

THE ANNALS
AND
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[NINTH SERIES.]

"..... per litora spargite museum,
Naiades, et circum vitreos considite fontes:
Pollice virgineo teneros hic carpite flores:
Floribus et pictum, divæ, replete canistrum.
At vos, o Nymphæ Craterides, ite sub undas;
Ite, recurvato variata corallia trunco
Vellite muscosis e rupibus, et mihi conchas
Ferte, Deæ pelagi, et pingui conchylia succo."
N. Parthenii Giannettasi, Ecl. 1.

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

[Plates I.—III.]

1. On new and rare *Polychæta*, *Gephyrea*, etc., from various Regions.
2. Recent Additions to the British Marine *Polychæta* (*continued*).

1. *On new and rare Polychæta, Gephyrea, etc.,
from various Regions.*

OF the pelagic forms related to the Phyllodocidæ Mr. Southern has added to the British Fauna *Maupasia cæca*, Viguiér, which has a head with slender tentacles and two pairs of tentacular cirri of equal length. The foot is short and blunt, the dorsal and ventral cirri projecting beyond the tip. The dorsal cirrus is foliaceous, the ventral long and slender. The bristles are more slender and elongate than those of the type, and the terminal piece rests on a process considerably within the tip of the shaft, which is pointed. The terminal piece is very slender. It

occurred in a tow-net at 411 fathoms off the West Coast of Ireland (*Southern*). Another addition is *Haliplenes magna*, Southern, from the same region, a pelagic form in which the head is rounded in front; dorsal tentacles as long as the head is wide, and slightly larger than the ventral pair, which are placed far back, just in front of the mouth. At the base of the head dorsally is a wide collar, projecting laterally, and continued on the ventral side behind the mouth. No eyes. Body 3.6 mm. long; segments thirty-five; width across the feet 1 mm. Colour in spirit pale yellowish brown. Foot with the pointed setigerous lobe projecting beyond the cirri and the tip of the spine is just visible. The dorsal cirrus is pear-shaped, the ventral bluntly conical. Bristles with slightly curved shafts and a prominent process at the tip. The terminal piece is long and slender, two to three times as long as the free portion of the shaft (*Southern*).

A third pelagic type is *Lopadorhynchus appendiculatus*, Southern, procured off the West Coast of Ireland in the tow-net over 450 fathoms. The dorsal tentacles on the head are twice as long as the ventral, which are not seen from the dorsum. The ventral tentacular cirri are somewhat longer than the dorsal, and on the basal piece of the ventral is a rudiment of the third pair. Body 13 mm. long and 5 mm. wide, narrowed posteriorly; segments twenty-three, of which twenty-two are setigerous. Dorsally each segment is marked by a transverse ridge running along the middle, so as to have lozenge-shaped depressions in each intersegmental area, and ridges also occur ventrally. Feet anteriorly modified, but the typical foot occurs at the seventh, which has a pointed setigerous lobe with a spine and a rounded setigerous lamella with seventy-six compound bristles. The dorsal cirrus is conical and larger than the ventral, the tips of both being within that of the setigerous lobe. The ventral cirrus has a filiform process at the tip and the aperture of a multicellular gland near its base. Small granules of dark purple pigment occur on the inner sides of the cirri.

The same form was described by Prof. Fauvel as *L. uncinatus* a few years later, and he emphasized the presence of the hooked bristles in the first two feet by his title to the species.

Eumenia hystricis, sp. n.

Dredged on the Channel slope at Station 8, 'Porcupine' Expedition, 1870, at a depth of 257-690 fathoms amidst a fauna chiefly northern.

A fragment devoid of the anterior region, resembling a curved larva of an insect, of a rounded form and apparently thickest posteriorly, for it tapers anteriorly, where the segments are longer, and closely ringed throughout the rest of its extent. Each segment bears two short gills, thus differing from *Eumenia crassa* or *E. jeffreysii*, and they are longest behind the middle and diminish in the caudal region. They spring apparently from the posterior edge of each segment-junction, and generally in the preparation present a somewhat club-shaped outline (Pl. I. fig. 3) with a firm cuticular investment having a finely granular hypoderm beneath. They are marked by transverse striæ, probably due to the circular fibres, whilst internally is a large blood-vessel which may form a loop distally, though the state of the specimen rendered this uncertain. Some of the gills contained large granular cells, but the nature of these has not been ascertained.

The segments (Pl. II. fig. 9) are simple—that is, without rings,—each dorsally slightly overlapping the anterior edge of the succeeding segment, and from the curve of the body the dorsal antero-posterior diameter is wide, the ventral narrow. The posterior segments become increasingly narrow and terminate in the anus, which has beneath it two papillæ. The dorsal surface of the body is convex, the ventral presents a slightly flattened surface with a shallow groove posteriorly. The cuticle, moreover, by dipping in formed a series of reticulations, which here and there were arranged in long rows.

A remarkable feature was the apparent absence of bristles, no trace of which was observed until the fragments were put in xylol, when a vertical row of minute points—apparently the bases of bristles, though at first sight resembling minute uncini—was observed. The arrangement of the gills at once distinguishes this species from *Eumenia crassa*, Erst., and *E. jeffreysii*, M'I.

Eumenia caulleryi *, sp. n.

Dredged in an inland sea in Japan, lat. 33° 48' N. and long. 133° 19' E., in 26 fathoms, in 1874, by Capt. St. John, and kindly forwarded by the late Dr. Gwyn Jeffreys.

Two complete examples resembling *Eumenia crassa*, Erst., in general appearance, but which had been rendered horny by drying, were obtained, the ends especially suffering from

* Named after Prof. Maurice Caullery, of the Sorbonne, Paris, a distinguished investigator of the Polychæts.

the desiccation. What appeared to be the anterior end presented two rounded processes with a slit (mouth?) between them. This area was followed by six or seven narrow rings, each increasing on its predecessor. Behind these the segments were wider, and by-and-by showed two rings. The body seemed to be somewhat fusiform in outline, diminishing at each end, the posterior region presenting narrower rings. A groove occurred on each side anteriorly and probably continued to the posterior region, but the condition of the examples rendered this ambiguous. In this groove were the branchiæ, which appeared to extend almost from end to end, arising in front of the bristle-tufts and forming clavate organs (in the dried condition) of some length. The state of the specimen precluded absolute accuracy in this respect, and also as to whether some may have been bifid. They sprang from the anterior edge of the fold of the segment somewhat below the bristle-tufts. The entire surface of the body was covered with a tough (almost chitinous) cuticle minutely reticulated, so that under a lens it resembled very fine shagreen. Under the microscope rounded areas with a definite rim appeared.

The pale golden bristles formed two separate tufts in each segment, the dorsal consisting of long, tapering, simple bristles (Pl. I. fig. 2) similar to those in *Eumenia crassa*, but having no bifid spinous forms amongst them.

The ventral tuft, again, has long bristles (Pl. I. fig. 1) and the tip (Pl. III. fig. 6) of similar shape, but closely spinous throughout the distal third or more. When covered with débris or the crystalline rods found in old spirit-preparations, these spines may be overlooked, though it was the regularity of the crystalline rods which at first directed attention to these spikes.

So far as known no *Eumenia* or *Lipobranchus* presents the features of this species, simple bristles finely tapered at the tip and shorter bifid spinous bristles characterising the known forms. Moreover, the presence of branchiæ throughout the body is another feature of moment, and in this it agrees with *E. hystrix*.

Genus FAUVELIOPSIS, nov.

Prostomium rudimentary; cephalic region blunt, with bristles on each side. Body definitely segmented, divisible into anterior, middle, and posterior regions and grooved ventrally. Dorsal and ventral bristles with a pear-shaped papilla between them. The stouter anterior bristles present a terminal hook.

Fauveliopsis * *challengeriae*, sp. n.

A remarkable form dredged by the 'Challenger' at Station 157 on the 3rd March, 1874, at a depth of 1950 fathoms, presents features which appear to be unique in the Polychæts. It occupied a hard brownish tube with black grains. The region in which it was found had a bottom of Diatom ooze, and was characterised by such rare forms as *Trophonia wyvillei*, M'I., *Pista abyssicola*, M'I., the neighbouring area harbouring the equally rare *Ephesia antarctica*, M'I., *Grubianella antarctica*, M'I., and *Leæna antarctica*, M'I., all dwelling in the Diatom ooze.

The specimen (Pl. II. figs. 1, 2, & 3) measures 17 mm. in length, and is rounded, with a pale iridescent cuticle, the marked annulation in front giving it some resemblance to a small earthworm, though posteriorly the imperfect preservation and partial collapse give a different aspect. The anterior end is slightly bulbous with a ventral flexure, and presents lateral bristles almost to the tip. The prostomium appears to be rudimentary, and is indistinguishable in the specimen; the flattened ventral eminences on each side of the mouth are probably related to the peristomium. Dorsally the anterior margin is rounded, but ventrally the two flattened eminences probably represent the palpi, the fissure between them leading apparently to the mouth. The outline of the anterior region dorsally is somewhat ovoid (Pl. II. fig. 4), and a constriction occurs behind the first bristle-tuft. The outline then enlarges to the median region and again slightly diminishes posteriorly, where it ends in two acutely pointed papillæ—after the manner of some *Protodrili*. The tissues, however, in this region are pulpy. The body is very definitely segmented, five bristle-tufts occurring in the ovoid anterior region, then follows a narrow segment with a much longer antero-posterior diameter, succeeded by others which gradually widen transversely, the last diminishing also in antero-posterior diameter. Next come two well-marked narrower segments, likewise wide transversely, after which a series of less distinct segments more than twenty in number go to the posterior end.

Dorsally (Pl. II. fig. 1) the surface is smoothly rounded, but ventrally (Pl. II. fig. 2) a median groove—commencing at the mouth—runs backward until it is lost in the softened posterior region. Laterally the body (Pl. II. fig. 3) is marked by transversely elongated lozenge-shaped areas

* Named in honour of Prof. Fauvel, of Angers, who for many years has successfully laboured at the Polychæts.

between the bristle-tufts. Through the translucent posterior region a moniliform alimentary canal passes backward to the fissure between the caudal cones.

The bristles, of which there are about thirty-three pairs on each side, are pale, though in the sun they sparkle with metallic lustre, and are all directed forward—a feature most boldly marked in the longer anterior forms, which, moreover, are arranged in a dorsal and a ventral tuft. The first bristles are close to the small median cephalic area, and consist of a dorsal and a ventral series, with a clavate or pear-shaped papilla (Pl. I. fig. 8) between them. Each has three strong curved bristles, the stoutest with a terminal curve or hook directed outward (Pl. II. fig. 5 and Pl. III. fig. 2) and two or three others (Pl. I. fig. 7) more or less hooked, but differently from the former, so that they present irregularity in this respect. The first five feet have the strongest bristles, those which follow have longer bristles without a hook at the tip, though slightly curved. The posterior bristles (Pl. II. fig. 6) are shorter and more slender.

The accompanying tube (Pl. II. figs. 7 & 8) is firm and hard, composed of brownish grains of sand, dotted all over with black particles. It is somewhat rough externally, but perfectly smooth internally, the mucoid lining presenting a finely granular aspect with broken fibres and reticulated structures like the tests of Diatoms and Radiolarians. The innumerable broken fibres may be connected with *Rhizosolenia*. Such may have readily collected on the mucoid surface during the feeding of the animal.

The strong simple bristles of this peculiar form recall those of the Oligochaets or the anterior bristles of *Sclerocheilus*—indeed, the Scalibragmidæ are characterised by the simplicity of their bristles and the reduction of the prostomium; but their outline differs much from that of *Fauveliopsis*, and they do not dwell in tubes. The bristles of this new species offer, both in their structure and distribution, a rare condition in the Polychaets. The strongly hooked anterior forms are evidently fitted for action in the soft ooze, the more slender types posteriorly probably being useful during the movements in the tube. Bereft of tentacles, as in *Myriochele*, another deep-sea form, both are tubicolar. The mouth-parts are akin to those of *Brada*, and the anterior segmentation is as distinct as that of the posterior region in *Trophonia glauca*, Mgrn., whilst the brittle refractive bristles approach those of this family (Chloræmidæ) in general structure, though not transversely striated. Whilst it bears certain

resemblances in the body and posterior bristles to *Sagitella opaca*, Ehlers *, one of the Typhloscolecidae, it differs wholly in the cephalic region and other respects. On the whole, *Fauveliopsis* appears to approach the Chloræmidæ.

Brada gravieri, sp. n.

Trawled by the 'Challenger' at Station 158, considerably south of Australia, lat. 50° 1' S., long. 123° 4' E., in *Globigerina* ooze, along with *Hyalinæcia benthaliana* and *Grubianella antarctica*, var. A small, somewhat elongate-ovoid annelid, 5 mm. long by 2 mm. at its widest part (Pl. I. fig. 4), the surface of which was uniformly covered with a whitish coating like down, but on examination this was found to be a calcareous powder with fragments, often rounded, of *Globigerina* on the papillæ of the surface, and which partly fell off when touched, leaving a white powder on the bottom of the vessel. The entire annelid, both dorsally and ventrally, was thus coated, with the exception of the extruded proboscis. The extension of the continuous and dense villous coating, ventrally as well as dorsally, distinguishes it from *B. villosa*, Rathke, from which it also differs in shape. The entire surface is coated with extremely long slender papillæ, far exceeding proportionally anything hitherto known in the group, and in this tangled web the calcareous ooze lodges, besides coating the papillæ with minute granules. So far as could be observed, they seemed to be simple filamentous papillæ without special differentiation at the top—that is, without a terminal dilatation. The muscles of the body-wall, both circular and longitudinal, are well developed.

As far as could be ascertained, the dorsal bristles consisted of a minute tuft (Pl. I. fig. 5) of translucent finely tapered bristles, the tips of which were apt to bend; these had the usual muscular fasciculi at their bases. Their minute size is in bold contrast with the ventral series, most of which had been broken. These consisted of proportionally large, straight, translucent bristles (Pl. I. fig. 6 and Pl. III. fig. 1, tip), which when entire must have projected considerably on each side of the annelid, and may have supported it in the soft *Globigerina*-ooze, if they did not aid in progression. They are thin-walled and in the preparation showed a ridge, apparently from collapse. Their diameter at the widest part exceeded that of the long slender papillæ. No trace of the transverse marks, so characteristic of the bristles of the

* Deut. Sud-Pol. Exped. 1901-3, p. 529, pl. xxxix. figs. 16 & 17.

Chlorœmidæ, was observed in either dorsal or ventral tufts, and their thin-walled condition is noteworthy.

Trophonia sarsi, sp. n.

Dredged by the 'Challenger' at Station 156, near the Antarctic Sea, 26th February, 1874, lat. $62^{\circ} 26'$, long. $95^{\circ} 44'$, at a depth of 1975 fathoms in Diatom ooze. This form is one (of not a few examples of the Polychæts) in this great Expedition which has apparently not come under the specific instructions for the preservation of marine Invertebrates, since only fragments of skin, a piece containing several pulpy segments, pieces of the intestinal canal, and the proboscis indicated the specimen. Thus it was put aside for greater leisure than could be afforded for the preparation of the 'Challenger,' vol. xii. It seems to have been an annelid of some size, probably 2 inches or more in length, and with a breadth at least of 3 to 4 mm., the skin at the feet bearing numerous long clavate papillæ with slender stems ending in bulbous tips, and the body appears to have been more or less flattened posteriorly. So far as can be ascertained from the pulpy fragments, it seems to be a Chlorœmid, but diverges in several particulars from any known form.

As only fragments of skin and loose bristles or separated groups of bristles were available, it was not easy to apportion these to their respective sites—indeed, a certain ambiguity still remains in this connection. It is not possible to say whether the longer anterior bristles formed a cage as in *Trophonia plumosa* and allied forms, as nothing in the preparation indicated such. What appeared to be dorsal tufts consisted of somewhat slender, smooth, translucent bristles (Pl. III. fig. 3), tapering from the base almost immediately to a long, fine, hair-like point. The inferior division of the foot contains no less than three kinds of bristles. The most conspicuous is a group of much elongated, slightly golden bristles (Pl. III. fig. 4 a) with thin walls like those of *Brada gravieri* which stretch far outward from the foot, and which are easily bent and broken like those of the species just mentioned. The base is broad and apparently flattened, and they taper almost from this distally and end in a delicately tapered point. Some isolated bristles of this kind were much larger and longer than the example sketched, but the region to which they belonged could not be ascertained. The largest, like those of *Brada gravieri*, were apt to collapse in Farrant's solution and present a keel. Some

were shorter, with broader bases and more rapidly tapered tips (Pl. III. fig. 4 *b*).

The second kind of bristles are long, straight, and more slender (Pl. III. figs. 5 & 6), more needle-like in shape, and minutely serrated throughout the distal half, the basal region being smooth and translucent, the tip finely tapered and devoid of spikes. The latter are apparently whorled, and thus slightly oblique lines cross the bristle. This marked differentiation of the tip is rare in the Polychæts, the serrations, as a rule, gradually becoming less and less and finally disappearing. Here the transition is abrupt. The third kind of bristles are remarkable in a Chlorœmid, for they are large, translucent, thin-walled bristles, quite visible to the naked eye, curved at the tip and ending in a blunt hook with a secondary process beneath, as in certain Polynoidæ, Sigalionidæ, and *Macrochæta*, whilst the convex outline is double (showing that the tissue is here thicker) and very minutely serrated (Pl. III. figs. 7 & 8). The double contour of the serrated or convex edge indicates a thicker wall. A developing tip or two generally occur in the tuft, the bifid tip and a short portion of the shaft being present.

The separated proboscis is a cup-shaped muscular organ, and like the gut was filled with whitish ooze crowded with tests of Diatoms, spicules of sponges, and a few Radiolarians.

*Melinna buskii**, sp. n.

A pulpy and fragmentary *Melinna* was dredged by the 'Challenger' at Station 157, on March 3rd, 1874, in 1950 fathoms, in the midst of the Diatom ooze, considerably south of Australia—a region, indeed, conspicuous for its novelties. Unfortunately, its condition was so unpromising that it was put aside during the pressure of the 'Challenger' work.

The anterior region in the softened example had lost its branchiæ, and only shreds of the tentacles remained. It is uncertain whether the free dorsal rim of the fourth segment had other than the smooth edge it now shows. The number of the bristle-tufts is probably seventeen, though only fourteen or fifteen could be seen, as the body was in two pieces and part absent. The bristles are powerful golden structures, tapering distally, with narrow wings and standing prominently on setigerous processes.

Posteriorly the body tapers a little and ends in an anus

* Named after the late distinguished zoologist, Prof. G. Busk.

with two long slender cirri. The sides have a series of somewhat slender lamellæ for the hooks.

The hooks (Pl. II. fig. 10) differ from any form described, the outline being triangular with a straight posterior border ending inferiorly in a process (probably for a ligament) and a gently curved base. The anterior edge has five teeth, which increase in size from above downward, the gulf below the last being rather small, and the prow has an oblique front edge giving it a somewhat truncated appearance. Their general shape agrees with that of *Melinna cristata*, though the straight posterior outline, the number of teeth, and the shape of the prow diverge.

The tube is soft (woolly in aspect), tears like soaked cotton, and is made up of a vast series of minute Diatoms, slender sponge-spicules, a few Radiolarians bound in a mass by the secretion of the annelid, not as usual in definite internal and external layers, but forming a cotton-like mass of a certain toughness.

A fragmentary Oligochæt, *Hemitubifex benedeni**, Beddard (*Clitellio ater*, Claparède), was procured between tide-marks at the East Rocks, St. Andrews, in 1863, the entire surface of which was densely covered with greenish papillæ, but only the posterior region was secured. Each segment has a slender tapering bristle and a stouter simple crotchet, hooked and tapered at the tip (Pl. I. fig. 9). In the preparation the posterior concavity of the hook is directed forward, and anteriorly the crotchets are less curved, as shown by comparing a posterior crotchet (Pl. I. fig. 10) with the foregoing (fig. 9). When magnified (350) the surface of the cuticle resembles shagreen from the dense coating of the greenish papillæ. The posterior region is tapered toward the tail, and this region has numerous thecate Infusoria of an elongate vase-shape attached by a pedicle. Such would indicate that the tail is more or less free, as in the case of *Tubifex rivulorum*. I am indebted to Dr. Beddard for identifying this form and aiding me with references.

Dalzell† describes *Lumbricus hirsutus* as covered with hairs, from the coast of Fife, with a pencil of bristles in each segment, but this differs in colour, the anterior region being whitish and the posterior dull red or umber.

* Monogr. Oligochæt. p. 261 ; see also Proc. Zool. Soc. 1888, p. 485.

† Pow. Creat. vol. ii. p. 140.

Gephyrean? *A.* In a tow-net at 600 fathoms, during the work of the 'Triton,' on the 20th August, 1882, a minute, badly preserved form occurred in the débris. Little more could be made out of the specimen than that it was a minute slender annelid in a pulpy condition, yet at one end it presented under the microscope two groups of remarkable bristles, unknown in the history of the Polychæts, so far as can be ascertained. These consisted of comparatively large curved bristles (Pl. III. fig. 9), one end terminating in a blunt point, the other gradually dilating into a broad blade with an oblique base, the dilated region which appears to be thin having a series of oblique striæ, which in some views simulate fibres. These bristles are evidently hollow, with comparatively thin walls, especially at the base, and the membranous central region may readily be thrown into striæ by the solution. The convex outline presents a double margin, as if the chitinous tissue were thicker there.

The structure of these bristles is peculiar, and it may be they belong to the *Gephyrea*, though the minute and elongated outline resembles that of an Oligochæte. The condition of the specimen, however, is most imperfect. Before mounting in Farrant's solution it was thought that somewhat triangular, diaphanous hooks appeared in the softened tissues, but none could be detected thereafter. One hooked bristle, however, was observed (Pl. III. fig. 10), with the same thin shaft as the larger bristles figured, but a peculiar separation or modification of the inner layer of the bristle appears to have taken place near the tip, the central axis remaining entire. Such a type of bristle has no connection with the large forms with the expanded bases. All are exceedingly diaphanous. These brief notes may be sufficient for the identification of the form by subsequent observers.

Another peculiar form, apparently Gephyrean, and which may be termed *Phascolosoma lankesteri**, was dredged in the 'Porcupine' Expedition of 1870, in 60–160 fathoms, east of Cape de Gatte. It inhabited a clear soft tube resembling that of *Placostegus*. It is a small form (Pl. II. fig. 11), barely half an inch in length, of a pale yellowish colour, nearly cylindrical in outline, but having a long process, widened at its extremity anteriorly, whilst posteriorly it is rounded and papillose. On each side of the base of the long

* In honour of my old and distinguished friend Sir E. Ray Lankester, K.C.B. The *Phascolosoma ohlini* of Théel (Swedish Antarct. Exped. 1911, p. 29) presents similar papillæ posteriorly, but differs in other respects.

anterior process is a tuft of translucent bristle-like fibres, probably caused by rupture. The free extremity of the elongated anterior process presents an irregular edge from low papillæ, but whether it represents an introvert can only be conjectured. At its base is an elongated and apparently tubular structure, which may have issued from the body at the bristle-like fibres. In certain views (Pl. III. fig. 11) the basal region of the long anterior process is asymmetrical, probably when seen laterally. No fold or break occurs in the outline as the process leaves the body, and its sides are perfectly smooth. The widest part is at the base, as shown in the figure; it then is nearly cylindrical for some distance, and again slightly widens as it approaches the bulbous end, which in the position occupied in the figure is not quite symmetrical. So far as observed, only longitudinal muscular fibres are present in the process, and the cuticle must be extremely thin as there is no sign of it laterally. In the centre of the process is a granular tube occupying more than half its diameter.

The body is invested by a tough cuticle, with papillæ here and there and the group already mentioned at the posterior end (Pl. II. fig. 12). The circular fibres beneath are fairly developed throughout and the longitudinal layer is powerful. Enclosed in the body-cavity were many ova of various sizes, the smallest presenting the appearance of naked granular cells with a large nucleus and nucleolus, the larger having a tough, apparently chitinous capsule. The bristle-like fibres of the anterior end seem to have been due to rupture and the spreading out of the stiff tapering muscular fibres.

2. *Recent Additions to the British Marine Polychæta* (continued).

In 1908* it was stated that no member of the Alciopidæ had yet been met with in British waters, but there was no reason why such should not be found, *e. g.*, "off the southern shores of England and the West Coast of Ireland." The skill and perseverance of those on board the Irish Fisheries' ship 'Helga,' indeed, shortly afterwards added no less than five species to the British Fauna from the surface of the deep water off the West Coast of Ireland. It was Greef who first in modern times brought the group into notice, and he was followed by Hering. Both divided the Alciopidæ into two main groups, the former using the head, feet, bristles, and proboscis as the leading features of distinction,

* 'Monograph,' vol. ii. part i. p. 112.

the latter the colour, the tentacles and cirri, the head, feet, and their appendages as the bases for classification. Apstein, again, forms his two main groups on the structure of the bristles, subdividing by aid of the structure of the feet into eight genera, viz.: *Alciopa*, *Asterope*, *Vanadis*, *Greefia*, *Callizonella*, *Corynocephalus*, *Rhynchonerella*, and *Callizona*. It is noteworthy that almost all were found either over or in the midst of very deep water, probably in the line of the Gulf Stream. The group is closely allied to the Phyllodocidæ, and some make it a subfamily of the latter.

The first of these is *Vanadis formosa*, Claparède, a comparatively large species measuring 30 cm. in length, with a breadth of 5 mm. and two hundred and twenty segments. Female with four seminal pouches. It was procured on the West Coast of Ireland in the mid-water trawl in deep water, though also in 5 fathoms (*Southern*). The second is *Greefia reynaudi*, Audouin & Edwards, also a widely distributed form in the great oceans. It occurred both in mid-water and at the surface over great depths. The third is *Callizona angelini*, Kinberg, procured in the tow-net near great depths. *Southern* identifies this form with *C. grubei*. The fourth is *Callizona setosa*, Greef, captured at the surface near a depth of 480 fathoms. The fifth is *Callizona nasula*, Greef, obtained in the mid-water trawl between 600 and 700 fathoms.

In the family of the Eunicidæ *Marphysa fallax*, Marion & Bobretzky, was found under a stone at Bananagh, Blacksod Bay (*Southern*). Elsewhere it occurs at Marseilles (*Marion & Bobretzky*); Dinard, France (*De St. Joseph*). Marion and Bobretzky observe that the compound bristles with the bifid tips differ from those of *M. sanguinea*, and that the dental apparatus also diverges from that of the latter species, in so far as six denticulations occur on the maxillæ. *Southern* notes four ventral cirri on the anal segment and three spines in the ventral division of the foot. *De St. Joseph* found his examples in the dredge, and with a coloration approaching that of *Lysidice ninetta*. They were small, viz., 15 mm. in length. Its bristles resemble those of *Marphysa belli*, but it differs in regard to the branchiæ and in the form of the head.

Armandia flagellifera, one of the Opheliidæ, was captured in a tow-net at night near the entrance to Ballynakill Harbour; dredged in 11 fathoms in mud, Galway Bay

(*Southern*). The *cephalic* region tapers to a slender point, which does not show a clavate tip. The extruded proboscis is furnished with thirteen slender papillæ (*Southern*). Nuchal organ conspicuous on each side in the front of the first bristle-bundle. The *body* is fully 12 mm. long, tapered at both ends, but nearly of uniform diameter throughout the rest of its extent. It is rounded dorsally, deeply grooved ventrally from the snout to the anal funnel. Setigerous segments thirty-three, each with three rings, and each ring biannulate (*Southern*). The dorsal cirri are filiform and fairly long. An eye-speck is situated behind each foot, from the fourth to the nineteenth, and each consists of small spheres of pigment or a single mass (*Southern*). In lateral view the body abruptly narrows to the anal funnel, which is a flattened tube with a dorsal opening posteriorly. The margin of the funnel is papillose posteriorly, *Southern* describing the opening as projecting in four lobes, each bearing a fusiform papilla. A long slender cirrus, nearly twice as long as the anal funnel, arises from the ventral base in front of the funnel.

The feet occupy the upper and outer border of the ridges made by the ventral longitudinal muscles. The setigerous lobe is rounded, and bears superiorly the long subulate cirrus in which at least one blood-vessel is present, then a tuft of simple capillary bristles; ventrally a similar tuft of bristles and a small, somewhat clavate, ventral cirrus (*Southern*).

In the Scalibregmidæ *Asclerocheilus intermedius*, De St. Joseph, was dredged by *Southern* in Blacksod Bay and other places on the West Coast of Ireland. It is a small species, measuring about 2 or 3 mm., the anterior end being distinguished by two rounded processes with a depression between. The body is somewhat fusiform in outline, slightly tapered anteriorly and abruptly so posteriorly. Body apparently has about twenty segments. So far as seen, no ventral cirrus is present and no eyes*. The ventral hooks of the second segment have a marked curve backward (sickle-like) at the tip, and terminate in sharp, not attenuate, points. The upper bristles of the second segment are capillary, with finely tapered, long points. The posterior bristles are more elongate. Apparently transverse rows of opaque glands occur posteriorly in each segment.

* The eyes are probably deep-seated, as in *S. minutus*. *Vide* the elaborate research by A. and L. Dehorne, Arch. Zool. Expér. t. liii. pp. 61-137, pls. iv.-vii. (1913).

Sphærodorum claparedii, Greef, and *S. minutum*, Webster & Benedict, examples of the Sphærodoridæ, come also from the West Coast of Ireland (*Southern*). The former appears to be so closely allied to *S. minutum* that hesitation is felt in separating them. The bristles of this and *S. minutum* differ very little, and the only other feature which was noticed was the more regular arrangement and size of the papillæ in *S. minutum*. *S. claparedii* may be a young form developing reproductive elements. The material at hand, for which I have to thank Mr. Southern, did not suffice to afford a satisfactory conclusion, and, therefore, his description was alone available.

In the family of the Paraonidæ, Cerruti, besides the *Aricidea jeffreysii*, M'Intosh, already described, the *Paraonis* (*Aricidea*?) *lyra* of Southern has to be added, from the surface tow-net in Galway and Dingle Bays. The specimens range from 12–20 mm. and from ninety to one hundred and five bristled segments. In this the head is somewhat bluntly conical, with a low rounded papilla bearing stiff cilia on the tip, and having yellowish pigment. Nuchal organs brownish, large and conspicuous, sloping obliquely backward and inward from the mid-lateral region. Body widest in the middle, tapering toward each end, 20 mm. long, and with ninety-five to one hundred and five segments. Three anterior segments have capillary bristles and small dorsal cirri, but the latter gradually increase in size and are long and slender in the posterior segments. Anal segment rounded, with three slender subulate cirri—two dorso-lateral and one median ventral; a pair of cirri fixed to the anterior border, but may represent the last pair of dorsal cirri. Anteriorly the dorsal and ventral bristles are almost equal in length, and continue so to the posterior end in the immature, but in the mature male the ventral increase in length about the fifteenth to twentieth segment, whilst the dorsal become shorter. The bristles of the male are more prominent than in the female, exceeding the width of body, especially posteriorly. The dorsal cirri are placed behind the fascicle of bristles. Capillary bristles slender, devoid of wings, and the longer ventral bristles in the male are striated longitudinally. On the lower side of the front row of the dorsal tuft are one to three short bristles with lyrate tips, one end being longer than the other, and with a row of spines on its inner margin; this type commences in the fourth segment and continues to the tail. In the fourth foot the dorsal bristles are slightly longer than the ventral; in the fiftieth foot the ventral are thrice as long.

In the male the upper ventral bristles are longer and thicker, as well as longitudinally striated—a condition not present in the female. In the eightieth foot the differences between the dorsal and ventral bristles is less pronounced. Red ova appear in the female in the twentieth segment, usually four in each (*Southern*).

In the family of the Chætopteridæ it was mentioned that tubes of *Spiochætopterus typicus*, Sars, had been procured in St. Andrews Bay, and since in Loch Linnhe.

Each segment posteriorly in the sole imperfect example secured (Loch Linnhe) has dorsally a pair of setigerous processes bearing a group of about four bristles, with long shafts and flattened spear-like tips. Two flaps or lamellæ occur laterally below the foregoing, and bear very transparent hooks, the outline of which is somewhat triangular, with a round apex, a thickened anterior margin, which is probably minutely serrated, though in the preparations such was not seen, and ending inferiorly in a short main fang. The transparence of these organs renders it difficult to make out their outlines, and they escaped Sars.

Phyllochætopterus anglicus, Potts, was discovered by Mr. Potts at Plymouth in 1913, and though it presents close relationships with forms he had met with on the Pacific coast of Canada, and appears to be intermediate between *P. prolifera* and *P. socialis*, Clap., yet he considers that it merits specific distinction, not only because the tubes run parallel, and are not, as a rule, adherent, though connected, but for the morphological characters of the animal. Further investigations, however, in view of the cosmopolitan distribution of many similar forms, and the necessity of allowing a wide margin for variations, may tend to minimise the present differences shown in the careful and well-illustrated description of Potts.

The British species appears to live in water of some depth south of the Eddystone, and had been captured by trawlers.

In connection with the structure of the peristomial appendages, Potts considers that, since the second pair contain, as Claparède pointed out in *P. socialis*, a few slender capillary bristles, they may represent the modified dorsal division of the foot of the segment.

While giving a full description of the bristles, Potts does not give details of the minute hooks, which escaped both Sars and Grube. They are very minute translucent structures, somewhat conical in outline, with a long curved

anterior margin most minutely serrated, the serrations readily escaping detection even under high powers. The posterior border is concave, and the base is convex in front, concave posteriorly (O.G. curve).

Potts considers that the conical peristomium is primitive, and that the formation of the peristomial funnel is a direct adaptation to microphagous habits. The prostomium is a definite structure, but varies in the several species, being better developed in some than in others. It is better developed in *P. anglicus* than in *P. elioti*, Crossland, from Zanzibar.

In the Spionidæ, Southern found *Pygospio seticornis* (Ørsted) on the West Coast of Ireland, and observed that it differs from what he had described in the 'Proceedings of the Royal Irish Academy' as *Spio seticornis*, Fabricius, from Clare Island. In *Pygospio seticornis* the head is bluntly bifid, though when seen laterally it is conical. The branchiæ commence on the first or second segment, and are large about the twelfth or thirteenth. The tail ends in two larger and two small cirri, somewhat like *Pygospio elegans*; though in one example the four caudal cirri were about equal. What was sent as a young specimen presented only two ovate lobes at the tail. The anterior bristles are stouter and more boldly curved, with a scoop-shaped lamella in front of them, whilst those at the tail are as usual in the group and nearly straight. There are five or six tufts of these.

The hooded hooks commence on the seventh bristled segment, and are more boldly curved about the anterior third. There can be little doubt about Ørsted's form being a *Pygospio*. It is not the *Nereis seticornis* of O. Fabricius.

Ørsted describes the species as having two series of parallel eyes, the tentacles not alternate; the segments devoid of black pigment; ligulate branchiæ in the middle of the body, but diminishing and disappearing at either extremity.

This form closely resembles *Pygospio elegans*, Claparède, with the exception of the arrangement of the branchiæ, and has been a puzzle to many students of the group. It is in need of careful re-examination. Leschke gives an account of two stages of what he considers to be the pelagic larvæ, which occur likewise in British waters, though their identity has not been satisfactorily tested.

Spio martinensis, Mesnil, comes from Dublin, Clew, and Blacksod Bays, Ireland (*Southern*). This is a much larger

form than *Spio gattyi*, and the aspect differs. The head is characteristically trilobed, a rounded median lobe projecting in front and supported by two lateral lobes a little further back. Two eyes occur toward the posterior border of the head. In lateral view the snout is bluntly conical, the central or prostomial region being nail-like and the mouth opening a little behind the tip. A short median tentacle occurs on the prostomium and a brief ridge appears to be continued a short distance backward to end in a small process or tentacle. The body is slightly narrowed anteriorly, is more distinctly diminished posteriorly, and ends in four foliaceous lobes or cirri. It is flattened both dorsally and ventrally, the upper surface carrying the branchiæ and the ventral surface being marked anteriorly by lines of dark pigment on the terminal region behind the mouth, and with a dark line in the middle of each segment-junction for ten or twelve segments following.

The first segment bears a broad sabre-shaped branchia, which overlaps its fellow of the opposite side behind the snout. It has a single lobe, the longer margin being inferior, and a tuft of finely tapered bristles which show a narrow margin distally on each side. Above these is a shorter tuft, slightly differing in direction. The second foot has a similar ventral lobe, a tuft of curved bristles, and, in addition, a superior lobe confluent with the branchia and carrying a tuft of longer bristles, finely tapered, but less curved distally. At the tenth foot the ventral lamella is elongated vertically with its upper margin deepest, and separated by a narrow cleft from the dorsal, which fuses with the edge of the branchiæ—the whole forming a broad flat blade. The bristles have the same structure. At the twentieth foot the vertical elongation of the ventral lobe is marked, and the lower half bears a row of hooks, which have a bold curve at the junction of the shaft with the neck, then slightly diminishes upward to the main fang, which makes more than a right angle with the neck, is long and sharp, with a spike above it, and has a wing on each side. The upper dorsal bristles are longer and more slender. At the fortieth foot the branchia is shorter and broader, and the upper group of the bristles much elongated and very finely tapered. The ventral hooks are similar.

In 1896 Mesnil established the genus *Nerinides* for De St. Joseph's *Nerine longirostris*, in which the prostomium was without frontal processes. The branchiæ extended from the second setigerous segment, and these

were about the length of the dorsal lamellæ. There were no hooked bristles, and the ventral division of the foot has no hollow. An anal sucker. The first species is *Nerinides longirostris*, De Quatrefages, from Blacksod Bay (*Southern*).

The *head* is acutely pointed, with a median ridge, which runs backward to the third segment, on which four eyes in a square are placed, and the sides have a flattened process (peristomium), from which project a pair of short tentacles of a golden-yellow colour, and these when separated retain vitality for three days (*De St. Joseph*). Beneath them is a ciliated groove with pigment-granules, and possibly with urticating elements (*De St. Joseph*). The tentacles, as in allied forms, aid in procuring nourishment. *Body* 10 cm. long and 8 mm. broad, slightly tapered anteriorly, and more so posteriorly, where it ends in a dorsal anus with a multilobed ciliated border not surrounded by cirri. The colour is rose-red anteriorly (probably from the blood-vessels), but from the fortieth segment, or thereabout, the posterior region is dull green, almost blackish, but near the vent the intestine is yellowish, and is usually filled with *Rissoa parva*. The first segment carries a branchia, and has a dorsal and a ventral division with bristles. There are two lamellæ, the posterior larger than in *N. foliosa* and bordering the branchia. Behind the anterior lamella is a flattened disc with a tuft of bristles similar to the inferior lamella, but longer. From the thirty-third to the forty-fifth segment, according to the size of the individual, the inferior division bears two or three bifid and hooded hooks, which by-and-by increase in number to about twenty, and at the ventral border a few wingless capillary bristles. Simultaneously, the posterior lamella forms a margin only to the first part of the branchia, which also is smaller. The feebly winged bristles persist to the posterior end in the dorsal division, but without accompanying hooks. In the last twelve or thirteen segments the branchiæ progressively diminish and disappear.

Mesnil and Caullery* (1917) describe this species as dimorphic, some eggs developing to typical Spionid larvæ, whilst others in the spawn-mass develop directly without a pelagic stage. Moreover, in the latter case cannibalism occurs, the authors assigning the title adelphophagy to the condition (the pœcilogony of Giard). De St. Joseph met with *Trichodina pediculus* as a parasite on the branchiæ; whilst in the interior of the branchiæ and the tentacles he found

* Compt. Rend. clxv. p. 284.

encysted Distomes, which might have been introduced by the *Rissoæ*.

The second species is *Nerinides tridentata*, Southern*, from Blacksod Bay in Laminarian roots. The *snout* is pointed, with a median ridge which in lateral view forms two divisions—an anterior less elevated and a posterior terminating in the more or less adnate tentacle. In the line between the two divisions are the four black eyes arranged in a transverse row. The mouth opens inferiorly, and the extruded proboscis is bell-shaped and smooth. The tentacles were absent in the example kindly sent by Mr. Southern, but he describes them as "short, thick, and firmly adherent, of a deep chocolate colour."

The *body* is nearly an inch in length (16–20 mm.) in life, tapered a little in front and more distinctly diminished posteriorly, where it terminates in two small rounded lobes, a slight dorsal process indicating the upper edge of the anus. Segments 61–70 short anteriorly, wider in the middle region. Dorsal surface flattened, ventral rounded.

The first foot has a small conical papilla or cirrus, and a single (ventral) tuft of translucent bristles with a well-marked curve at the commencement of the tip. If wings are present they are very narrow. The second part bears dorsally a small branchia curved inward, the dorsal lamella being fused to it and ending inferiorly in a truncate edge. A tuft of finely tapered translucent bristles spreads like a fan upward and outward. The upper bristles of the tuft are longer and more delicately tapered, and the wings in these are less distinct than in the shorter and thicker forms at the lower edge. The inferior division has a bluntly rounded lamella and a shorter tuft of bristles with traces of wings. At the tenth foot the branchia is larger, forming a broad, flat, curved process, the soldered lamella of the superior lobe ending inferiorly in an edge which projects less than the upper margin of the ventral lamella. The dorsal tuft of bristles has the same structure as in the second, only they are in two rows, are longer and stronger, and the tips less elongated. The lamella of the inferior division has increased in depth, and the bristles are proportionally longer and still stouter than the dorsal. Both tufts have a distal curve. Southern describes a group of three slender striated setæ on the lower margin of the ventral bundle.

* Proc. R. Irish Acad. vol. xxxi. No. 47, p. 98, pl. x. fig. 23 A–J.

Hooks appear in the ventral divisions of fifteenth to sixteenth foot. At the twentieth foot the branchia retains a similar shape and is still large, with the dorsal lamella on its outer edge. The bristles are similar to those in front. Ventrally the lamella has much increased in depth, and is separated only by a short gap from the dorsal, where its breadth is greatest, for it diminishes ventrally. From its lower edge fully half its border is occupied by hooks, which are closely arranged inferiorly, but have more space superiorly. The shaft of the hook dilates from the base upward to the bold forward curvature, when it slightly diminishes to the neck, from which the proportionally large main fang comes off at a little more than a right angle. A single spike (in lateral view) occurs on the crown. Distinct wings guard the tip of the hook, which is thus in reality hooded. The lamellæ of the feet are most prominent in the posterior part of the body, and thus differ from those of *N. longirostris*, and the latter lives in clean sand, whereas *N. tridentata* frequents Laminarian roots (*Southern*).

In the 'Annals and Magazine of Natural History,' ser. 8, vol. iii., February 1909*, a form from the 'Porcupine' Expedition of 1869 was alluded to under the title of *Scolecolepis* (I). This has now been definitely termed *S. lamellata*, with the following characters:—

Head with an even transverse margin in front, a short blunt tentacle at each angle, and from the centre a short elevated region proceeds backwards to end in a small process which is pointed posteriorly like an adherent tentacle. Minute eyes seem to be present on each side of the latter, but the condition of the specimen renders accurate determination uncertain. The whole region is short, and the proboscis is thrust out as a short cylinder with a crenate margin. Body fragmentary, flattened, slightly and abruptly tapered anteriorly, and with a median band ventrally. The segments are narrow and numerous. The first foot carries a subulate branchia and a large lanceolate lamella projecting freely upward nearly as far as the branchia. The latter remains subulate at the fiftieth foot. Dorsal bristles of the first foot slender, long, and finely tapered, and the ventral are also long and slender. Behind the tenth foot the bristles are similar and of a dull golden colour. The ventral bristles form two groups, viz., upper finely tapered forms and a lower series of shorter broader bristles overlapping the former,

* P. 176.

and with acute tips. At the fiftieth foot a notch separates the two divisions, and the modified ventral bristles have a sharp and slightly hooked point minutely dotted under a high power.

This is a fragmentary form, yet with such definite characters as to render its identification easy.

The first foot carries a subulate branchia and a large lanceolate lamella. The ventral division also has a lanceolate process, and the bristles in both are long and slender. From the shape of the body the lamellæ and bristles occupy the dorso-lateral edge, so that the branchiæ, which readily fall off, pass transversely inward over the flattened dorsum. At the tenth foot the ventral lamella forms a broad, almost semicircular flap, with a tendency to a peak inferiorly. The ventral series of shorter broader bristles overlap the finely tapered forms stretching outward along the lamella.

The branchiæ remain subulate at the twenty-fifth foot, and stretch beyond the elongated upper lamella, which is acutely lanceolate superiorly, its outer edge being comparatively even till it curves inward inferiorly. The ventral lamella forms a blunt flap with the bristles in the groups just mentioned. At the fiftieth foot the branchia is still rather long and subulate, and the upper lamella is prominent and rounded inferiorly, whilst superiorly it is acutely lanceolate. The upper bristles of the dorsal series are long, slender, and finely tapered. A notch separates the two divisions of the foot. The ventral lamella is also prominent and rounded, generally with a short peak. The modified bristles ventrally show a sharp and slightly hooked point, minutely dotted under a high power. No wings are visible in either dorsal or ventral bristles.

A new British species is *Aonides paucibranchiata*, Southern*, from Clew Bay and Berehaven. The snout is acute, though less abruptly so than in *A. oxycephala*, and it is prolonged backward to end in a peak. Four eyes occur posteriorly, the anterior pair having a larger space between them. The body, though much smaller, has a similar form to that of *A. oxycephala*, and it bears about ten gills anteriorly, the branchial region being thus different from that of the common form, in which the gills appear to be closer in the preparations, though that may be caused by the methods adopted in preservation. In the seventy-eighth foot the dorsal division contains four hooks and six capillary setæ.

* Proc. R. I. Acad. vol. xxxi. No. 47, p. 100, pl. xi. fig. 24 A-E.

The ventral division has seven hooks and four capillary bristles, the two central being longer and stouter than the others. The lamellæ have long, finger-shaped, amber-coloured glands.

The tail of *A. oxycephala* in the examples from Herm is small, and has dorsally two short conical lobes, whilst beneath are about eight smaller conical cirri, whereas in this species there are but two pairs of anal cirri.

Besides the additional Spionids mentioned in the 'Annals' for January 1915, another form, viz., *Magelona rosea*, Moore, has been dredged by Mr. Southern in Killary Harbour in mud. In this the prostomium and peristomium are coalesced to form the broad ovoid head (in spirit), with dorsal cephalic ridges tapering to acute points, which diverge anteriorly. Peristomium with prominent lateral lobes; tentacular cirri arising laterally with papillæ, which increase in length distally. Proboscis soft, bulbous, with parallel striæ. Body slender, depressed, tapering and subquadrate anteriorly, 40 mm. long; segments about ninety-five. Ninth bristled segment with tapering simple bristles*. Pygidium small, oblique, with anus dorsal, covered by a broad flat papilla, and with posteriorly a pair of small slender cirri. Colour translucent white, intestine buff or greenish brown, pharynx salmon-pink. In sand at and below water. Nearly ripe in August.

The larvæ have been described by Fewkes as *Prionospio tenuis*, from Newport, and by Andrews from Beaufort, N.C., and Wood's Hole.

Under the family of the Cirratulidæ, *Cirratulus chiajii*, M'Intosh, has been subsequently described as *Cirratulus norvegicus*, De Quatrefages, but Della Chiaje had long before termed it *Lumbricus filigerus* and *Cirratulus filigerus*, so that if priority held such would be its title. It is perhaps doing no injustice to De Quatrefages or other author by giving it the title *C. chiajii* after its early investigator.

A form termed *Cirratulus norvegicus* in the 'Annals' for February 1911 †, has since that date been named *Cirratulus mcintoshii* by Southern ‡, who found it in Inishlyre, Killary, and Bofin harbours. It is interesting to find this Norwegian species in British waters.

* Unfortunately, the specimen sent by Mr. Southern had no ninth segment.

† Ann. & Mag. Nat. Hist. ser. 8, vol. vii. p. 171.

‡ Proc. R. I. Acad. vol. xxxi. No. 47, p. 110.

Macrochæta clavicornis, Sars, was procured between tide-marks in Blacksod Bay, and dredged elsewhere on the West Coast of Ireland (*Southern*). The head is distinctly defined, with a median process to the blunt snout, and four large eyes arranged nearly transversely, the larger being external. Two clavate palpi arise from the peristomial segment; four pairs of somewhat clavate cirri from the next four segments. The body is from 0.75 to 1 cm., somewhat spindle-shaped in spirit, and densely covered with papillæ. Tufts of long translucent bristles with minute spines occur dorsally, whilst ventrally are peculiar, flattened, large, transparent, and articulated hooks and bifid tips. Its wide distribution is shown by its occurrence in Norway and Madeira. In general aspect, at first sight, this form resembles a Chloræmid, and it has a densely papillose skin and long, slightly spinose bristles. The papillæ agree in minute structure with those of the Chloræmids, and mud and sand occur in the interstices. The pigmented anterior region ends bluntly, with a median process, somewhat like the central apparatus of *Stylarioides arenosa*. The four eyes, arranged nearly transversely, are very distinct. The example, kindly sent by Mr. Southern, is mature, since the posterior region had many large ova. The alimentary canal harboured *Opalina* with two vacuoles.

Marion and Bobretzky* (1875) describe *Heterocirrus frontifilis*, Grube, from Marseilles, which, in many respects, agrees with *Macrochæta*.

In the family of the Halelminthidæ is *Notomastus rubicundus*, Keferstein, from fine clean sand, Plymouth (*Allen*). The cephalic region is conical, with four larger eye-specks and two groups of smaller eyes in front, a lobulated nuchal organ on each side. Body 10 cm. long and 2 cm. broad, vermiform, slightly enlarged anteriorly about the sixth segment, tapered posteriorly, and ending in a button-shaped tail, all with neural parapodia and dorsal parapodial gills (*Eisig*). Genital opening at the fifth pair, and two in the sixth. Thorax reddish, abdomen brownish or yellowish green, or bluish green anteriorly. Bristles simple, winged, tapering; eleven pairs. Abdominal hooks with four teeth in lateral view, from the thirteenth segment backward. Mature from December till May.

Keferstein, who discovered this species at St. Vaast-la

* Ann. Sc. Nat. 6^e sér. t. ii. p. 64, pl. viii. fig. 18, and pl. ix. fig. 18.

Hougue, gives a detailed description of its structure. The body measures 250 mm., and is divided into an anterior and a posterior region, the latter commencing at the twelfth bristled segment. The hook-rows are short dorsally, long ventrally in the posterior region. There are two pairs of cephalic ganglia, and the great nerve-cords have neural canals. The alimentary canal has a papillose proboscis, œsophagus, oval stomach, and a gut which terminates on the last segment, the anus having a short ventral lobe. The segmental organs occur in every segment, and probably open between the dorsal and ventral feet, though he found another pore on each side behind it. He did not notice the sexual apertures with the hooks, his example being a female. Externally was a parasitic *Loxosoma*.

Heteromastus filiformis, Claparède, again occurred in sand west of Salthouse Lake, Plymouth (*Allen*). The cephalic region agrees with that of the type (*Claparède*), and so with the proboscis, which has clavate papillæ. The body reaches the length of 6 cm., and there are over one hundred segments. The digestive and the perivisceral systems agree with *Capitella*. The anterior segments are short and broad, the posterior long and narrow. The anterior bristles are winged, the posterior with the characteristic hooks dorsally and ventrally.

All that is known of the coloration of *Cæsicirrus neglectus*, Arwidsson (of the family Maldanidæ), a species by no means uncommon, is the remark by Cunningham and Ramage* in their "Polychæt Fauna of the Firth of Forth," that in their "*Axiothea catenata* the colour is pinkish, pale towards the anterior end, with broad bands surrounding the body at intervals." The region whence these authors drew their supply has since altered its character, probably from pollution, so that a careful search was unsuccessful. It lives gregariously in tubes of sand-particles sunk in the sand. In examples from Wales† the anterior end of the Annelid is somewhat pale, though the median vessel causes a streak along the dorsum, the blood at the same time tinting the cephalic plate. In front of the third bristle-tuft the region has a smooth and glistening cuticular coat, which is iridescent, and at the segment-junction in front of the

* Trans. Roy. Soc. Edin. vol. xxxiii. p. 679 etc. (1888).

† I am indebted to Mr. Arnold Watson for living examples.

tuft (third) a faint reddish belt, apparently from a blood-vessel, occurs. The next segment-junction has a belt of red on each side of it, apparently of reddish pigment, the specks of which pass a short way on the following segment (fifth bristled), which has its bristle-tuft about the middle. Then there is a slight constriction of the body-wall, at which a broad red belt occurs, a bristle-tuft (sixth) being placed just in front of another red belt which passes all round the body. The next bristle-tuft (seventh) is in front of a furrow marking another segment, the anterior third of which has the broadest band of red yet met with in front. This is followed by a pale region ending at the next bristle-tuft (eighth), and concluding the specially differentiated region anteriorly, the seventh and eighth tufts being separated by a long interval.

The next segment and half of the following are coloured except at the margins by a longitudinal belt of red, apparently along the intestine, probably from an intestinal sinus, and thereafter the reddish hue is due to the longitudinal and circular vessels, especially those of the gut, the tip of the tail and its cirri being pale. In these examples the majority of the short anal cirri had processes at the tip, as Arwidsson shows in his figure *, and describes as "short, finger-like lobes," some being only bifid, others trifid or quadrifid, whilst each of the processes in a bifid form may have two or more minor papillæ at the tip. Occasionally the cirrus ends in a bluntly conical apex with a minute papilla at each side near the apex. The gut itself is yellowish or pale orange. The proboscis, which is constantly protruded by the animal, when removed from its tube shows a tinge of red from a blood-vessel along the middle, and its distal region appears to be smooth.

In *Petaloproctus terricola*, De Quatrefages, another addition, the head is fused with the buccal segment and without a marginal ridge. Body about 18 cm. long, 2-3 mm. broad, and of twenty-four segments, twenty-two of which are setigerous. First segment distinctly separated from the buccal. First three segments have no ventral division. In the others there are two ventral tori, each with about forty crotchets. Dorsal bristles strong, yellow, and winged, and others colourless, not winged, spinous. Behind the sixth or seventh segment are capillary bristles, sinuous and long (overlooked by Claparède and Grube) with minute spines. In seven or eight posterior segments in front of the anal,

* Proceed. Roy. Irish Acad. vol. xxix. no. 6, p. 219.

between the dorsal and ventral divisions, is a fleshy process, adherent dorsally and pointing ventrally, separated by the two setigerous processes at the tori, and resembling those of *Maldane cristagalli*, Claparède. Anal segment achæitous; anus near the ventral edge, whereas in *Maldane* it opens towards the dorsum. Two or three furrows are prolonged from the ventral to the dorsal surface—which De St. Joseph regarded as rudiments of segments.

The *cephalic region* of a specimen sent by Mr. Southern from Blacksod Bay resembles that in *Nicomache*, though somewhat longer and more projecting ventrally. A keel arises a little above the mouth and runs vertically to the dorsal edge. The surface is speckled with pigment as in *Nicomache maculata*. Each of the three following segments bears a spine below the dorsal tuft of bristles, four of these tufts characterising the anterior region. Three long segments follow those with the spines, the third the longest, with two hook-rows, viz., an anterior and a posterior. This segment is of softer consistence than those in front. The anal plate has an expanded smooth margin, which projects freely all round, except dorsally, and has the anus on its posterior surface a little within the ventral broad rim, and it shows a radiate arrangement of its margin. Apparently two narrow rings next it are achæitous, that in front of these has a row of hooks and a tuft of bristles of considerable length. The dorsal surface of the third, fourth, fifth, and sixth segments in front of the anal plate present a median conical free flap pointing backward, the third having a pedicled process like a *Loxosoma* attached to it. These eminences increase in prominence from the sixth backward.

The bristles of the first region (four segments) are pale golden and brittle, having a straight shaft and a curved, finely-tapered tip with narrow wings. The spine in these segments is stout, golden, and pointed, the tip being slightly hooked.

The bristles of the middle region are pale golden and of two kinds, a stronger series of about five with stout shafts and tapering winged tips, and a more numerous group of slender capillary bristles which extend considerably beyond the former. The tips of the stout series in front of the tail are somewhat longer, but the capillary bristles are shorter, for they do not reach the extremities of the stout forms.

The hooks in the smaller example are stout and rather short, with a base dilating up to the shoulder, which has a hump posteriorly; then the neck is narrowed where it is

grasped by the cuticle, again dilates toward the main fang, a distinct bulge occurring below the origin of the gular bristles, where it is again narrowed below the main fang—which is curved at less than a right angle to the neck, and has four teeth above it. The neck and shaft are boldly striated. In the larger specimen the main fang leaves the neck nearly at a right angle, and above it are four prominent teeth. The gular bristle appears to be single, and sometimes curves beyond the main fang and over it.

This species was first obtained by De Quatrefages, whose description is fairly complete.

Two examples of *Heteroclymene robusta*, Arwidsson, come from Plymouth, and I have to thank Dr. Allen for the opportunity of examining them. Besides the lateral notches in the cephalic border, the rim behind has crenations, the median deepest posteriorly. The segments in the middle of the body can be much elongated, one being about an inch and three-quarters; the bristles and rows of hooks project outward on enlargements at the segment-junctions. The anal disc is an exquisite structure, as finely radiate as the operculum of *Serpula vermicularis*, only the anus is in the centre of a cone, over which the radii pass downward and then upward to the minutely crenate edge. The mid-ventral cirrus is somewhat flattened, as well as longest, and there are three or four shorter cirri on each side, somewhat irregularly arranged, a portion of the dorsal edge being bare.

The tube is as thick as that of *Lanice conchilega*, but firmer, retaining its cylindrical form until somewhat severe pressure is applied. It is composed of shell-fragments, minute shells, spines of Echinoderms, smoothly filled in with fine grains of sand and secretion.

In *Micromaldane ornithochæta*, Mesnil, from Clew Bay (Southern), a minute form, measuring 4 mm. long, the cephalic region, when viewed from above, is somewhat clavate and symmetrically rounded (elliptical). In lateral view it is irregularly clavate, the dorsal outline being smoothly curved and ending ventrally in the projecting snout, which slopes backward and slightly upward to the mouth.

The body is comparatively short, consisting of nineteen segments, seventeen of which are bristled. It is enlarged anteriorly, is cylindrical in the middle, and tapers posteriorly

to the truncated posterior end. The middle region consists of two long segments. The caudal part is crenated from the various rings, and the achæitous last segment is truncated distally with a small papilla—probably representing the anus. Glands are distributed extensively in the body-wall.

The bristles have the shape of a pointed assegai or sharp spear, the cylindrical shaft being stout, and the tip a flattened translucent spear-point.

The hooks are minute, apparently few in number, and have a rudimentary shaft, which enlarges into a bulbous shoulder, above which the neck is rather thick. The main fang is curved downward at considerably less than a right angle to the neck, and the crown of the hook is high, with five or six teeth. In general shape these hooks somewhat resemble those of *Lumbriclymene minor*, Arwidsson. No gular bristles are present. Mesnil thought the hook resembled an avicular Sabellarian bristle, and that it showed the evolution of a Maldanid toward that group. Such views, however, are conjectural. He found one example containing greyish ova.

EXPLANATION OF THE PLATES.

PLATE I.

- Fig. 1. Serrated or spiked bristle of *Eumenia caulleryi*, sp. n. $\times 350$.
 Fig. 2. Smooth dorsal bristle. $\times 350$.
 Fig. 3. Branchiæ of one side. $\times 350$.
 Fig. 4. *Brada gravieri*, sp. n. Enlarged under a lens.
 Fig. 5. Dorsal tuft of bristles. $\times 350$.
 Fig. 6. Great ventral bristles, the base being at the top of the Plate. $\times 350$.
 Fig. 7. Anterior bristle of *Fauveliopsis challengeræ*, sp. n. $\times 350$.
 Fig. 8. Pear-shaped papilla of the foot. $\times 350$.
 Fig. 9. Anterior bristles of greenish papillose Oligochæt, *Hemitubifex benedeni*, Beddard, from St. Andrews. $\times 350$.
 Fig. 10. Posterior hook. $\times 350$.

PLATE II.

- Fig. 1. *Fauveliopsis challengeræ*, sp. n., from the dorsum. Enlarged.
 Fig. 2. Ventral aspect of the same. Enlarged.
 Fig. 3. Lateral view, showing the lozenge-shaped areas between the bristle-tufts. Enlarged.
 Fig. 4. The anterior region more highly magnified.
 Fig. 5. Anterior bristles projecting from the foot. $\times 350$.
 Fig. 6. Posterior tuft of bristles. $\times 350$.
 Fig. 7. Tube of the foregoing. Twice natural size.
 Fig. 8. End of tube, more highly magnified.
 Fig. 9. Lateral view of the anterior segments of *Eumenia hystericis*, sp. n. Enlarged under a lens.
 Fig. 10. Hook of *Melinna buskii*, sp. n. $\times 700$ diam.
 Fig. 11. Outline of *Phascolosoma lankesteri*. Magnified under a lens.
 Fig. 12. Posterior end of the latter with papillæ. $\times 90$.

PLATE III.

- Fig.* 1. Tip of large bristle of *Brada gravieri*, sp. n. $\times 350$.
Fig. 2. Hooked bristle of *Fauveliopsis challengerice*, sp. n. $\times 350$.
Fig. 3. Dorsal bristle of *Trophonia sarsi*, sp. n. $\times 90$.
Fig. 4. Simple long ventral bristles (*a* and *b*). $\times 90$.
Fig. 5. Long spinous ventral bristle. $\times 90$.
Fig. 6. Tip of the foregoing. $\times 350$.
Fig. 7. Large and long serrated ventral bristle of the third kind with bifid tip. $\times 90$.
Fig. 8. Serrated tip of the same. $\times 350$.
Fig. 9. Curved bristle, with broad base, of Gephyrean A. $\times 350$.
Fig. 10. Tip of hooked form. $\times 350$.
Fig. 11. Outline of the base of the anterior process of *Phascolosoma lankesteri*, showing obliquity. $\times 90$.

II.—*New Species of Carabidæ from South Africa.*

By C. N. BARKER, F.E.S.

THE types of all the species described below are contained in the collection of the Durban Museum, and paratypes have been forwarded for acceptance to the British Museum (Natural History) of all except the following, which are uniques, viz.:—*Chlænium incandescens*, *Chlænium marleyi*, *Callistomimus obscurus*, *Platynus suturalis*, and *Callistomimus pulchellus*. The last-named species is already represented in the National Collection by one or more examples, *teste* Mr. H. E. Andrewes, to whom I am much indebted for kind assistance in comparing my types with those of allied species.

Tribe LEBIINI.

Lebia durbanensis, sp. n.

Length 7–8 mm.; width 3–4 mm.

Head dark to piceous red, mouth-parts and antennæ rufescent. Prothorax centrally deep to piceous brown, shading off marginally to testaceous. Legs and beneath testaceous yellow, the latter a shade darker than the former, with the sides and apical segments of abdomen and the pygidium piceous. Elytra pale testaceous yellow, patterned with black as follows: a sutural basal subquadrate patch covering intervals 1–4, below obliquely contracting inwards to the first, thence in three successive steps of one interval each widening to a little below middle, where it emits a narrow spur connecting usually, but not always, with the inward widening of a submarginal band extending from



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