XIX.—Report on the Annelida Polychæta collected in the North Sea and adjacent parts by the Scotch Fishery Board Vessel 'Goldseeker.'—Part IV. Goniadidæ to Spionidæ

James W. Pryde M.A.

To cite this article: James W. Pryde M.A. (1915) XIX.—Report on the Annelida Polychæta collected in the North Sea and adjacent parts by the Scotch Fishery Board Vessel 'Goldseeker.'—Part IV. Goniadidæ to Spionidæ, *Annals and Magazine of Natural History*, 15:86, 239-256, DOI: [10.1080/00222931508693634](https://doi.org/10.1080/00222931508693634)

To link to this article: <http://dx.doi.org/10.1080/00222931508693634>

Published online: 11 Sep 2009.

Submit your article to this journal [↗](#)

Article views: 6

View related articles [↗](#)

clypeus, and between the front carinæ; clypeus slightly pubescent; gaster with a fine pubescence.

Red-brown, head and gaster darkest.

Darwin, N.T., 16. iv. 13 (*Hill*). ♂.

CHRISTMAS ISLAND, STRAITS SETTLEMENT.

A few ants were collected in March 1914, and kindly submitted to me by my friend Mr. D. Ward Pinkney. They are as follows:—

Odontomachus hæmatoda, L., var. *breviceps*, var. n.

♂.—L. (including mandibles) 8.5 mm.

Length of mandibles 1.2 mm.; width of head 1.6 mm.; length of head 2.1 mm. Head much shorter, broader, and less emarginate behind than in the type. Occipital lobes much more rounded. Head widest at the eyes. Sculpture, pubescence, &c., as in the type.

Colour: dark chestnut, legs paler.

One ♂.

Triglyphothrix striatidens, Em., ♂.

Solenopsis geminata, F., var. *rufa*, Jerd., ♀ ♀ ♀.

Prenolepis vividula, Nyl., ♂.

CORRIGENDA (Part I., 'Annals,' ser. 8, vol. xv., Jan. 1915).

P. 134, line 26, for *Eur.* read *Em.*

P. 136, line 22, for *Myrmosphyma* read *Myrmophyma*.

XIX.—*Report on the Annelida Polychæta collected in the North Sea and adjacent parts by the Scotch Fishery Board Vessel 'Goldseeker.'*—Part IV. Goniadidæ to Spionidæ. By JAMES W. PRYDE, M.A., Walker Trust Research Scholar, Gatty Marine Laboratory, St. Andrews, and now 2nd Lieut. in the "Black Watch."

THIS, the fourth part of the Report on the Annelida Polychæta collected in the North Sea and adjacent parts by the Scotch Fishery Board vessel 'Goldseeker,' includes the following ten families:—Goniadidæ, Glyceridæ, Ariciidæ, Opheliidæ, Scalibregmidæ, Sphærodoridæ, Chloræmidæ, Chætopteridæ,

Cirratulidæ, and Spionidæ. Most of the families are represented by one genus and one species only; but in the Chloræmidæ two genera, viz. *Stylarioides* and *Brada*, occur. The numbers of each species vary very much, and only in two cases, viz. *Ammotrypane aulogaster* and *Stylarioides plumosa*, do they exceed twenty-two examples. These numbers, therefore, differ greatly from those published in Part III. of the Report*, where one species, viz. *Hyalinæcia tubicola*, was represented by 649 specimens and 755 tubes. No annelids were obtained in the tubes of the Chætopteridæ, notwithstanding that these are fairly numerous in this collection. The Spionidæ, a family renowned for its varieties and for the difficulties one encounters in distinguishing its many species, have only one representative, viz. *Scolecopsis vulgaris*, and the absence of the other forms may be accounted for by the fact that the members prefer a littoral to a deep-sea habitat. In some families, e. g. Cirratulidæ, there is only one small representative, and it is interesting to note the slight differences which exist between this solitary specimen and the adult form.

No lists of synonyms have been given, but they can be obtained from Prof. M'Intosh's 'Monograph' under the heads of the various species. As already stated, the specimens were those belonging to the collection handed over to Mr. W. Small, M.A., B.Sc., by Prof. D'Arcy Thompson. In conclusion, I have to thank Prof. W. C. M'Intosh for his kindness in assisting me when I was in difficulties, and in giving me, from his own collection, a typical series of slides of each group.

Family Goniadidæ.

Genus GONIADA, Audouin and Edwards.

Goniada maculata, Ersted, 1843.

Only one small specimen, scarcely half an inch long, is the representative of the genus and species. It was obtained at Station 41 B at a depth of 15 fathoms, and was dredged along with *Megalia assimilis*. This form has a very wide range, and has been found from littoral waters to a depth of 795 fathoms ('Porcupine' Expedition of 1870). It is prevalent in the shallow waters of the North Sea, and extends to North American and Canadian waters. No member of the genus was obtained by the 'Challenger,' but at Station 167 A in 10 fathoms the only representative of the family,

* Vide Ann. & Mag. Nat. Hist. ser. 8, vol. xiv. p. 289 (October 1914).

viz. *Eona trifida*, was dredged. Izuka, in his researches in the seas of Japan, found three species, but *Goniada maculata* did not occur. The reports of the German investigations of this family are not to hand, and so no comparisons &c. can be drawn.

The head is a long, bluntly rounded, conical process, with four short squat cirri, and consists of eight segments, which are very indistinct in this form. The body has, including the head, about eighty segments, and tapers more anteriorly than posteriorly, where it ends in two fairly long tapering cirri, which are pale and translucent. The colour appears to vary with the sex and with the season. This example is dusky brown throughout, but light touches occur at the bases of the feet and on the sides of the head. For a full description of fresh forms see 'Monograph of British Annelids,' vol. ii. part ii. pp. 464-6. The feet stand out conspicuously from the sides of the body, and are in agreement with those of typical forms. The bristles, however, like the example, are small, but are quite characteristic of the species, being pale in colour, tapering, and thin, the dorsal bristles having straight shafts, with no serrations or terminal pieces, and slightly dilatated tips. The ventral bristles are also pale and have fairly long curved shafts, with slender serrated terminal pieces articulated at the ends. The bristles are arranged fan-wise, and the tips of the posterior bristles, especially the central series of the fan, attain a much greater length.

The alimentary tract is simple, fairly narrow posteriorly, but wide anteriorly, and is easily seen through the thin body-wall. The mouth is ventral, possesses lips, and the anus lies between the two anal cirri already mentioned. The specimen is not mature, but some forms procured off the S.W. of Ireland had large ova in July. Prof. M'Intosh is inclined to think that *Goniada alcockiana*, Dr. Carrington, is a variety of this species.

Genus GLYCINDE, Fritz Müller.

Glycinde nordmanni, Malmgren, 1866.

Four very much dried and shrivelled specimens of this annelid were dredged on the 4th December, 1905, at Dabs Voe, in 15 fathoms. Each measures about 2 inches long, but one is very much thinner and more linear than the others, whose bodies taper anteriorly but more gradually posteriorly. The colour is dark brown, resembling that of *Ophiodromus flexuosus*, and there is little difference in hue

on dorsum and ventrum. This unique colour is no doubt due to the scorching the animals received in the laboratory fire, for in living examples the animals are pale pink or skin-coloured. The species is not uncommon in the stomach of the cod and flounder, and, when plentiful, forms abundant food-supply for these fishes. The range of the species is wide, for, besides being prevalent in British waters, it has been found off the Siberian coast (*Wirén*) and at other parts of the world. Allied forms, like those of the 'Challenger' collection, frequent shallow water. No mention of this species is made by Izuka, and no German report has come to notice.

The head is conical, but the four tentacles at the tip are just like little warts. No eyes are distinct, and the proboscis, although extended in three forms, has been injured and shows the various pieces of armature very poorly. The feet, although considerably dried, conform with the type-slides, and the bristles are quite characteristic of the species. None of the specimens were mature, but, according to various observers, the females at least become mature about June or July, and although no ripe males have been recorded, it is probable that both sexes mature simultaneously.

Prof. McIntosh says "It is remarkable to find such slight differences between the *Glycinde trifida* of the 'Challenger' from Charlotte Sound, New Zealand, and the British form."

Family *Glyceridæ*.

Genus *GLYCERA*, Savigny, 1820.

Glyceria lapidum, De Quatrefages, 1843.

In haul 111 one incomplete specimen of this form was dredged along with *Lumbriconereis gracilis* at a station $\frac{1}{4}$ mile N.W. of Glass Island, Shetland, at a depth of 16 fathoms. The animal is about $1\frac{1}{4}$ inches long and has about sixty bristled segments, each segment being three-ringed, and all appearing equal. Although only one example appears in the collection, this species is by no means scarce or uncommon, as the habitat given in Prof. McIntosh's 'Monograph' will show. It is found in deep as well as in shallow water, abounds in British seas, and extends to Norway, shores of North America, west coast of North America, Azores, Setubal, Mediterranean, but is not recorded in 'Challenger' Report nor from Japan.

The head tapers to a blunt point, from which four short slender tentacles arise, while the body tapers more posteriorly

than anteriorly. The dorsum is more convex than the ventrum, but the convexity is lost in the caudal region, which is somewhat flat and strap-shaped and terminates in two anal cirri.

Anteriorly the body has a rich golden-brown colour, which gradually changes to yellowish white posteriorly. The body-wall is thin and transparent, and the simple straight gut with its contents shines through, thus reminding one of the condition prevalent in the posterior region of many of the Eunicidæ.

The proboscis is fairly long, being about one-third the length of the entire animal, and presents a hard and very muscular appearance. It is richly covered with minute papillæ, which, according to the Monograph*, are filiform, with crenated edges. The tip, which is much wider than the base, roughly forms a square, at whose corners is placed a black, spurred, powerful tooth. The teeth are sunk in bulb-like muscular pads, the opening of the proboscis being where the pads meet in the centre. The organ is pinkish in colour and has many minute transverse striæ.

The feet are slender and appear on the anterior ring of the segment, a condition reversed in *Eumenia jeffreysii*, where the feet are borne on the posterior ring. They are white in colour and semitransparent. The example is so small that the anterior feet could not be removed without incurring serious damage to the animal; however, a lengthy account of them can be had in the Monograph. The feet from the twentieth were found to be quite typical, although the bristles were much more slender than those of the type-series. The specimen was not mature, but in this species epitokous forms appear which have larger bodies, longer and more prominently marked feet, and more attenuate bristles. From observation the animals ripen and shed their sexual products in the month of July.

Family Ariciidæ.

Genus ARICIA, Savigny, 1820.

Aricia cuvieri, Audouin and Edwards, 1833.

The distribution of the above family is very uncertain, and several well-known European forms extend to the shores of North America, where they have received different names. The members of the family frequent deep or inshore waters.

* Vide 'Monograph,' vol. ii. part ii. p. 480.

In this collection six examples were obtained in a fry-net in haul 6830 at 152 m. on 6th February, 1907, at Station 39 B, lat. 57° 59' N., long. 0° 57' E. The animals are very small, the largest being about 2 inches long, but 6 to 8 inches is a common size. From accounts given by other writers the above species is a deep-water form, having been obtained at depths ranging from 164 to 422 fathoms, 'Porcupine' Expedition of 1869, and from 257 to 358 fathoms by the same Expedition of 1870. It extends to Norway and the shores of Greenland, but neither Izuka nor the writer of the 'Challenger' Report makes any mention of it.

The head is small and conical, and agrees with the description laid down in the Monograph*. The proboscis is unarmed.

The body of the largest has about 65 bristled segments. It is stout in comparison with its breadth and attains its maximum breadth about the anterior ninth or tenth, where it measures about 4 mm. From this part it tapers quickly anteriorly, but more gradually posteriorly till it ends bluntly, the anus being situated at the tip dorsally, with two lateral flaps, a ventral process and papilla, and with two very long slender cirri, which the writer of the Monograph notes pass off from the anterior part as in *Aricia latreillii*. The dorsum, except in the first five segments, is flat, while the ventrum is rounded. Gradually, however, a groove appears ventrally, deepens and becomes more prominent towards the caudal region, which is absent in several of the specimens. The peristomium is narrow dorsally, but broad ventrally, the mouth occupying the position of the median ventral line at the posterior border of the segment. In shape the mouth resembles a sunken pit with smooth rounded sides, having two prominent crescentic lips, which are lateral in position, but there are no longitudinal symmetrical furrows passing forward from the segments behind. The proboscis, which is not extruded in any, is a deeply frilled organ which projects from the mouth as a button-like process. The Monograph adds "There are about ten frills in the form of a rosette."

The feet commence at the second segment and continue to the anus, but in the first twenty or thirty segments the dorsal portion of each foot is different from the ventral. From the thirty-first, however, both portions are similar. The feet agree with the descriptions laid down in the Monograph and with the types on the slides, and in position on the body they are situated more dorsally than ventrally. However, towards

* *Vide* 'Monograph,' vol. ii. part ii. p. 499.

the caudal region the feet become lateral in position, but never ventro-lateral. The branchiæ commence at the fifth pair of feet, and appear as little conical processes which increase in size from before backward. They are nearer the mid-dorsal line than the dorsal cirri, but between the twentieth and thirtieth segments they leave this region and approach the cirri. This, however, I find to be variable. Along with the increase in size of the branchiæ there is a corresponding increase in the size of the dorsal cirri, and this increase is especially marked at the base of the organs. Each branchia has two vessels which are linked together by a numerous series of connecting-trunks. The bristles, spines, and papillæ of the feet all conform with the Monograph*. The segmental organs are limited, but appear more prominently in posterior two-thirds of the body. All the examples are immature. However, quoting from the Monograph†, "Lo Bianco found *Aricia foetida*, Clap., ripe from January to June at Naples. The eggs are of a greenish colour and deposited in a cylindrical vermiform mass of mucus."

The contents of the gut were composed of fine mud particles, débris, and vegetable matter.

Family Opheliidæ.

Genus AMMOTRYPANE.

Ammotrypane aulogaster, H. Rathke.

Twenty-two specimens of this form, which has a general distribution, are present in the collection, but, like many others, they have suffered from the laboratory fire mentioned in previous reports. The tube containing the animals has no label, and consequently no depth nor locality can be given. The animals themselves are badly scorched and very much shrivelled. This species is found off the shores of the British Isles, but extends much farther north. Izuka makes no reference to either the family or the species, but in the 'Challenger' Report there is a form, *Ammotrypane gracile*, dredged off Japan, which closely resembles the European species.

The head is pointed, fairly large, but devoid of tentacles, tentacular cirri, and eyes. The mouth is ventral in position and appears as a fairly large longitudinal slit, which continues as a ventral groove to the posterior end of the animal.

The body is linear, the longest specimen measuring about

* Vide 'Monograph,' vol. ii. part ii. p. 500.

† *Ibid.* p. 501.

2 inches, being pinkish brown on the dorsum and pale pink on the ventrum and at extreme anterior end. The body-wall is smooth, firm, and thick, and agrees generally with that of *Ammotrypane gracile*, which, however, differs from it in having the intermediate pedicle—between the dorsal and ventral longitudinal muscles—short. The ventral groove, running from mouth to anus, is fairly deep, and is flanked by thick brood-ridges, which disappear at the scoop-shaped hood surrounding the anus. Along each border of the hood there are four cirri, while a pair of larger and thicker cirri, with a slender cirrus between them, are situated at the base.

The feet, with bristles and branchiæ, are placed laterally in close relation to the ventral ridges. In several they seem to occupy lateral shallow grooves formed by the ridges on the ventral side and by the convexity of the dorsum on the other. The bristles agree with the type-examples, but the branchiæ do not arise on the same foot in every form, this probably being due to the destruction of these organs by the fire.

In transverse section the cuticle is very dense, but the hypoderm is not strongly developed. The nerve-area, situated ventrally, appears as a transverse band, and so differs from that of *Ammotrypane gracile*, which is ovoid. The longitudinal dorsal muscles have regularly arranged fasciculi and slant obliquely along the dorsal arch from a kind of median raphe.

The specimens were immature, and the contents of the intestine were mud, sandy particles, and débris. In the intestine of a 'Challenger' specimen was sandy mud, with diatoms, broken sponge-spicules, fragments of Echinoderm spines, and Foraminifera.

Family Scalibregmidæ.

Genus EUMENIA.

Eumenia (*Lipobranchus*) *jeffreysii*, M'Intosh.

This species is the sole member of the above family in the collection, and it is surprising that *Scalibregma inflatum*, a form having a wide distribution, does not occur. The following table gives the data connected with the hauls:—

Date.	Haul.	Station.	Depth.	Apparatus.	Number obtained.
17-7-08	152	Ardmore Point $1\frac{1}{2}$ miles S.	180 m.	Dredge.	14
28-6-09	192	Kinnaird Deep.	181 m.	Dredge.	6

No mention of this species is made by Izuka or the writer of the 'Challenger' Report, although the genus *Eumenia* has one representative among the 'Challenger' worms, viz. *Eumenia reticulata*, which differs from Théel's *Eumenia longisetosa* in that the dorsal lamellæ commence at the fifteenth instead of at the tenth foot. *Eumenia jeffreysii* extends to Norway, and Dr. Gwyn Jeffreys dredged it off the Hebrides and the Shetland Isles; but there is reason to believe that it abounds in more northern latitudes.

The head is bluntly conical in shape, contracted in appearance, and has a slight median groove, but bears no tentacles. The body is maggot-like, deep reddish brown in colour, which is often deeper in hue at the ends, and the feet are represented by dorsal and ventral pads, from which the bristles project. The bristles are long, linear, and translucent; while the spines which support the feet are stout and strong, although fairly short. There are no anal cirri, while those on the feet, if present, are rudimentary. Each segment has three rings, of which the posterior, bearing the feet, is the most pronounced. Each ring, moreover, is formed by an aggregation of small papillæ, which give the animal a rough, warty appearance.

Although the animal is short, the gut, when exposed, is fairly long, sacculated in appearance, and is of great width where the sacculations occur. The gut-wall is very thin, and the gut-contents can be easily seen as a yellowish-green mass which differs in appearance from the dark green-coloured faecal packets found in *Hyalinœcia tubicola* and other Eunicidæ. The mouth opens into a buccal cavity, which leads into a short but fairly wide œsophagus, which, in turn, enters a muscular stomach cubical in shape. From the posterior end of the stomach the gut extends to the anus, which is a prominent aperture at the tip of the tail. In several of the examples there was a large reddish-coloured mass surrounding the posterior region of the gut, yet often having extensions in the anterior end. This mass was composed of ova in some cases and in others of spermatozoa, which were aggregated together to form spermatophores, which were almost as large as the ova, but which did not possess zonæ. In the anterior region the gut is moored in position by five or six mesenteries, which are very thin and which stretch from the wall of the gut to the body-wall. There may also be one or two at the posterior end. A rich supply of blood-vessels and nerves extends along the whole alimentary canal.

The nervous system of this species is very well developed. There is a fairly large bilobed brain, which gives off a ventral

nerve-cord. On this cord there are small ganglia which are situated in the same part of each segment as the feet and from which branches are sent out to the feet and the gut.

Family **Sphærorodidæ.**

Genus **EPHESIA**, H. Rathke.

Ephesia gracilis.

One incomplete specimen having seventy-eight segments was dredged along with *Syllis cornuta* in 15 fathoms. The example is almost complete, only a few of the posterior segments being absent. It is linear in outline, tapered anteriorly and posteriorly, and attaining its maximum breadth about the thirty-second segment.

The head is fairly large, almost quadrangular in shape, and at the anterior corners of the quadrangle there are bulb-like palpi which have nipple-like apices. The cirri in the anterior region are very indistinct, having been damaged in the mounting of the example. The anterior segments are short, fairly narrow, and appear to be somewhat crowded; but in the posterior region of the animal the segments are so broad that the intervals between consecutive feet are conspicuous. The colour is brown and the body-wall is so thin and transparent that the entire gut is seen as a simple tube which is narrow anteriorly, very wide in the mid-region, and fairly wide posteriorly. All over the body, both dorsally and ventrally, occur numerous transverse striæ, which are only visible under very high power. The animal is not mature.

The Sphærorodidæ do not occur in Grube's 'Gazelle' collection nor in that from the Philippines. Schmarda gives a single doubtful form from Jamaica. In the 'Porcupine' Expedition this species was obtained at a depth of 664 fathoms, and in the Norske Nordhavs-Expedition it occurred at 417 fathoms. No mention of the species is made in the 'Challenger' Report, but an interesting form, *Ephesia antarctica*, was procured at Station 156 near the antarctic circle at a depth of 1975 fathoms*.

"The segments resemble those of the common *Ephesia gracilis*. Dorsally is the large globular appendage, which exhibits a much more minute papilla than in the latter form.

* Vide 'Challenger' Report, vol. xii. p. 361.

Internally the globular processes have elongated granular structures. The skin of the foot is likewise covered with papillæ. A single spine supports the foot, the bristles in which differ from those of the adult *Ephesia gracilis* in having the terminal piece less hooked as well as distinctly differentiated from the end of the shaft. The terminal piece forms a somewhat conical process with an oblique base, the dorsal margin being slightly convex, the ventral slightly concave. The shaft is somewhat curved and is dilated at the tip below the bevelled articular surface. The bristles are very translucent and approach those of *Ephesia canadensis*, a species, however, which differs in other respects from this form."

Family Chloræmidæ.

Genus STYLARIOIDES.

Stylarioides plumosa, O. F. Müller.

This species is one of the two representatives of a somewhat widely distributed and noteworthy family. The annelids were obtained as follows :—

Date.	Haul.	Station.	Locality.	Depth.	Apparatus.	Number obtained.
8-7-07	89	16	62° N., 6° 12' W.	128 m.	Sm. Trawl.	21+fragments.
28-6-09	19		Kinnaird Deep.	181 m.	Dredge.	4.

In "Notes from the Gatty Marine Laboratory, St. Andrews. —No. XXX."*, Prof. M'Intosh gives the above as a common British species; but it is generally distributed in the North European seas, and extends to Greenland and the shores of America. This species, however, does not appear in the dredgings of the 'Porcupine' Expeditions of 1869 and 1870, although the genus is well represented by *Stylarioides glauca*, *S. flabellata*, and *S. sarsii*, which resembles *S. plumosa*, but has a shorter anterior region, fewer segments, more velvety surface, and stiffer dorsal bristles. In the dredgings of Dr. Whiteaves in the Gulf of St. Lawrence, Canada, good

* *Vide* Ann. & Mag. Nat. Hist. ser. 8, vol. ii. p. 524 (Dec. 1908).

examples of *S. plumosa* were obtained. Again, Canon Norman found several of this species, but his examples are much inferior to those from British waters. Perhaps it may be said that the home of the genus is in North European seas and in the Arctic Ocean, for in Northern Norwegian waters alone the following species abound :—*Stylarioides plumosa*, *S. glauca*, *S. flabellata*, *S. hirsuta*, and *S. normani*.

In the 'Challenger' Report* the writer notes : "The distribution of this family [Chlorœmidæ] is in some respects noteworthy, both as regards area and depth. Thus most of the specimens described by former voyagers come from shallow water or between tide-marks, but the explorations of the 'Challenger' have carried these peculiar forms to a depth of 2500 fathoms, or nearly twice the depth at which the naturalists on board the 'Porcupine' had found *Stylarioides glauca*. Moreover, the wide distribution of the remarkable intermediate type, *Buskiella abyssorum*, is interesting in connection with the view that the ancient forms have been gradually driven into the great depths by the more recent types attaining supremacy in the shallower water." Three new species were added to the list by this ('Challenger') Expedition.

The specimens of this collection are not very large, the longest being about 2 inches and having fifty segments and the shortest a little over one-quarter of an inch with twenty-four segments. They agree with the description given in Ann. & Mag. Nat. Hist. ser. 8, vol. ii. (December 1908), but the hoof-shaped process does not occur in any. The bristles of the small, probably a young, form are not of the usually golden colour, but are semitransparent, very slender, and taper to fine points. The transverse markings, however, are quite distinct and characteristic. The surface of the body is very rugose and the bristles of the feet project from it in little clumps. These bristles, like those of the anterior region, are pale, non-iridescent, and translucent.

The branchiæ are shrivelled and pale, but in life they are beautiful green-coloured organs, the coloration being due to the blood, which is green, and are protected, like the palpi, by the anterior bristles, which have a forward and upward direction.

Prof. M'Intosh remarks :—"It is interesting that the type of bristle seen in this form persists in species from the Indian and other oceans, as shown, amongst others, by Prof. Ehlers

* Vide 'Challenger' Report, vol. xii. p. 362.

in his recent beautiful work on the annelids of the German Deep-sea Expedition."

Genus BRADA, Stimpson.

Brada normani.

Three examples of this annelid were found on 8/7/07 in haul 87 at Station 16, lat. 62° N., long. 6° 12' W., in a small trawl at the depth of 128 m. Each animal measures a little over an inch, and has twenty-two segments. There is a test of very fine sand-grains surrounding the body, and, like the surface of the body, is very rugose. The bristles in the anterior region and on the setigerous processes project as little golden clumps beyond the sandy test.

The body is maggot-like, having the anterior end more bluntly rounded than the posterior. The mouth is a conspicuous triradiate opening at the extreme anterior end, while the anus appears as a vertical slit at the extreme posterior. The lips are thick, swollen, and covered with minute sand-particles. Along the line of the dorsal bristles there are large, long, flattened papillæ which have pointed tips. As Prof. McIntosh remarks, "These papillæ differ in a marked degree from those usually seen in *Stylarioides*, *Brada villosa* or *granulata*. The dorsal bristles are few, slender, and inconspicuous. The ventral ones are long, have thick shafts of almost uniform breadth throughout, and end in bluntly rounded tips which are slightly bent. The tips in some, however, are probe-like and tend to be slightly attenuate. These bristles have well-marked transverse striæ, which become fainter towards the tips, where they ultimately disappear. In many there are also oblique striæ which are prominent on the part of the bristle projecting beyond the surface. The setigerous lobes are fairly conspicuous, standing out from the rugose surface as little elevations from which the bristles project, and around which are clustered several bulbous papillæ. The gut is simple, straight, and very narrow, and in segments 6, 7, and 8 it is surrounded by a dense mass of ova which are reddish-yellow in colour. The ova are small, spherical, and have very thick zonæ.

Family Chætopteridæ.

Genus PHYLLOCHÆTOPTERUS, Grube.

No species can be assigned to the various tubes of this genus, which were procured as follows:—

Date.	Haul.	Station.	Locality.	Depth.	Apparatus.	Number obtained.
21-6-06	31	Buchan Deep.	57° 31' N., 1° 12' E.	106 m.	Sm. Trawl.	3 tubes.
27-7-06	45	23 A	59° 51' N., 1° 12' E.	115 m.	Sm. Trawl.	1 tube.
20-7-07	103		Kinnaird Deep.	201 m.	Dredge.	5 tubes.
20-7-07	103		Kinnaird Head.	20 fms.	Fry Net.	2 tubes.
14-2-08	8730	40 B	57° 24' N., 1° 7' E.	95 m.	Dredge.	3 tubes.
7-7-08	142	Knoere Knap-Sagna Fiord	N.E./N. $\frac{1}{2}$ mile.	395 m.	Dredge.	3 tubes.
			No label.			10 tubes.
			No label.			3 tubes.

The tubes differ very much in size and thickness, and while some have rings clear, well marked, and at regular intervals, others have them irregularly placed and almost indistinct. The tubes found at Buchan Deep are about 8 inches long, fairly thin, clear, and nearly transparent, and are almost entirely filled with very fine sand. They have irregularly arranged transverse striations, and at one end there is often a perforated septum, which probably acts as a means of defence and at the same time functioning as the V-shaped or zigzag valves in *Hyalinæcia tubicola*. Prof. McIntosh, in his remarks on this genus in the 'Challenger' collection, says:—"Toward the posterior end a very neat diaphragm with a minute aperture in the centre occurs; and above the septum is occasionally a collection of the small ovoid faecal masses and other débris, so that this region of the tube is rendered opaque"*. The rings on the tubes were very irregular and only a few were well pronounced. The tube obtained at Station 23 A was fragmentary and resembled the quill-like tube of *Hyalinæcia tubicola*, but no valves or septum was present. Those dredged at Kinnaird Head and Deep were taken along with several Polynoidæ, Serpulidæ, and Terebellidæ, and, although quill-like, they were brown in colour and very much coarser than that previously mentioned. One measured about 8 inches long and was annulated at short but fairly regular intervals, and every tenth or fifteenth ring was stronger and better made than the others. Another had a very marked septum at one end. One of

* Vide 'Challenger' Report, vol. xii. p. 376, pl. xliv. 10 a.

three taken at Station 40 B had an external coating composed of broken pieces of Hydroids—mostly *Obelia* and *Sertularia*—small pecten-valves, coarse sand, and pieces of gravel. Those obtained in Sagna Fiord were quill-like, and were taken along with Nephthydidæ, Eunicidæ, and Maldanidæ.

Sometimes tubes are obtained showing forked branching, an appearance which is due to a fracture of the tube, and the continuation of the latter, not by the union of the broken ends, but by the secretion of a new piece with which the tunnel is continuous. The broken fragment has its channel closed, and it remains adherent apparently as a useless process. Prof. M'Intosh says, "this occurs both anteriorly and posteriorly, as tubes are found with a diaphragm in each limb of the fork. The bifurcation is thus only apparent, not actual" *.

This genus is represented in the 'Challenger' collection by a new species called *Phyllochætopterus clapedii*.

Genus SPIOCHÆTOPTERUS, Sars.

Several tubes belonging to this genus were found in the following hauls :—

Date.	Haul.	Station.	Locality.	Depth.	Apparatus.	Number obtained.
4-9-06	61	7	61° 06' N., 2° 1' E.	134 m.	Sm. Trawl.	4 tubes.
14-2-08	8730	40 B	57° 24' N., 1° 7' E.	95 m.	Fry Net.	2 tubes.
9-6-08	201	16	62° N., 6° 12' W.	112 m.	Dredge.	1 tube.
			No label.			1 tube.
			No label.			1 tube.

The tubes are all sizes and some are coated with fragments of small shells, valves of minute pectens, coarse sand, and gravel. Some, however, have a thick paper-like constituency and are very wide in bore. If the fragments of shells etc. be picked off or dissolved away, the internal portion of the tubes is yellowish and hyaline in character; but in the paper-like tubes no trace of the hyaline character is visible. None of the tubes show the valvular condition.

In the 'Challenger' Expedition several yellowish hyaline

* *Vide* 'Challenger' Report, vol. xii. p. 376.

tubes were obtained off the coast of New York at the depth of 1240 fathoms *, but, like those of the present collection, they were empty.

Family Cirratulidæ.

Genus CHÆTOZONE, Malmgren.

Chætozone norvegica.

At Station 41 B, lat. 56° 42' N., long. 0° 35' E., and at a depth of 75 m., a small complete form about a quarter of an inch in length was dredged. The feet, bristles, and general body-characters are quite diagnostic of the species, and there is nothing of outstanding interest about the form. The bristles are very slender, finely tapered, and almost transparent. The animal is not mature.

This genus is usually found in deep water, while the genus *Cirratulus* frequents shallower depths. In the 'Challenger' Report one member of the genus *Chætozone*, viz. *Chætozone benthaliana*, was found as deep as 1250 fathoms, while other representatives were procured at depths varying from 400 to 700 fathoms. The species *Chætozone setosa* described by Malmgren was found at a depth of 20-40 orgyiar.

Family Spionidæ.

Genus SCOLECOLEPIS.

Scolecolepis vulgaris, Johnston.

This species is the only representative of the Spionidæ. The members of the family are found in greater number in shallow water than in deep water, and in this present collection there are two fragments, each about 1 inch long, showing neither head nor tail. The fragments were obtained in haul 174 with a small trawl on 24th August, 1908, at Station 19 A, lat. 60° 36' N., long. 4° 46' W., and at a depth of 1030 m. This depth is the greatest which has as yet occurred in the data of the hauls connected with the Scotch North Sea investigations; but in the 'Challenger' Report members of the family were dredged at depths ranging from 110-725 fathoms. In the account of this species given by McIntosh † no depth is given, and in Izuka's work on the Errantiate Polychæta of Japan the Spionidæ do not even occur.

* *Vide* 'Challenger' Report, vol. xii. p. 380.

† *Vide* Ann. & Mag. Nat. Hist. ser. 8, vol. iii. p. 153 (Feb. 1909).

The fragments are very much lacerated, but the feet, which are close together, are not damaged, and agree with those on the type-slides. One of the fragments contains feet which must come before the fiftieth foot, because the ventral division shows no long winged hooks, which only appear about the fiftieth. However, there is some uncertainty where the hooks commence, for according to De St. Joseph they appear between the thirtieth and the fifty-second, while another investigator, Mesnil, records their appearance from the thirty-fifth to the thirty-seventh. The hooks are very powerful, having strong stout shafts which are curved and prominently striated, the hooks themselves facing upwards. The wings are large and extend to the surface of the lamella. Accompanying the hooks are slender, finely pointed, smooth bristles whose tips reach upwards beyond the hooks, while ventrally beyond the last hook there is a cluster of six or seven—three, according to Prof. M'Intosh,—which are minutely striated. In all the slender bristles the tips are curved and face downwards. The dorsal bristles are long, slender, and finely pointed, the length extending beyond the lamella being only about one-fourth the total length. The bristles arise close together and spread out fan-wise as they extend outwards. The bases are sheathed in muscles, which move them. The branchiæ which are present on all the feet of the fragments are large, bluntly conical, and present edges having a frilled appearance. Prof. M'Intosh remarks that in life the lamellæ of the feet as well as the branchiæ, which meet those of the opposite side in the front, are muscular and perform various movements.

The body-wall of this species is very thick and muscular, and thus presents a condition totally different from that of many of the Eunicidæ, which have body-walls so thin that the fæces in the gut appear as green masses. I was unable to obtain any nephridia, but one fragment contained ova which were fairly large in size and opaque in colour. The gut, which was exposed in parts, is fairly wide and is covered by a white-coloured tissue which has been probably discoloured by the preserving fluid. The contents of the gut were sand, débris, and brown masses which appeared like pieces of tissue. It is doubtful whether the animals are carnivorous or not.

The fragments were taken along with several Polynoidæ which were worked out by Mr. W. Small.

Bibliography.

- IZUKA. 1912. 'The Errantiate Polychæta of Japan.'
MALMGREN. 1865. 'Nordiska Hafs-Annulater.' Stockholm.

- M'INTOSH. 1874. Trans. Zool. Soc. vol. ix. part 7. "On British Annelida."
 —. 1885. 'Challenger' Reports, Zoology, vol. xii. "Annelida Polychæta."
 —. 1908. 'Monograph of British Annelida.—Polychæta,' vol. ii. part i.
 —. 1908. Ann. & Mag. Nat. Hist. ser. 8, vol. ii. (Dec. 1908).
 —. 1909. Ann. & Mag. Nat. Hist. ser. 8, vol. iii. (Feb. 1909). "British Spionidæ."
 —. 1909. Ann. & Mag. Nat. Hist. "Notes from the Gatty Marine Laboratory.—No. XXXI."
 —. 1910. 'Monograph of British Annelida.—Polychæta,' vol. ii. part ii.

XX — *Note on the Mouth-parts in a Species of Polyplax (Anoplura) and on the Relationship between Anoplura and Mallophaga.* By BRUCE F. CUMMINGS, British Museum (Natural History).

(Published by permission of the Trustees of the British Museum.)

ONE of the most interesting of recent memoirs on the Anoplura and Mallophaga is that published in the 'Arkiv för Zoologi' for 1910 *, by Dr. Eric Mjöberg of the Academy of Sciences, in Stockholm. In the course of this work, entitled 'Studien über Mallophagen und Anopluren,' the author brings forward a very considerable amount of morphological evidence, gleaned from various regions of the anatomy, showing good cause why the Anoplura, or blood-sucking lice (usually taken to be allied to the Rhynchota), should be regarded as more closely related to the Mallophaga—or mandibulate bird-lice. An account of previous views of the systematic position of the two orders is given on page 203, and a recapitulation is here unnecessary. Mjöberg links the Mallophaga with the Psocidæ and the Psocidæ with some Blattoid-like stem-form.

For the first time, Mjöberg has presented us with a more or less extended comparison of the two groups—system for system; and, by marshalling unmistakable likenesses in the genital organs, the tracheal system, the external morphology, and even the mouth-parts, has placed the intimate phylogenetic relationship of Anoplura and Mallophaga on a sound basis. The Anoplura, therefore, appear to be Mallophaga which have taken to sucking blood, and are modified accordingly. It has been suggested that some Mallophaga, such as

* 'Arkiv för Zoologi,' vi. 1910, pp. 1-296.