventral region, and expanded to form a hood or collar which projects outwards and forwards as a longitudinally folded membrane, evidently very mobile in life.

Its appearance is well seen in the figure given by Johnson[1] (Pl. iv., fig. 46) of *N. cyclurus* from American waters.

The peristomial cirri are short and approximately of equal length, the uppermost is longest, reaching to the 2nd chætigerous segment.

The parapodia are relatively long, especially in the posterior region of the body.

The dorsal cirrus, on the anterior feet, is rather more than twice the length of the dorsal ligule (Pl. xlvi., fig. 17), but by about the 35th foot it only exceeds it by a little (Pl. xlvi., fig. 18), and in the 50th and following it only about reaches to its apex. This relation is retained for the remainder of the body (Pl. xlvii., figs. 19-20). The actual length of the cirrus decreases, it is not merely relatively shorter.

The base of the notopodium just within the cirrus is, already in the 15th segment, quite noticeably elevated, and by about the 20th is elevated and compressed laterally to form a lamella. In the 30th this becomes much higher and continues to do so posteriorly. Meanwhile the dorsal ligule, which is at first a rounded lobe (Pl. xlvi., figs. 14-15), soon becomes pointed, elevated and compressed to form a lamella, so that the two structures, over the greater part of the body, unite to form a conspicuous lamella on the upper edge of which the dorsal cirrus is implanted in a slight notch (Pl. xlvi., fig. 18). The entire lamella is vascular and glandular, and especially the ligule.

In the 9th foot (Pl. xlvi., fig. 16) the middle ligule is a rounded, conical lobe, shorter than the dorsal, which diverges upwards from it. The ventral ligule is still shorter than the middle and even less than the lips of the ventral chætophore.

As will be seen from a comparison of the figures of successive feet a line taken along the outer margin of the ligules, which is at first nearly vertical comes to slope downwards and inwards, forming a greater and greater angle with the vertical till in the hinder feet it is about 70°.

1. Johnson—Proc. Boston Soc. Nat. Hist., xxix., 1901, p. 400.

The chætæ are as follows:—The notopodial bundle consists of very long homogomph spinigers. The neuropodial supra-acicular bundle contains homogomph spinigers and rather fewer heterogomph falcigers (Pl. xlvi., fig. 13), while in the sub-acicular bundle there are only a great number of heterogomph falcigers (Pl. xlvi., fig. 12). The spinigers have a long delicate appendix of the same length and structure throughout the body. The appendix of the faltate chæta is rather long, and finely setose. There is a slight difference in the form of the articular cup of these chætæ in various parts of the foot and in different segments, as may be seen in the figures.

The first and second parapodia have ventral bundles only; all the appendices are broken off in the first foot, but in the second some of the sub-aciculars are heterogomph spinigers, with a shorter appendix than in the homogomphs. The third foot also has similar chætæ in the sub-acicular bundle, and the appendix of the falcate is longer than in the posterior feet.

The jaws.—The maxillæ are brown, with 7-8 denticulations on the curved exposed region, and a further 7-8 on the straight basal region.

The dental formula of the paragnaths, which are shown in Fig 21, is :—

I. One or two rather large conical denticles in a longitudinal row, with, in some individuals, 2-3 small ones at their side.

II. An irregular rectangular patch of about 16 large denticles in three transverse rows.

III. A transverse patch of large and small denticles in three rows, the large ones in the second and third rows.

IV. An obliquely rectangular patch of 16 rather large denticles in two oblique rows (on the outer side of the maxilla).

V. Absent.

VI. An irregular rounded group of 2-3 curved rows of rather large denticles. The group lies further forward than the rest of the proximal or buccal series.

VII. ; VIII. Forms a band of numerous denticles, those along the anterior margin (8-10 in number) larger than the rest, which are quite small and more numerous, and irregularly disposed in 2, 3 or 4 rows. The large ones do not extend up to the group VI.

Remarks.—This species is closely allied to the Eastern Pacific species. Harrington found *C. cyclurus* in association with Hermit-crabs. The present species differs from it in the form of the parapodia both in the atokous and in the epitokous forms. In the atokous condition the dorsal ligule has a rounded instead of the sharply pointed tip of *C. peristomialis*, and the notch in which the dorsal cirrus arises is much deeper, owing to the greater height of the basal lamella. The dental formula also, if I understand Harrington's account rightly, differs in that the denticle in V. is present. His account, however, is very obscure. He writes thus :— "(5) Median dorsal proximal teeth=two points, prominent, in an ill-defined ring on proximal basal somite, which is slightly strongest at ventral side." It may be that these "two points" are the two groups of larger denticles in the compartment VI.

The dental formula given by Izuka for *C. shishidoi* agrees closely with that in the present species.

It appears to me that the slight differences between *C. cyclurus* and the Japanese species *C. shishidoi*, Izuka,[1] are insufficient for specific distinction. Moore has recorded *C. cyclurus* from Vancouver Island[2] and from the Californian coast.[3] Ramsay[3a] also describes it from the N.E. Pacific. Harrington's specimens came from Puget Sound.

The two species are evidently closely allied, and it is here that the trinominal nomenclature would be useful; it has not been introduced into Polychæt literature, but it well might be. Thus we should have *C. cyclurus cyclurus* from American waters, *C. cyclurus shishidoi* from Japan, and *C. cyclurus peristomialis* from Australasian waters.

It is perhaps rather dangerous to suggest a new generic title for any Nereid, judging from the disuse of the many names suggested by Kinberg and Malmgren, but the extraordinary development of the lower lip differs entirely from anything hitherto described, so far as I can ascertain from the literature accessible to me here.

1. Izuka—Journ. Coll. Sci. Imper. Univ. Tokyo, xxx., 1912, p. 177.
2. Moore—Proc. Acad. Nat. Sci. Philadelphia, 1908, p. 343.
3. Moore—*Loc. cit.*, 1911, p. 246.

3*a*. After the MS. had been sent to the Editor I came across Ramsay's account of *C. cyclurus* (Proc. Zool. Soc., 1914, p. 237), wherein he suggests that the extraordinary development of the peristomium was almost worthy of generic recognition. He draws attention to the "curious homogomph falcate setæ" which occur in the notopodial bundle of the parapodia in hinder part of the worm. I find in my MS. account, written some 10 years ago or more, that these occur also in our New Zealand species. Ramsay also discusses the relation of this species to *Alitta virens*.

There are, it is true, resemblances to *Alitta virens*, Sars, as may be seen by consulting the memoirs of Malmgren,[1] Ehlers[2] and Turnbull[3] but from this species the present differs not only in its collar-like lip but in the form of the parapodium, especially in the much greater development of the dorsal lamella and in the proportions of this to the other parts of the foot; in the greater length of the dorsal cirrus as well as in other details which may be merely specific.

Although *A. virens*, as well as some other species such as *N. lamellosa*, Ehlers[4] has the ventral surface of the peristomium marked by furrows, so that it resembles *C. peristomialis* when the lip is folded fan-like over the mouth, yet in none of them is there any evidence that it can be spread outwards as it is here. Even Turnbull, who studied *A. virens* alive, says nothing of this; indeed his and other figures show that it is not collar-like.

Loc.—Great Australian Bight, Long. 129° 28′ E., 250-450 fathoms.

Distribution.—I have specimens from New Zealand waters, described in MS. some years ago, which agree precisely with the above. One of them is in the Heteronereid phase, which may as well be described here.

The Epitokous Condition.

In the epitokous state this worm consists of 130 segments and measures 140 mm. Its greatest breadth is 20 mm. at the 15th segment, including the parapodia, or 10 mm. over the body alone.

The change in the parapodia occurs at the 27th segment, when the various foliaceous outgrowths appear as small structures, which gradually increase in size till the mid-body and then dwindle again and disappear at about the 85th, so that the worm is apparently not completely in the heteronereid condition (Pl. xlvii., fig. 22).

In the 40th foot the dorsal lamella is higher, more prominent than in the atokous state, and overhangs the base of the dorsal cirrus, so that the notch becomes a deep bay. The dorsal chætæ are replaced by the usual natatory bristles. The dorsal, middle and ventral ligules have undergone little change, but the ventral chætophoral lip has developed a large semicircular folium, as has also the base of the ventral cirrus.

1. Malmgren—Nordiska Hafs-annulaten, 1865, p. 183.
2. Ehlers—Die Börstenwürmer, 1864-68, p. 559.
3. Turnbull—Trans. Connecticut Acad., iii., 1876, p. 266.
4. Ehlers—*Loc. cit.*, p. 564.

The first specimens obtained in New Zealand waters were found in the topmost whorls of a gastropod shell inhabited by a Hermit-crab, but later others were met with free in the sea.

Family GLYCERIDÆ.

Genus Glycera, *Savigny*.

Glycera tesselata, *Grube*.

(Plate xlvii., figs. 23-25.)

Glycera tesselata, Grube, Arch. f. Naturgesch., xxix., 1863, p. 41. *Id.*, Ehlers, Die Börstenwürmer, 1864-68, p. 654. *Id.*, Treadwell, Bull. U.S. Fish Comm., xx., 2, 1903, p. 201. *Id.*, Moore, Proc. Acad. Nat. Sci. Philadelphia, 1903, p. 464; *Id.*, Moore, *Loc. cit.*, 1908, p. 348; *Id.*, Moore, *Loc. cit.*, 1911, p. 360. *Id.*, Izuka, Journ. Coll. Sci. Imper. Univ. Tokyo, xxx., 1912, p. 241.

Five individuals, from the seas around Tasmania, represent this non-branchiate species with long pointed anterior parapodial lips and two shorter rounded posterior lips, with long filamentous pharyngeal papillæ, and a terminal eyespot on the prostomium.

One specimen measures about 50 mm. in length, for it is twisted and, therefore, its actual length impossible of measurement. Its breadth is 3 mm. and the number of segments about 100.

The prostomium is short, with about 10-12 annulations; its length about twice its basal width, and as great as the length of two normal segments. It is, however, bent backwards in this individual and covers 7-8 segments, which are much shorter than the later ones. At its tip it carries the usual two pairs of short tentacles, and between them, on the ventral surface, is a black pigment spot, which, however, is absent in one specimen from Maria Island, Tasmania. The body segments are biannulate dorsally, the length of those in the anterior region about 1-5th the diameter of the body, but in the hinder half of the worm 1-4th this diameter.

The colour is in most cases a uniform yellowish brown, but in two specimens from Maria Island the anterior segments and the prostomium are speckled with brown pigment.

The parapodia are, with the exception of the anterior, of equal length, about 1-3rd the width of the body. The proportions of the length of a parapod to its height is about as 3 : 2. The two anterior lips are long, narrow, and pointed, the ventral slightly longer than the dorsal (Pl. xlvii., fig. 23). The two posterior lips are separated by a distinct, rather deep, incision; they are rounded and much shorter than the anterior lips. The ventral is rather longer and of less height than the dorsal.

The dorsal cirrus is nearly spherical, a little removed from the foot up the side of the body, with a deep constriction at its base. The ventral cirrus is conical, its tip reaching as far outward as the posterior lip.

The chætæ are colourless, the acicula golden.

The dorsal chætæ are capilliform, about 9-10 in number, with upturned tips and a narrow denticulated and striated flange. The ventrals are homogomph spinigers, 5 in the supra-acicular and 8 in the sub-acicular bundle; the appendix has a narrow striated and denticulated flange on one or both sides; the edge seems to have a row of minute dots along it, which, under high magnification, are seen to be minute prominences.

The dorsals have the same ornamentation.

The first two parapodia are without the dorsal cirrus; the three or four anterior feet have both the posterior and anterior lips pointed. The feet gradually increase in size till the 8th, after which they remain uniform.

The pharynx, in this specimen everted, is short and wide; its length is 5 mm., its breadth 4 mm. at the anterior end. Its base overlaps the anterior feet. In a soft specimen the everted pharynx has a length of 7 mm., a terminal breadth of 3 mm., and resembles M'Intosh's figure of *G. amboinensis*.

Its surface is covered with closely set, uniformly distributed, long filamentous papillæ, giving it a velvety appearance, These papillæ have a subterminal oval disc at one side of the apex, which appears sucker-like in that it is slightly hollowed out (Pl. xlvii., figs. 24-25). The apex of the papilla carries a few stiff sensory hairs. The subterminal oval disc is known from the work of Gravier,[1] but neither in this paper nor in that of Jourdan[2] nor Oppenheim[3] are these terminal hairs shown, though the sense cells and nerve fibres are traced out.

1. Gravier—Bull. Sci., xxxi., 1890, p. 422.
2. Jourdan—Ann. Sci. Nat., Zool., (7), xiii., 1892.
3. Oppenheim—Proc. Amer. Acad. Arts and Sci., xxxvii., 1902, p. 553.

The usual four black jaws, surrounded at their base by a circle of soft stout conical processes, lie at the apex of the pharynx.

Remarks.—The occurrence of a Mediterranean species in these waters appears at first rather remarkable. But we may bear in mind that *Eunice siciliensis* and *Hyalinoecia tubicola* are instances of the same wide distribution. Moreover, the present species has already been recorded from the North Pacific and from the coasts of California and Japan by Moore.

It appears to me probable that *G. amboinensis*, M'Intosh,[1] is synonymous with this. His specimen was in a poor state of preservation, and apart from his statement that the pharyngeal papillæ are "conical" it fits well with this.

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

Off Maria Island, Tasmania, 78 fathoms.

Distribution.—Mediterranean ; Atlantic ; North Pacific.

Family OWENIIDÆ.

Genus Owenia, *delle Chiaje.*

Owenia fusiformis, *delle Chiaje.*

Owenia fusiformis, delle Chiaje, Descr. notom. animal. invert. Sicilia citeriore, 1842. (Pl. 175, figs. 1-6.)

Ammochares ottonis, Grube, Beschr. neue oder wenig bekannter Anneliden, 1846, p. 164.

Owenia filiformis, Claparède, Mém. Soc. Phys. Genève, xix., 1868, p. 446.

Owenia brachycera, Marion, Revue Sci. Nat. Montpellier, iv., 1875.

Owenia tenuis, Haswell, Proc. Linn. Soc. N.S. Wales, vii., 1883, p. 633.

A shelly tube, 22 mm. in length and 4 mm. in diameter, containing a fragment of a worm measuring 16 mm. by 2 mm., and consisting of 8 chætigerous segments without head or anal end, must be attributed to this species, which as Ehlers[2] has pointed out is of practically cosmopolitan distribution.

1. M'Intosh—Chall. Rep., Zool., xii., 1885, p. 345.
2. Ehlers—Die Polychæten des magellan. u. chilen. Strandes, 1901, p. 193.

The above synonymy has been taken from St. Joseph's[1] useful work in which the European Polychætes are reviewed and the references gathered together.

I have changed the name of the family, which has hitherto borne the title Ammocharidæ since the time when the genus was termed *Ammochares*, Grube; but as modern zoologists agree in resurrecting delle Chiaje's generic name, the name of the family according to the rules of zoological nomenclature must be derived from its type genus.

Loc.—Eleven miles S. 74° E. of Cape Martin, South Australia, 21 fathoms.

Distribution.—From Greenland and Davis Strait to the Mediterranean; Chili; Philippines; Japan; and New Zealand.

Family TEREBELLIDÆ.

Genus SCIONE, *Malmgren.*

SCIONE HARRISSONI,[2] *sp. nov.*

(Plate xlvii., figs. 26-31.)

A single individual in its tube of small shells and shelly fragments, Polyzoa and mud so loosely held together that it falls to pieces when the worm is removed.

The worm measures 34 mm. in length, with an anterior diameter of 3 mm., which posteriorly decreases to 1 mm. It is ill-preserved, soft and readily ruptured. There are 43 distinct segments, but the mid-body is so soft, being partially decayed, that it is not easy to be sure of the number of segments here. The hinder segments, however, are well preserved, and the last 25 carry rather high chætigerous papillæ. The colour is a dull brown, but the dorsal surface of the branchial segment is deep reddish brown.

It is a female filled with eggs.

There are 15 notopodial bundles of capilliform chætæ, each bundle inserted in a small prominence. The first bundle is in the 4th segment.

1. St. Joseph—Ann. Sci. Nat., Zool., (8), v., 1898, p. 397.

2. So named after the late Mr. C. T. Harrisson, Federal Government Biologist, on board the ill-fated "Endeavour," to whose care we owe the excellent preservation of these Polychætes.

The ventral shields are 13 in number ; anteriorly they are transverse, rectangular ; posteriorly, square.

The genus is characterised by three cutaneous lateral folds at the anterior end belonging to as many segments.

The prostomium is produced into a dorsal thin upper lip, with an undulating margin, behind which is the tentacular ridge which extends downwards at each side nearly to the lower lip (Pl. xlvii., figs. 26-28). The tentacles appear short, but were so intertwined that it was impossible to measure them. There are no eyes or pigment spots. The peristomium is produced laterally and ventrally into a large thickish fold, broader laterally, where its edge is reflected ; narrow ventrally, allowing the rectangular lower lip to be seen (Pl. xlvii., figs. 26-27).

The second segment and the next are fused together.

I follow Ehlers in this analysis of the region as given for *Terrebella* (*Scione*) *cetrata*.[1]

On what is probably the 3rd segment is the single pair of arborescent gills, which spring from a nearly vertical wall in front of the first chætigerous segment (Pl. xlvii., figs. 26-28). From the hinder margin of this branchial segment rises the second lateral cutaneous flap, which extends downwards to the level of the lower edge of the tori uncinigeri of the following segments, but does not extend across the ventral surface.

The third fold, which springs from the hinder portion of the first chætigerous, is of less width but of the same extent as the second.

The arborescent gill has a thick stem which bears a few short thick branches, which in their turn divide again into a number of short twigs, so that the gill itself appears as a mass of densely aggregated branches.

In front of the base of each gill is a small conical prominence projecting forwards, and carrying at its apex a narrow cylindrical process, which is inclined outwards (Pl. xlvii., fig. 28). (Are these the representatives of a second, anterior, pair of gills ?)

The uncini commence on the second chætigerous segment as usual, and the first six are uniserial ; but on the 7th and on the eight following segments they have an "alternate" arrangement. Those in the abdomen, however, are again uniserial, all the points being turned in the same direction.

1. Ehlers—Florida Anneliden, 1887, p. 248.

The uncini are all alike, but those of the abdomen are smaller. Seen from the side, each appears to have three small teeth on the back of the main tooth, but from above it is seen that there are three rows of teeth (Pl. xlvii., figs. 29-30).

The capilliform chætæ have curved points with a flange on each side, of which that on the convex side is much broader and longer than the other (Pl. xlvii., fig. 31).

Remarks.—This worm agrees with Malmgren's[1] diagnosis of *Scione*, and though he makes no mention of the cutaneous folds in his generic diagnosis he describes them for the species *S. lobata*.

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

Family CAPITELLIDÆ.

Genus NOTOMASTUS, *Sars.*

NOTOMASTUS EISIGI, *sp. nov.*

(Plate xlvii., figs. 32-35.)

A single specimen, somewhat curled and imperfect posteriorly, was enclosed in the remains of a tube of sand and shelly fragments. The incomplete worm measures about 36 mm. in length.

The thorax, which measures 12 mm. in length, consists of the usual twelve segments, bearing only capillary bristles. The diameter increases from 2 mm. at the peristomium to 3 mm. at the sixth segment and then decreases to 2.5 mm. at the twelfth.

The prostomium is small, rounded, with a minute terminal globular knob, and is retractile to some extent within the peristomium. The peristomium is nearly twice the length of one of the following segments, which are very glandular and bi-annulate, the skin being cut up into the areas by secondary fissures, as in the European species. (These two facts are not shown in the figures.) The peristomium is without chætæ, and I am unable to find any on the following segment. If they are present they must be very

1. Malmgren—Nordiska Hafs-annulaten, 1865, p. 383. Dr. Leiper (Ann. Mag. Nat. Hist., 1908, p. 468) includes this in his list of Polychæte generic names that are pre-occupied; it will do no harm to retain it for the present.

minute, for when rolling the worm over till the following segments are in profile so as to show the bristles, I can see none on the second segment. Possibly they are embedded in the glandular tissue, as in the clitellum of an earthworm at maturity. Each segment after the second bears two widely separated tufts of capillaries; all are alike, both ventral and dorsal, slightly curved, finely and simply pointed, with a small flange on each side, of which one is broader than the other, but in both the oblique striations are very faint.

In the third and fourth segments they are only few in number and quite short, while in the fifth and following they are more numerous and longer.

The ventral surface of the last seven thoracic segments is traversed by a narrow band-like ridge, about 1-6th of the diameter of the body, and bounded on each side by a narrow furrow. This ridge is continued, though in a less marked manner, on the abdomen.

The abdominal region is marked off from the thoracic by its smaller diameter; the segments are no longer than those anteriorly, but the skin is smooth, so far as one can judge in the ill-preserved, soft and rather damaged condition, for the sand and shelly fragments contained in the intestine cause the body wall to rupture on handling. The abdomen is about 2 mm. in diameter, of uniform width over the 20 segments which remain, and I can see no annulations.

The first abdominal segment, though having all the appearance of the others, is provided with capillaries in the dorsal and ventral bundles (Pl. xlvii., fig. 33).

Each of the following segments carries the usual notopodial and neuropodial tori uncinigeri, in which there is a single row of hooded hooks. The neuropodial torus extends up the whole side of the body as a distinct ridge, and ends dorsally in a free simple "gill." (Pl. xlvii., fig. 32.) Above this is the rounded "lateral organ," and on the dorsal surface the short notopodial torus, which is not at all prominent and nearly meets its fellow in the median line as in *N. lineatus*.

The hook (Pl. xlvii., fig. 34) has a long shaft curved like the chæta of an earthworm; it is bent gently at its proximal end, and terminates distally in the usual hook, with an accessory tooth on its upper surface. The whole hook is almost entirely enclosed in a large nearly circular hood, which is in reality double (Pl. xlvii., fig. 35).

Remarks.—This differs from the diagnosis of the genus *Notomastus* as given by Eisig[1] in the presence of capillaries on the first abdominal segment. It differs from *Eunotomastus* of M'Intosh[2] in having only 12 thoracic segments and in the presence of capillaries only in the anterior abdominal segments.

I hesitate to form a new genus, as my literature is not sufficiently modern for me to ascertain whether such a divergence is already known.

Loc.—South of St. Francis Island, South Australia, 35 fathoms (with *Thalanessa oculata* and *Ophelia dannevigi*).

Family OPHELIIDÆ.

Genus OPHELIA, *Savigny.*

OPHELIA DANNEVIGI,[3] *sp. nov.*

(Plate xlviii., figs. 36-37.)

A single specimen, 20 mm. in length with a breadth of 1.25 mm. across the ventral surface, and a height of 2 mm. The body contains 32 chætigerous segments, and has the usual spindle shape.

The prostomium carries at its apex a finely pointed conical tentacle with a pair of nuchal organs at its base, appearing as little brown streaks.

The mouth is at the level of the first chætæ.

The anus is surrounded by a circlet of 16 subcylindrical tentacle-like organs, eight on each side, arising from a common basal membrane. In addition there is a couple of ventral lancet-shaped stouter processes (Pl. xlviii., fig. 37.)

The ventral surface is traversed by a broad furrow, marked with transverse muscular bands, and bounded by a well-defined rounded ridge on each side. This "sole" is continued on to the head where, however, the ridges are absent. At first narrow, it attains its full width at about the tenth segment, and retains this till near the hinder end, where it again narrows, terminating at the base of the ventral anal lobes.

1. Eisig—Die Capitelliden, Naples Monograph, 1887, p. 807.
2. M'Intosh—Chall. Rep., Zool., xii., 1885, p. 388.
3. Named after the late Mr. H. C. Dannevig, Commonwealth Director of Fisheries.

The notopodia and neuropodia are distinct lobes, except in the anterior segments, where they are very small. Each lobe is a short cylindrical structure with definite lips, and on the anterior face is a small round-topped papilla. There is no ventral cirrus (Pl. xlviii., fig. 36.)

Parapodial gills are present after the tenth segment, except on the last three ; each has the usual form—simple, tongue-shaped and grooved. The first and second parapodia are very inconspicuous and carry but few chætæ : I counted three in the former and five or six in the latter. In the remainder they are numerous, all are alike, capilliform, of a shiny brownish tint.

The last three segments of the body decrease in diameter successively and abruptly, so that from the side they appear to be telescoped into one another, with a projecting posterior angle, where the chætæ arise ; these are very long on these segments, and reach beyond the anal tentacles.

The body may, then, be analysed as follows :—Total, 32 segments, of which the first ten and the last three are without gills, so that there are 19 gill-bearing segments.

Remarks.—It presents a good deal of similarity to *O. neglecta*, Schneider, as described by St. Joseph,[1] but he gives eighteen anal tentacles in addition to the ventral lobes, and the number of segments is one less.

Loc.—South of St. Francis Island, South Australia, 35 fathoms (with *Thalanessa oculata* and *Notomastus cisigi*).

Family MALDANIDÆ.

Genus ASYCHIS, *Kinberg.*

ASYCHIS VICTORIÆ, *sp. nov.*

(Plate xlviii., figs. 38-45.)

Praxilla abyssorum, M'Intosh, Chall. Rep., Zool., xii., 1885, p. 408.

A fragment, consisting of the head and seven chætigerous segments, measures 53 mm. in length by 4 mm. in diameter.

The prostomium slopes downwards to the ventral surface, is convex dorsally with a broad median flat ridge or platform occupying about half its width (Pl. xlviii., fig. 38)'; this is transversely striated and bounded on each side by a deep

1. St. Joseph—Ann. Sci. Nat., Zool., (8), v., 1898, p. 369.

furrow, nearly longitudinal, which, however, curves outwards anteriorly and ceases before it reaches this end (Pl. xlviii., fig. 40). The anterior end is rounded, and its thin margin is somewhat upcurved. Along each side of the prostomium is an upstanding lamella, whose thin upper edge is entire, and posteriorly is continuous with the margin of the peristomium. The prostomium is dorsally overhung by a transverse flap of the peristomium, which is also entire. If this flap be lifted up the prostomial platform or flattened ridge is seen to extend below it for about half the length of the peristomium ; this concealed portion is equal in length to the exposed portion of the platform.

The peristomium is biannulate, the posterior annulus being about half the length of the anterior, which is traversed by a horizontal furrow on each side dividing it into an upper and a lower portion, which latter is prolonged into the marginal lamella of the prostomium (Pl. xlviii., fig. 38).

The ventral surface of the head is flat, and the mouth is a longitudinal slit widened posteriorly into a nearly circular aperture, which lies at about the middle of the anterior annulus of the peristomium (Pl. xlviii., fig. 39).

The second segment and the four following are biannulate ; the anterior annulus is chætigerous and about twice the length of the posterior. The segments gradually increase in length, so that the distance between the 6th and 7th bundles of chætæ is about twice that separating the 2nd and 3rd bundles, the actual distances being 9 mm. and 5 mm. respectively.

Each of the segments 4, 5, 6 and 7 has a lateral glandular cushion along its entire length, which reaches up the side as far as the notopodium, but on the 8th this glandular cushion is limited to a quadrate area round the torus uncinigerus.

The first chætigerous segment, which succeeds the peristomium, has only dorsal capillary chætæ, arranged in a vertical fan-shaped bundle protruding from a two-lipped notopod.

In the following segments there is, in addition, a ventral torus uncinigerus, in which the hooks are arranged in a single row. This torus is very short in the third segment, rather longer in the fourth, and attains its full development in the fifth, where it is nearly half the height of the body.

The number of chætæ in the first and second bundles as well as the vertical length of the bundle are greater than in the succeeding segments ; the length of the second bundle being twice that of the sixth, but, in compensation, the height of the torus has increased.

There are two kinds of chætæ in the notopodium (Pl. xlviii., fig. 41)—(*a*) long, brownish capilliforms, with a very narrow flange and attenuate apex which is biserrulate (Pl. xlviii., fig. 44) ; and (*b*) much shorter, rather thinner, colourless, biflanged bristles, whose apex is also very long, but without serrulations ; the flange on one side is much wider than on the other (Pl. xlviii., fig. 45). These smaller chætæ lie anteriorly to the longer.

I counted in two bundles 20 of the longer and 12 of the shorter sort.

The hooks (Pl. xlviii., figs. 42-43) have a nearly straight shaft with a long terminal tooth, with three or four successively smaller teeth on its back, and the usual tuft of delicate filaments projecting upwards in front.

Remarks.—There is, I think, reason to suppose that *Praxilla abyssorum*, M'Intosh, is identical with this species. The figures in the " Challenger " Report (Pl. xlvi., figs. 10, 11) certainly disagree with the genus *Praxilla* in the form of the head and in other details. The figure is not very detailed, owing possibly to the state of contraction of the worm, but it shows the biannulate peristomium and the horizontal furrow on its side. It is true that M'Intosh states that the uncini do not begin till the 5th segment ; that again is possibly due to its state of preservation, for the tori in these anterior segments are quite short and the hooks few. The figure of the hooks, however, agrees precisely with that found in the present species. It appears, moreover, that he found two kinds of dorsal chætæ in the first four segments at any rate, for he writes :—" Some of the bristles are furnished with a distinct wing, while others are simple slender tapering structures." Another fact weighs with me, viz., that the worm was obtained in nearly the same region, " midway between the Antarctic region and Australia, in 1950 fathoms."

The form of the head, as well as certain other features, agree with Ehlers' account[1] of *Asychis* (*Maldane*) *amphiglypta* from South Georgia. At first he placed it in the genus *Maldane*, but in his account of the New Zealand Polychætes[2] it was included in the genus *Asychis*.

1. Ehlers—Polychæten Hamburger magalhaenische Sammelreise, Hamburg, 1897, p. 119.
2. Ehlers—Neuseeländ. Annelid., 1907, p. 26.

I have duplicates of specimens which I had sent to Ehlers from Waiheke, near Auckland, New Zealand, and noticing the resemblance between the Victorian specimen and Ehlers' account, I examined the New Zealand species. I find that the second or smaller sort of dorsal chætæ are totally unlike those figured by him for the *A. amphiglypta* from South Georgia, where he describes them as acicular in form. In the Waiheke specimens, however, they are transparent bristles, with a wide flange which is not traversed by the shaft and has the striations palmately arranged, instead of pinnately—that is, they radiate from the end of the shaft. These chætæ are situated anteriorly to the longer capillaries, not posteriorly as the acicular-like chætæ in *A. amphiglypta* are stated to be.

It is possible that Ehlers overlooked these smaller chætæ, which only just project through the skin. When mounted in canada balsam the flange is scarcely visible, and then they appear bluntly pointed; again, the capillaries, which he represents as "jointed," are, in the New Zealand as well as in the Victorian species, finely biserrulate along the fine apical point.

The present worm is quite distinct from the New Zealand species and from *A. amphiglypta*. I have placed it in Kinberg's genus *Asychis*, since it appears to agree better with that than with any of Malmgren's genera, but as I have but little recent literature on the family, I have described the external features somewhat in detail.

Loc.—Thirty miles south of Cape Nelson, Victoria, 1100 fathoms.

Family STERNASPIDÆ.

Genus STERNASPIS, *Otto.*

STERNASPIS SCUTATA, *Ranzani.*

Thalassema scutata, Ranzani, Isis, xi., 1817, p. 1457.

Sternaspis thalassemoides, Otto, Nova Acta, Acad. C.L.C., x., 1821, p. 619.

Sternaspis princeps, Selenka, Chall. Rep., Zool., xiii., 1885, p. 6.

One specimen, a good deal shrunken, with a length of 12 mm. and a width of the anterior chætigerous region 4.5 mm.

I have compared it with specimens from Naples and can find no essential differences; neither proportions of body nor of the shield, neither in the colour nor configuration of the latter, neither in the number of bundles of chætæ round its margin, nor in the number of those in the rows in anterior region of the body.

The only instance, so far as I know, of the capture of a member of the genus in these southern waters is that recorded by Selenka in his "Challenger" Report in which he describes under the title of *S. princeps* specimens from deep water east of the East Cape of New Zealand. A very brief account is given, accompanied by a figure which does not show the features used in his diagnosis. In that account two characters are mentioned—the existence of "about forty" bundles of chætæ around the shield, and the presence of an oblique ridge across the shield dividing it into two unequal areas. But this is true also of *S. scutata* from Naples.

The number of bristle-bundles varies, apparently with the size, for in a small specimen there are 28-30 bundles, and in a larger one I find 38 bundles.

I have specimens of *Sternaspis* from two widely separated parts of the New Zealand coast—from Akaroa, in the South Island, 6 fathoms, and from the mouth of Akitio River in the North Island, 20-36 fathoms. The former are smaller than the latter, but I can find no difference between them and the Naples specimens, comparing similar-sized individuals. I am compelled, therefore, to suppose either that there are two species of *Sternaspis* in our New Zealand waters, or that Selenka's species is a synonym—which is the view I take.[1]

Loc.—One hundred and forty-two miles west of Kingston, South Australia, 30 fathoms.

Distribution.—European seas; Japan; North Pacific[2]; New Zealand.

Family SABELLIDÆ.

Genus Sabellastarte, *Kroyer.*

Sabellastarte japonica, *Marenzeller.*

Laonome japonica, Marenzeller, Sud-japan. Annelid., 1884, p. 16.

The species must be removed from the genus *Laonome*, Malmgren, in which the thoracic chætæ are of two distinct forms, to that of *Sabellastarte*, in which there is but one form, though this occurs in two sizes in a bundle.[3]

1. I give further details about these New Zealand specimens in Trans. N.Z. Inst., vol. xlviii.
2. Moore—Proc. Acad. Nat. Sci. Philadelphia, 1903, p. 487.
3. St. Joseph—Ann. Sci. Nat., Zool., (7), xvii., 1894, p. 249.

The species is one of the giants in the family. Three individuals were received by me; two were still within the tube, the third fortunately had been removed and was in consequence well preserved.

I may add a few notes in supplement of the diagnostic description by Marenzeller.

The worm measures 168 mm. in length over all, of which the gills occupy 45 mm., but this is not their true length, for they are much contracted and twisted. In a second individual, measured in the tube, the body is 126 mm. long and the gills less twisted add 60 mm. to this. The gills are, thus, approximately half as long as the body. The thorax is 11 mm. in length, 10 mm. in width, and 7 mm. in height. In this individual there are only seven chætigerous segments, the first segment being without any chætæ; the uncini commence with the dorsal bristles on the second segment. Another specimen exhibited a still greater degree of abnormality, for it has only four bundles of chætæ with the uncini below, although the ventral gland shields and intersegmental furrows indicate the normal eight segments. In this case the 1st, 3rd, 4th and 8th are without chætæ.

The abdomen contains more than 200 segments, with an anterior diameter of 10 mm.; it is flat ventrally, much arched dorsally, but further backwards the arching decreases till in the hinder half of the body the dorsal surface is nearly as flat as the ventral. The diameter is pretty uniform throughout, till close in front of the hinder end, when it rather suddenly tapers, the end being rounded.

As Marenzeller finds, the fæcal groove does not cease at the hinder end of the thorax, but is traceable as an ill-defined shallow furrow along the dorsal surface forwards, in a curved line towards the median dorsal depression, which lies just behind the collar-gap anteriorly. The groove would probably disappear in soft specimens; it is recognisable in this well-preserved individual owing to the slight irregular foldings of the skin. A similar but narrower furrow symmetrical with it exists on the left side.

The general colour of the worm is pale brown with a purplish tint; on the thorax this tint is produced by minute dots of pigment, which are especially aggregated above the notopodia, thus producing a broad purplish band, which extends on to the posterior face of the collar lobes and on to the branchial base. The gills themselves are uniformly pale brown, without any purplish tint, as also are the edge and anterior face of the collar.

Ventrally the gland shields are darker than the neighbouring parts ; the region between them and the chætigerous papillæ on the abdomen being almost white.

The gills are symmetrical, the ventral margin of the base of each is inrolled in a plane spire which describes more than a circle. The radioles (gill filaments) really arise in a single series, as Quatrefages[1] pointed out for *S. indica*, Sav., but some have broader outer edges than others, and thrust them out of series so that there appears to be an inner and an outer rank.

There are at least 130 radioles on each gill. The tip is naked for a distance equal to about twice the length of the upper pinnæ.[2]

The dorsal tentacles are 15 mm. in length, the so-called "palps" or buccal lobes are folded, directed forwards, and about as long as the ventral lobe of the collar.

The collar has a deep median cleft separating a right and left ventral lobe, which is triangular with rounded tip, overarching the first segment. The lateral portion, which is continuous with this, is low, slightly reflected, and decreases in height as it passes upwards to the level of the notopodia ; here a deep incision separates it from a dorsal lobe, which is directed forwards and inwards, at right angles to the former, to meet, but not to unite with, its fellow in the mid-line anteriorly.

The tube is a rich chestnut brown in colour, of tough horny material ; the lower end is paler, transparent and flexible ; the upper end opaque, much darker, and coated with fine grey mud. The lower end being softer is crumpled and twisted, so that the true length is difficult to determine, but it is about 220 mm., with a diameter of 12 mm. at the upper end.

As to the capilliform chætæ of the thorax, the figures given by Marenzeller exhibit some slight differences from my observations, which, however, may be due to his artist. Thus the flange on the shorter sort (Pl. iii., fig. 4B) is somewhat narrower than in the chætæ examined by myself, and the more slender sort (Pl. iii., fig. 4A) is represented as having a second flange, which is not always the case in the present specimens ; while here the flange is broader than Marenzeller's figure indicates.

1. Quatrefages—Hist. Nat. Annel., ii., 1865, p. 432.

2. I follow M'Intosh and Willey in the use of these terms, though it is unfortunate that they use "radiole" in a different sense from Grube.

These small differences, however, are of little importance when the general agreement is so close.

Remarks.—It seems useless to attempt to identify Baird's[1] "*Sabella grandis*" from which the gills were absent, and almost as useless to speculate as to whether the present species is or is not identical with *Spirographis australiensis*, Haswell,[2] from Port Jackson, for little precise anatomical detail is given. Both, however, are large forms, whatever genus they may belong to. It is possible that the large size and the inrolled gill-base led Haswell to place it in that genus.

The former is said to have come from New Zealand, but no Sabellid of this size (six and a-half inches without the gills) has been met with on these shores since that date.

Loc.—Off Babel Island, Bass Strait, about 60 fathoms.

Distribution.—Japan.

Family SERPULIDÆ.

Genus SPIROBRANCHUS, *Blainville.*

SPIROBRANCHUS LATISCAPUS, *Marenzeller.*

(Plate xlviii., figs. 46-50.)

Pomatostegus latiscapus, Marenzeller, Süd-Japan. Annelid., 1884, p. 22. *Id.*, Moore, Proc. Acad. Nat. Sci. Philadelphia, 1904, p. 173.

"? *Pomatoceros strigiceps*," M'Intosh, Chall. Rep., Zool., xii., 1885, p. 173. *Id.*, Treadwell, Bull. U.S. Fish. Comm., xxiii., 3, 1906, p. 1179.

I have transferred the species to the genus *Spirobranchus* on account of (*a*) the wide V-shaped ventral area on the thorax, and (*b*) the form of the abdominal chætæ, which are not "sickle" shaped as in *Pomatostegus*, but "trumpet" shaped,[3] and (*c*) the larger number of denticulations on the uncini.[4]

It was Ehlers who first pointed out these differences between the two genera, which previously had been distinguished by the form of the operculum. Ehlers, Marenzeller, St. Joseph and others have relegated this feature to a

1. Baird—Jour. Linn. Soc., viii., 1865, p. 160.
2. Haswell—Proc. Linn. Soc. N. S. Wales, ix., 1885, p. 673.
3. Ehlers—Florida Anneliden, 1887, p. 299.
4. Pixell—Trans. Linn. Soc., Zool., xvi., 1913, p. 78.

secondary position, and it is this feature of the present species which led to its being placed in the genus *Pomatostegus*, for the discs are in two or more tiers and there are no outgrowths from the surface of the opercular disc such as occur usually in *Spirobranchus*, but, on the other hand, it is calcareous instead of being of horny material.

There are one or two features in which the present worm appears to differ from that described by Marenzeller—(*a*) in the extent of the basal denticulated area on the collar chætæ, and (*b*) in the presence of a distinct lateral notch in the collar.

A comparison of the worm with that briefly described by M'Intosh under the title "? *Pomatoceros strigiceps*" from New Zealand seas leads me to identify that worm with Marenzeller's. It is certainly not *Pomatoceros strigiceps*, Morch, which is very common along our shores, and has been identified by Ehlers as *P. coeruleus*, Schmarda.[1]

The few details given by M'Intosh and his figures of the chætæ agree with the present species. The figure of the side view (Pl. lv., fig. 4), though rather obscure in details, in that the outline of the collar lobes are not definitely shown, when read in association with his account of it, renders it very evident that the "peculiar region having the aspect of a partially closed fan," lying in front of the dorsal lobe of the collar, corresponds with what I term the "latero-dorsal lobe" in my account below.

It seems desirable to add a short account of the worm with some figures to supplement Marenzeller's.

The dimensions agree almost precisely with those given by him (Pl. xlviii., fig. 46). The operculum carries 3, 4 or 5 discs, which are circular, pale pinkish in colour, calcareous, with a smooth upper face, which is nearly flat or slightly concave; there are neither outgrowths nor raised radial ridges on the surface. The vertical surface between the successive discs is feebly ridged longitudinally. In one specimen, possessing five discs, the terminal one is produced to form a smooth cone (Pl. xlviii., fig. 49). (Has this been worn away in other specimens? Does this correspond to the characteristic spines of *Spirobranchus*? It is worth noting that in some species such as *S. maldivensis*, Pixell,[2] the disc is unarmed and flat.)

1. Ehlers—Neuseeländ. Annelid., 1904, p. 67, and 1907, p. 30.
2. Pixell—*Loc. cit.*, p. 84.

The branchial base has its ventral margin inrolled in a plane spire for about a circle; the right and left bases are connected by a membrane which reaches to the level of the origin of the filaments or radioles, of which there are 30 on each side, rather thick and arising in a single series.

The collar is on the ventral surface directed forwards so as to cover the gill bases; it is entire here, though in the median line it is folded, which gives it the appearance of an incision (Pl. xlviii., fig. 47). On each side close to the dorsal surface, there is an incision separating a dorsal triangular lobe, directed forwards, which is posteriorly continuous with the thoracic membrane or "pallium."

Partially hidden by this dorsal lobe is a separate "latero-dorsal" lobe, slightly folded lengthwise, which is directed forwards and extends slightly beyond the free edge of the ventral lobe (Pl. xlviii., fig. 43). This I take to be M'Intosh's fan-shaped region.

The first bundle of chætæ (collar chætæ) is widely separated from the following dorsal bundles. It is situated at the upper end of an oblique tongue-shaped ridge, seen through the transparent "pallium" owing to its faint purple colour. It runs upwards from the level of the torus uncinigerus of the next segment, towards the apex of the dorsal collar lobe; it appears to be a support to this lobe or to the pallium (Pl. xlviii., fig. 48).

The tori uncinigeri are so arranged on the thorax that their ventral margins reach successively lower levels, thus a wide triangular area is outlined, with its open base forwards and the apex situated on or before the last thoracic segment. Gland shields occur within this area (Pl. xlviii., fig. 47).

The collar chætæ are about six in number, and have the usual shape (Pl. xlviii., fig. 50), though the basal denticulated region is much more extensive than is shown in Marenzeller's figure.

In all the other features there is agreement with that species.

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

Distribution.—Japan; Hawaii.

Genus Protulopsis, *St. Joseph.*

Protulopsis palliata, *Willey.*

(Pl. xlviii., figs. 51-55.)

Protulopsis palliata, Willey, Ceylon Pearl Oyster Fisheries, pt. iv., Suppl. Rep., xxx., — Polychæta, 1905, p. 316.

A single female specimen of a worm in its tube. The worm measures 21 mm. excluding the gills, which are 6 mm. in length, and the thorax 6 mm. ; the diameter is 2 mm. More or less cylindrical anteriorly, the body becomes flat at the hinder end, where the long capillary bristles project from each side to a distance equal to the width of the body. There is a dorsal gland at this hinder end.

There is little to add to Willey's account ; the fact that the tori uncinigeri commence in the fourth chætigerous segment is confirmed.

There are two curious structures on the base of the gill-support, one on the dorsal, the other on the ventral face.

Dorsally, the low transverse dorsal lobe of the collar seems to be continued forwards over the base of the gill as an irregular folded membrane as far as the origin of the radioles ; this membrane is broadly adherent to the gill-base (Pl. xlviii., fig. 53), and I take it to be "the wide lappet, which is rolled upon itself," described by Willey as occurring in the Ceylon species. He further suggests that it "is probably able to follow the branchial spire to its termination," a statement which I don't quite understand. If, however, I am correct in ascribing the present worm to Willey's species, this "lappet" certainly cannot do this ; it is by its adherence limited to the gill-base.

On the ventral face, there is on each side, well removed from the collar, a fold of skin nearly semicircular in outline which I do not remember to have seen figured or described previously (Pl. xlviii., fig. 52).

The ventral lobe of the collar is very greatly developed, forming a deep pouch in the preserved material with its opening forwards. Its connection laterally with the pallium or thoracic membrane is rather complex, and I have found it difficult to analyse in the small specimen, in which, too, the membranes very readily tear when touched. I have given figures, which I believe to be accurate representations of their relations.

I may remark that the distinction of the genus or sub-genus *Protulopsis* rests on a very uncertain feature. St. Joseph[1] separates it from *Protula* owing to the difference in the form of the abdominal bristles, which in the older genus are "sickle shaped," whereas in the new sub-genus they are less curved; at the same time he points out in a note on p. 338 in referring to *Filograna*, that in the case of these delicate chætæ immersion in alcohol for some time tends to alter the curvature, to diminish it, so that a sickle form may straighten out, and it is easy then to confuse the chætæ. However, I have retained the name as Willey's species is easily distinguished.

Loc.—East north-east of Maria Island, Tasmania, 100 fathoms.

Distribution.—Galle, Ceylon.

1. St. Joseph—Ann. Sci. Nat., Zool., (7), xvii., 1894, p. 263.

Plate XLV. will not be Published.

EXPLANATION OF PLATE XLVI.

Nereis arenaceodentata, Moore.

Fig. 1.—Head (× 8). The peristomial cirri are removed from the left side of the figure.

Fig. 2.—The fifteenth parapodium (× 35). The chætæ are omitted.

Fig. 3.—A sub-acicular chæta from the neuropodium (× 720).

Ceratonereis falcaria, Willey.

Fig. 4.—Head (× 40). Camera outline.

Fig. 5.—The thirteenth parapodium (× 70).

Fig. 6.—A parapodium posterior to the 21st segment with the characteristic dorsal chætæ (× 70).

Fig. 7.—A notopodial chæta from an anterior segment (× 720).

Fig. 8.—A notopodial chæta from the 22nd and subsequent segments (× 720).

Fig. 9.—A neuropodial chæta (× 720).

Fig. 10.—The maxillary region of the pharynx (enlarged). *Cheilonereis peristomialis*, sp. nov.

Fig. 11.—Head from the side (× 4) drawn from a specimen from New Zealand in which the peristomial lip is fully spread out.

Fig. 12.—A sub-acicular chæta from the neuropodium (× 250).

Fig. 13.—A supra-acicular chæta from the neuropodium (× 250).

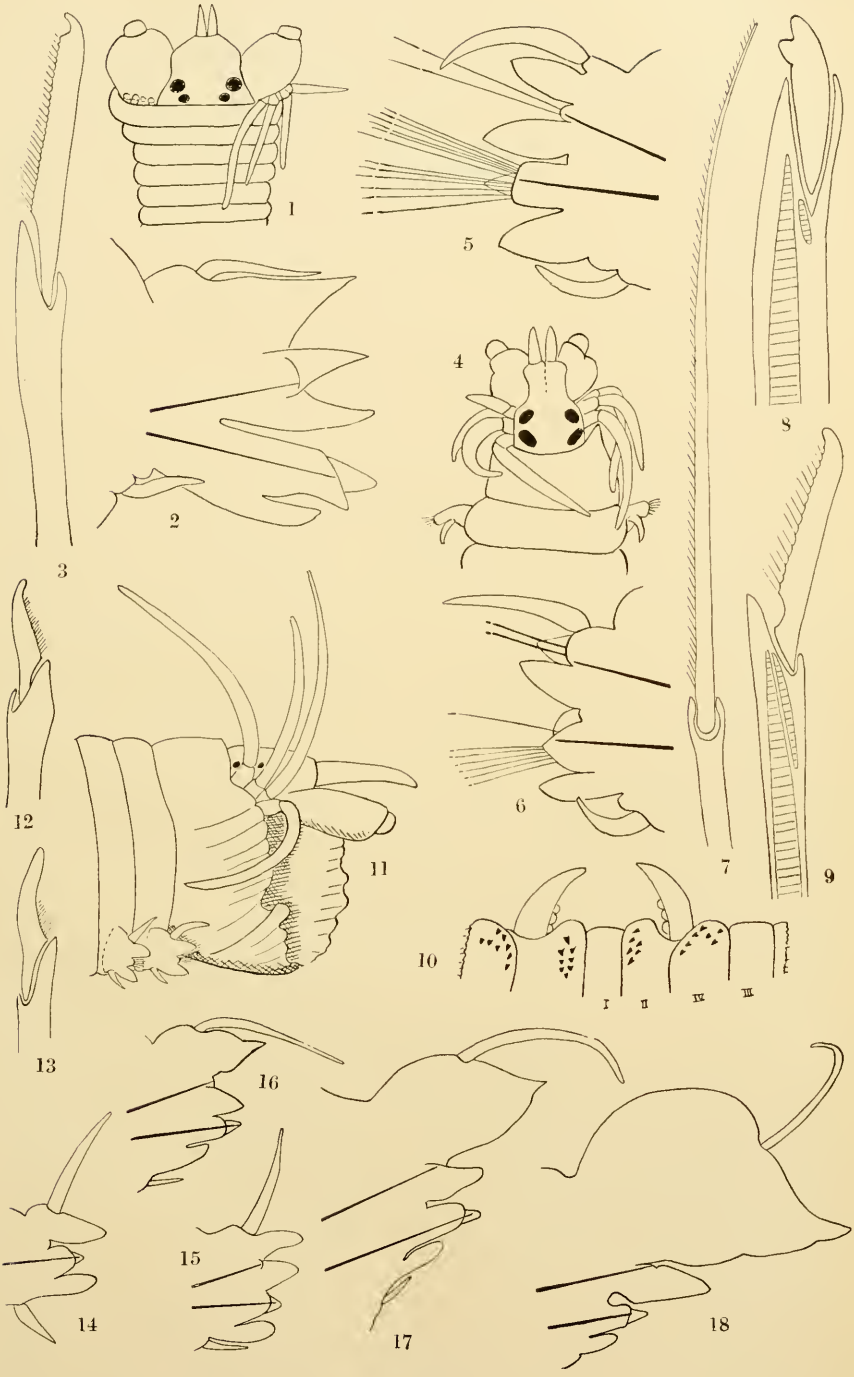
Fig. 14.—The second parapodium (× 10).

Fig. 15.—The third parapodium (× 10).

Fig. 16.—The ninth parapodium (× 10). The lamella is commencing to develop.

Fig. 17.—The twentieth parapodium (× 10).

Fig. 18.—The thirty-fifth parapodium (×10). The dorsal lamella and the dorsal ligule are now at their maximum development.



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EXPLANATION OF PLATE XLVII.

Cheilonereis peristomialis, sp. nov.

Fig. 19.—The fiftieth parapodium (× 10).

Fig. 20.—The ninetieth parapodium (× 10).

Fig. 21.—The everted pharynx (enlarged).

Fig. 22.—A parapodium of a female Heteronereid phase (× 8) from a New Zealand specimen.

Glycera tesselata, Grube.

Fig. 23.—A parapodium (× 35).

Fig. 24.—A pharyngeal papilla (× 250).

Fig. 25.—The tip of another papilla, side view showing the terminal disc (× 250).

Scione harrissoni, sp. nov.

Fig. 26.—Anterior end from the side (× 10). Somewhat diagrammatic; the tentacles are removed with the exception of one; they were broken away in order that the structure of the head might be seen clearly; the gill has been cut short.

Fig. 27.—Ventral view (× 10).

Fig. 28.—Dorsal view (× 10). The left gill is represented diagrammatically, as it had been broken in examining the head.

Fig. 29.—A thoracic uncinus (× 360).

Fig. 30.—An uncinus from above (× 720).

Fig. 31.—A thoracic capilliform chæta (× 360).

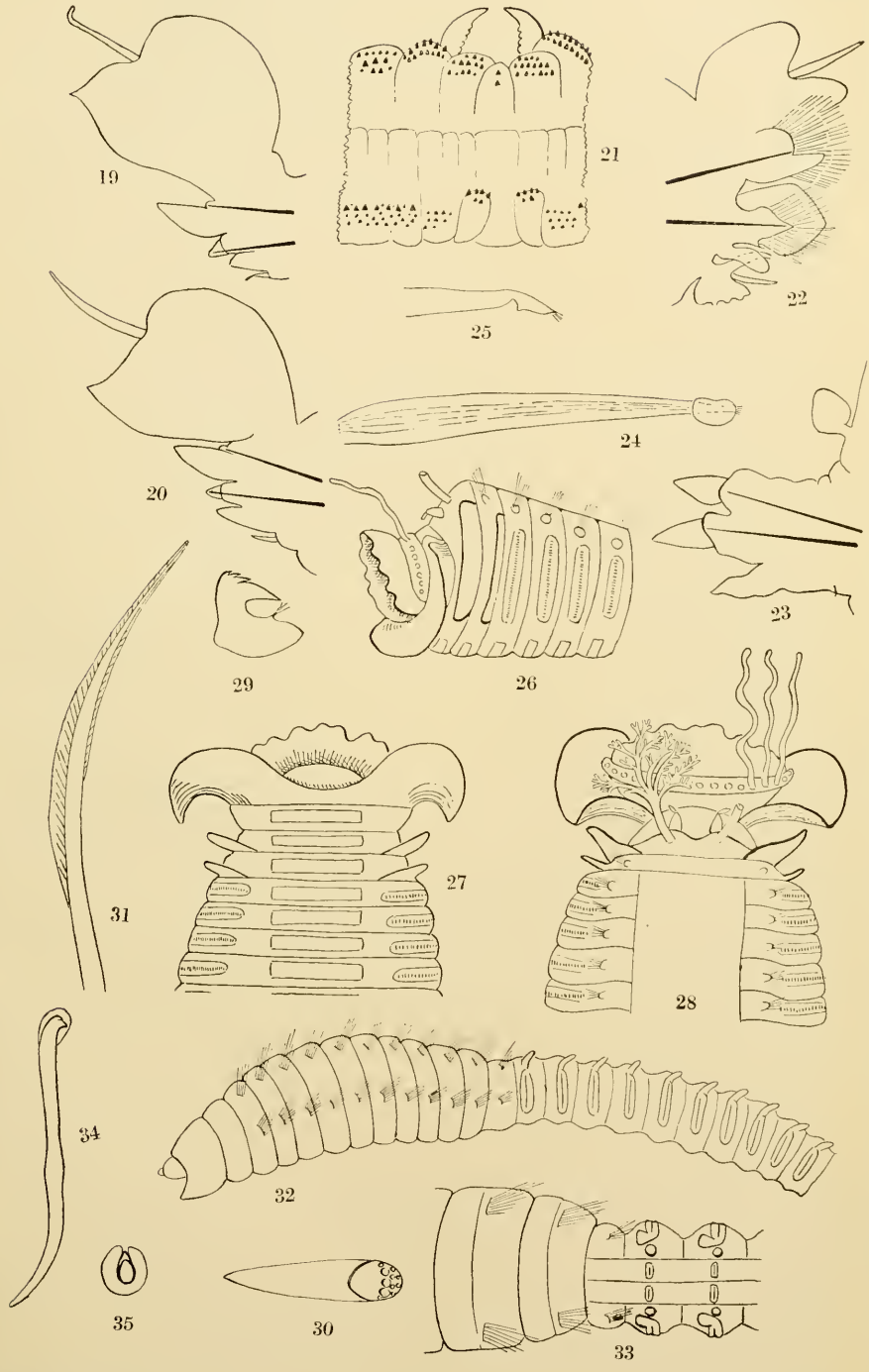
Notomastus eisigi, sp. nov.

Fig. 32.—Side view of greater part of the worm (× 4).

Fig. 33.—Dorsal view of last two thoracic and anterior abdominal segments (× 8). The circular marks on the abdominal segments are the "lateral organs," outside which are the angular "gills" at the upper end of the neuropodial tori. The notopodial tori are close together dorsally.

Fig. 34.—An abdominal chæta (× 45).

Fig. 35.—View of a chæta from above (free hand) showing the double wing enclosing the hook.



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EXPLANATION OF PLATE XLVIII.

Ophelia dannevigi, sp. nov.

Fig. 36.—A parapodium and gill, the latter cut short (much enlarged).

Fig. 37.—Ventral view of the posterior end (× 20). The chætæ and gills are cut short on the left of the figure.

Asychis victoriæ, sp. nov.

Fig. 38.—Side view of the fragment (× 2).

Fig. 39.—Ventral view of the anterior end (× 2).

Fig. 40.—Dorsal view of anterior end (× 2).

Fig. 41.—A notopodial bundle of chætæ (× 35). The long capilliforms are cut short.

Fig. 42.—One of the neuropodial chætæ (× 35).

Fig. 43.—The apex of a neuropodial chæta (× 250).

Fig. 44.—A portion of a capilliform chæta near its apex (× 360).

Fig. 45.—One of the shorter flanged, finely pointed chætæ from a notopodial bundle (× 250).

Spirobranchus latiscapus, Marenzeller.

Fig. 46.—Entire animal (× 2).

Fig. 47.—Ventral view of the anterior end (× 4), showing the V-shaped furrow in which the ventral glands lie, and behind them the transverse ventral portion of the pallium or thoracic membrane; the gills have been cut short.

Fig. 48.—Side view (× 4) to show the latero-dorsal lobe of the collar. The gills and operculum are now omitted.

Fig. 49.—Operculum (× 6) in its fullest stage of development with a conical terminal plate.

Fig. 50.—One of the collar chætæ (× 250). The tip is broken.

Protulopsis palliata, Willey.

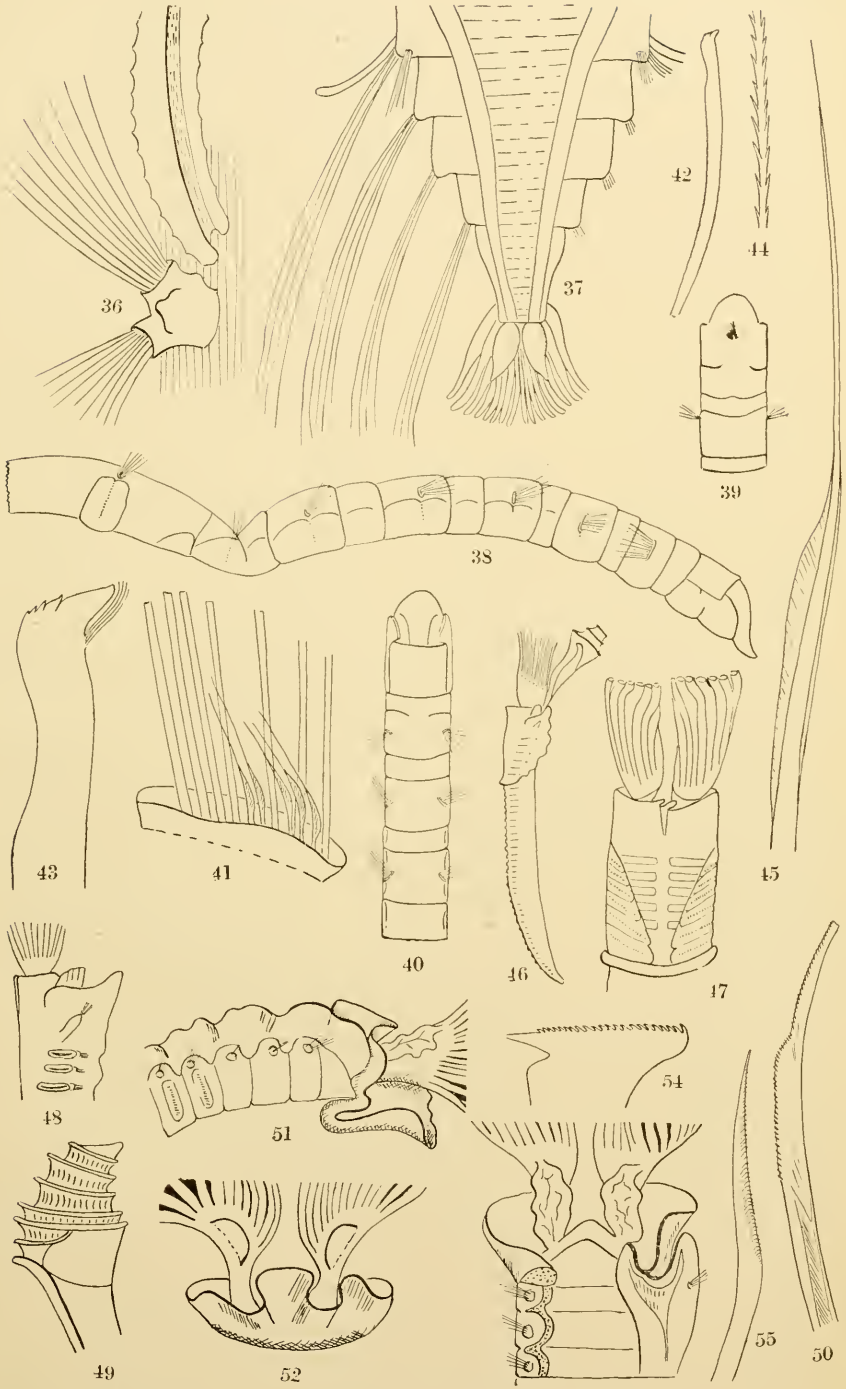
Fig. 51.—Side view of the anterior end (× 6). The gills cut short and the collar somewhat diagrammatically treated.

Fig. 52.—Ventral view of the collar (× 6), showing the great development of the ventral lobe of the collar, which forms a pouch, the base of which overhangs the first segment. On the gill-base is a curious upstanding semicircular fold.

Fig. 53.—Dorsal view (× 6). The pallium or thoracic membrane on the left side is cut away. The peculiar anterior continuation of the dorsal lobe of the collar (?) is seen passing along the gill-base to which it is adherent.

Fig. 54.—An uncinus, greatly enlarged.

Fig. 55.—An abdominal chæta (× 250).



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